Date: 25.06.2020

Sh. Ashu Garg
Registrar General
National Green Tribunal
New Delhi

Subject: Submissions by NITI Aayog in pursuance of the Order of the Hon'ble National Green Tribunal dated 18.10.2019 in the Original Application No. 606/2018 (Main) '*Compliance Municipal Solid Waste Management Rules, 2016 and other environmental issues*' - Regarding

Respected Sir,

In pursuance of the chamber meeting held at the National Green Tribunal on the subject of enforcement of orders of the Hon'ble Tribunal relating to solid waste and sewage management dealt with by way of earlier orders in above matter and in O.A. No. 673/2018 and O.A. No. 06/2012 and other connected matters, the Hon'ble Tribunal passed an order dated 18.10.2019 in O.A. No. 606/2018 (Main) on '*Compliance of Municipal Solid Waste Management Rules, 2016 and other environmental issues*' (enclosed herewith). The Order stated in paragraph 8 that - "*There is need to standardize necessary technologies with cost breakups for operation and maintenance, including procurement. Besides this, the service providers need to be identified and empanelled. This exercise may also require the concerned authority to explore business models*". It had also stated in paragraph 2 that - "*development of business models for privatisation of (a) sewage collection, treatment and disposal, including utilisation of treated water and sludge; (b) remediation of legacy waste dumpsites; and (c) other such activities relating to collection, treatment and processing and utilisation of wastes and provision of services such as setting up of rainwater harvesting system may have to be considered*".

For the above-mentioned purpose, Hon'ble NGT constituted a Committee under the Chairmanship of the nominee of Vice-Chairman, NITI Aayog, including Secretary, Ministry of Housing & Urban Affairs (MoHUA), Secretary, Ministry of Jal Shakti (MoJS), Director-General, National Mission for Clean Ganga (NMCG), Secretary, Ministry of Environment, Forests & Climate Change (MoEFCC), Chairman, Central Pollution Control Board (CPCB), and CEO, Government e-Marketplace (GeM) Portal (in paragraph 8 of the Order).

Subsequently, first meeting of the Committee under the chairmanship of Vice-Chairman, NITI Aayog was held on 19.11.2019 wherein it was decided that CEO, NITI Aayog will be the nominee of the Vice-Chairman, NITI Aayog to chair the committee constituted by the Hon'ble Tribunal. Thereafter, CEO, NITI Aayog convened a meeting in which a sub-group was formed under the chairmanship of Director General, NMCG, which included Additional Director-General, NMCG, Additional CEO, GeM Portal, Joint Adviser, Central Public Health Environmental Engineering Organization

(CPHEEO) of MoHUA, Adviser (Housing & Urban Affairs), NITI Aayog and Adviser (Water Resources & Land Resources), NITI Aayog. It was directed during the meeting that this sub-group will take a decision regarding the documents and business models that should be uploaded on GeM Portal for easy adoption by states to undertake solid and liquid waste management in India.

The Committee held three meetings: on 19.11.2019, 20.11.2019 and 17.03.2020. Pursuant to the decisions taken during these meetings, NITI Aayog has formulated the Model Concession Agreements (MCAs) and Model Request for Proposals documents (RFPs) for Integrated Solid Waste Management (including Bio-Remediation of Legacy Waste) and Integrated Liquid Waste Management (including Faecal Sludge Management) on Hybrid Annuity Model (HAM) of Public-Private Partnership (PPP).

MoHUA has provided Engineering Procurement Construction (EPC) Contract for Legacy Waste Dumpsite Remediation and several other documents relating to legacy waste dumpsite remediation and integrated solid waste management activities such as collection, transportation, processing and disposal of municipal solid waste.

NMCG has also provided documents for setting up of sewage treatment plants and other guiding documents for improved liquid waste management in the country.

Now the Urban Local Bodies (ULBs) have the following options for solid waste management and liquid waste management under PPP:

For Solid Waste Management:

(i) To undertake only legacy waste remediation: existing method of tendering EPC contract which is entirely financed by the government be taken up (it is a successful model as indicated by MoHUA).

(ii) To undertake only solid waste management system (collection, transportation, processing & disposal) (Non-HAM): the existing method of tendering Design, Build, Finance, Operate & Transfer (DBFOT) contracts which is either not funded or only partly funded by the government be taken up. The drafts of such agreements, model RFP, list of necessary clauses of such agreements, and guidelines for drafting of concession agreements have been made available through Swachh Bharat Mission (Urban), MoHUA, and the World Bank.

(iii) To undertake both legacy waste remediation as well as solid waste management system: the MCA of NITI Aayog under HAM may be taken up.

(iv) To undertake only solid waste management system (collection, transportation, processing & disposal) (under HAM): only the parts of the NITI Aayog MCA pertaining to Bio-Remediation

of Legacy Waste may accordingly be removed by the ULB and remaining agreement may be taken up.

For Liquid Waste Management:

(i) To undertake only sewage treatment (Non-HAM): existing method of tendering EPC contract or DBFOT contract for setting up sewage treatment plants under state or central government funding schemes, may be taken up.

(ii) To undertake only sewage treatment (under HAM): model bidding documents prepared by NMCG may be taken up.

(iii) To undertake both sewage treatment as well as faecal sludge management system: the MCA of NITI Aayog under HAM may be taken up.

As per paragraph 5 of the NGT Order, the Tribunal was of the opinion that *placing these documents on the GeM Portal would go a long way in tackling the situation by curtailing procedural delay.*

In accordance with the requirement of the NGT Order, all the relevant documents were shared with the CEO, GeM Portal on 11.06.2020 to initiate the process of uploading of the documents.

I am sharing the documents with you for the kind information and reference of the Hon'ble Tribunal.

The following documents are attached herewith:

(A) Order of the Hon'ble National Green Tribunal dated 18.10.2019 in O.A. No. 606/2018 (Main) on '*Compliance of Municipal Solid Waste Management Rules, 2016 and other environmental issues*'

(B) Solid Waste Management (SWM)

(i) Model Concession Agreement including Schedules (prepared by NITI Aayog)

(ii) Model RFP for Solid Waste Management (prepared by NITI Aayog)

(iii) EPC Contract for Legacy Waste Dumpsite Remediation

(iv) DPR preparation Toolkit for Dumpsite remediation

(v) EPC Contractors & O&M Vendors for dumpsite remediation

(vi) Equipment & Suppliers for dumpsite remediation

(vii) Template for management of Dumpsites

(viii) Toolkit for DPRs preparation

(ix) List of SWM Empanelled Agencies

(x) Empanelled Institutes – SWM

(xi) Empanelled Transaction Advisers - SWM

(xii) Checklist for scrutiny of DPR for SWM projects

(xiii) Checklist for scrutiny of PPR or PFR for SWM projects

(C) Liquid Waste Management (LWM)

(i) Model Concession Agreement (prepared by NITI Aayog)

(ii) Schedules to Model Concession Agreement (15 Schedules) (prepared by NITI Aayog)

(iii) Model RFP for Liquid Waste Management (prepared by NITI Aayog)

(iv) DPR Guidelines – LWM

(v) Empanelled Institutes for evaluation of DPRs - LWM

(vi) List of Transaction Advisers & Project Engineers - LWM

(vii) Model Bidding Documents for NMCG projects – STP

(D) Letter addressed to the CEO, GeM Portal through which the above-mentioned documents were shared with GeM, requesting them to initiate the process of uploading.

The documents listed above have been approved by the competent authority at NITI Aayog. This submission is in compliance and fulfillment of the directions given by the Hon'ble National Green Tribunal to NITI Aayog in its Order dated 18.10.2019 in O.A. No. 606/2018 (Main).

Yours sincerely,

(Avinash Mishra)
Adviser
Water Resources & Land Resources
NITI Aayog

Copy to,
Adviser to the Hon'ble Chairperson, National Green Tribunal

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 606/2018(Main)

Compliance of Municipal Solid Waste Management Rules, 2016 and other environmental issues

Date of hearing: 18.10.2019

CORAM: **HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
HON'BLE MR. JUSTICE RAGHUVENDRA S. RATHORE, JUDICIAL MEMBER
HON'BLE MR. JUSTICE S.P. WANGDI, JUDICIAL MEMBER
HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER
HON'BLE DR. SATYAWAN SINGH GARBYAL, EXPERT MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

ORDER

1. This order is being passed in pursuance of chamber meeting held today in the National Green Tribunal on the subject of enforcement of orders of this Tribunal relating to solid waste and sewage management dealt with by way of earlier orders in above matter and in *O.A. No. 673/2018* and *O.A. No. 06/2012* and other connected matters.

2. The meeting became necessary as it was being repeatedly put forward that compliance of the orders was taking lot of time on account of procedures of DPRs and tendering process which could be curtailed if standardize technologies, cost breakup and service providers could be identified and placed on *GeM Portal* operated by the Ministry of Commerce, Govt. of India. The subject of the meeting is as follows:

> *"Clean environment and implementation of Swachh Bharat Mission, and Namami Gange initiatives inter alia require proper management of solid and liquid waste. In absence of collection, treatment and disposal of sewage, untreated sewage is being discharged in water bodies or on land. There is huge collection of solid waste which needs to be remedied. It may be noted that there are 351 polluted river*

stretches in the country and about 2500 legacy waste dumpsites which are hazard to health and environment.

One of the challenges for effective remedial action is to reduce avoidable delays caused in DPRs and Tender process. Information of suitable service providers at reasonable terms can be of great help. There is need to standardise the methodology and terms for empanelling credible service providers and evolving an appropriate mechanism which may obviate the need for DPRs and Tender process. Observations of NGT on the subject in some of the orders are annexed.
GeM portal developed by Government of India is one of the standardized focal point which can be followed for this purpose as well. This requires consideration of the following:

(i) Procedure for standardising technologies and cost breakup for operation and maintenance of such methodologies.
(ii) Developing a business models for privatisation of
(a) sewage collection, treatment and disposal, including utilisation of treated water and sludge;
(b) remediation of legacy waste dumpsites; and
(c) other such activities relating to collection, treatment and processing and utilisation of wastes and provision of services such as setting up of rainwater harvesting system"

3. The orders already passed on the subject annexed to the meeting note are as follows:

"ANNEXURE

- ***The Tribunal is of the view that instead of every Local Body individually floating tenders for different services, standards and technical specifications of available services may be specified by the Department of Urban Development and adopted by Local Bodies. Such services may be hired on laid down standard norms to save time. However, this aspect may be finally gone into by the Committees.***

Tabular chart furnished by the MoHUA suggesting solution to the problems presented during the interactions is as follows:

Sr. No.	***Problems faced by the States/Union Territories***	***Solution suggested by the MoHUA***
3.	***Financial constraints***	***•Collect user fee • Levy penalty for polluters • Bulk Waste Generators rules be complied***

- O.A No. 606/2018Compliance of Municipal Solid Waste Management Rules, 2016 Order dated 20.08.2019; para 22& 14.

- ***Procedure for giving of contracts (for STPs etc.) may be shortened and standardized at State level and if possible at***

National level by NMCG and CPCB. *- O.A No. 6/2012 Manoj Mishra Vs. Union of India & Ors. Order dated 11.09.2019; para 12.*

- ***A flat recovery rate towards collection and treatment of sewage may be adopted as a viable option for sustainable sewage management.*** *– O.A 496/2016News Item Published in "Hindustan Times" dated 19.06.2015 Titled "Dirty flows your drinking water" authored by Ritam Haldar" Order dated 11.09.2019; para 18.*

- ***Having regard to urgency of the situation, if Indore model is to be adopted, wholly or in part, the need for tender process can be dispensed with if the work is to be done departmentally, as already directed in the cases of Ahmedabad and Gurugram.*** *- O.A No. 519/2019 WITH O.A No. 386/2019, News item published in "The Times of India" Authored by Jasjeev Gandhiok & Paras Singh Titled "Below mountains of trash lie poison lakes" WITH Centre for Wildlife and Environment Litigation Applicant(s) Versus Union of India & Ors Order dated 17.07.2019; para 21.*

- ***(iii) Technical specification for the RWH systems and recharge purposes and indicative list of available service providers may be placed on the website of the DJB and the Local bodies within one month from today. Online interactive helpline/information may also be made available to facilitate the users. It maybe made clear that the users are at liberty to engage services of their choice from any source*** *– O.A 496/2016News Item Published in "Hindustan Times" dated 19.06.2015 Titled "Dirty flows your drinking water" authored by Ritam Haldar" Order dated 11.09.2019; para 18."*

4. The meeting was attended *inter-alia* by representatives of Niti Ayog, MoHUA, MoEF&CC, DG, NMCG, Chairman CPCB, Mr. Talleen Kumar, CEO, GeM and Ms. Radha Chauhan, former CEO GeM Portal.

5. The general view of the participants was that standardization of technologies and cost breakup and identification of service providers and placing them on GeM Portal will go a long way in tackling the situation by curtailing the procedural delay. This requires coordination among the concerned authorities and clarifying the existing CVC guidelines, if necessary.

6. As per CPCB data, there are more than 4000 legacy waste dump sites which need immediate remediation under the binding rules and

orders of this Tribunal having regard to harmful impacts on environment and public health. Besides, this will unlock the land occupied by such waste sites which is urgently required for setting up of integrated waste management and processing facilities/for afforestation/green belts/bio-diversity parks/buffer zones in accordance with environmental laws. If necessary, a part of the land could be monetized if so decided by the concerned State Governments. The legacy dump sites remediation is to start at the earliest as already directed in *O.A. No. 519/2019* vide order dated 17.07.2019.[1]

7. Discharge of untreated sewage in water bodies is a major source of pollution of rivers. 351 river stretches are identified as polluted including Ganga, Yamuna and other major rivers. Either STPs are inadequate or non-functional and/or not connected to the sewerage network. This needs to be remedied and treated sludge utilized for manure or otherwise and treated water utilized for industrial or agricultural purposes. No untreated sewage may be discharged in the rivers. This direction has been issued by this Tribunal vide order dated 28.08.2019 in *O.A. No. 593/2017*.[2]

8. Expeditious compliance of directions for clearance of legacy waste sites as well as stopping of discharge of untreated sewage and directions on associated subjects require immediate implementation

[1] Remediation work on all other dumpsites may commence from 01.11.2019 and completed preferably within six months and in no case beyond one year. Substantial progress be made within six months.

[2] Thus, the mandate of law is that there must be 100% treatment of sewage as well as trade effluents. This Tribunal has already directed in the case of river Ganga that timelines laid down therein be adhered to for setting up of STPs and till then, interim measures be taken for treatment of sewage. There is no reason why this direction be not followed, so as to control pollution of all the river stretches in the country.

… (iii) All the Local Bodies and or the concerned departments of the State Government have to ensure 100% treatment of the generated sewage and in default to pay compensation which is to be recovered by the States/UTs, with effect from 01.04.2020. In default of such collection, the States/UTs are liable to pay such compensation. The CPCB is to collect the same and utilize for restoration of the environment.

for protection of environment and public health by curtailing undue delay. As suggested, necessary technologies need to be standardized with cost breakups for operation and maintenance, including procurement. Besides this, the service providers need to be identified and empaneled. This exercise may also require the concerned authorities to explore business models. For this purpose, we consider it necessary to constitute a Committee as follows:

i.	Nominee of Vice-Chairman, Niti Ayog	-	Chairman and Coordinator
ii.	Secretary, Ministry of Urban Development	-	Member
iii.	Secretary, Ministry of Jal Shakti	-	Member
iv.	DG, National Mission for Clean Ganga	-	Member
v.	Secretary, Ministry of Environment, Forest & Climate Change	-	Member
vi.	Chairman, Central Pollution Control Board	-	Member
vii.	CEO of GeM Portal	-	Member

9. Let the above Committee hold its first meeting preferably within two weeks and take further prompt action in the matter preferably within one month. An action taken report may be furnished to this Tribunal within two months from today by e-mail at judicial-ngt@gov.in.

A copy of this order be sent to Niti Ayog, National Mission for Clean Ganga, Ministries of Urban Development, Jal Shakti and Ministry of Environment, Forest & Climate Change, Central Pollution Control Board, CEO of GeM Portal and the Chief Secretaries of all the States/UTs.

Adarsh Kumar Goel, CP

Raghuvendra S. Rathore, JM

S.P. Wangdi, JM

K. Ramakrishnan, JM

Dr. Satyawan Singh Garbyal, EM

Dr. Nagin Nanda, EM

October 18, 2019
Original Application No. 606/2018

Toolkit for Project Preparation on Dumpsite Remediation

Ministry of Housing and Urban Affairs (MoHUA)

Ministry of Housing and Urban Affairs

Annexure I

Toolkit for project preparation on Dumpsite Remediation

1.	Name of the Project:
2.	Name of the ULB, District, State/UT:
3.	Brief Description of City indicating population, Area, No. of Wards etc.
4.	Scope of the project: Supply and installation of necessary machines, equipments, excavating, stabilising (windrows), screening and segregation into different classes and sizes (C & D waste, RDF, Bio-soils and others).
5.	Detail Description of Dumpsite like location, Age, Area, Height, quantity etc.
6.	Map showing description of boundaries of the Dumpsite all around, such as Roads, Localities, Rivers/Canals, Hills , nearest habitation along with Longitude and Latitude.
7.	Scope of disposal for RDF, Bio Soils, C & D waste and others as per local demands
8.	Estimated Cost
9.	Estimated duration of the project
10.	Benefits of the Project like area to be reclaimed, estimated value and intended use.
11.	Source of funds
12.	List anticipated hindrances in project implementation and measures for solutions

Certified that the facts and figures mentioned have been duly verified.

(Officer 1)
Municipal Commissioner

(Officer 2)
Municipal Engineer

Explanatory Note

Sl. 7 Various options where segregated waste like RDF, Bio soils, C & D waste and other fractions may be utilised in nearby area may be indicated.

Sl. 8 Approximate cost may be estimated based of scope of work proposed to be given to contractor like whether only equipments are proposed on rent or purchase and O & M or on processing fee basis.

Additional points

Sl. 1 characterisation of waste , if any, done may be given

Sl. 2 Suggested models of reclamation of Dumpsites

Model 1: (Recommended to be anchored by state govt. for a cluster of smaller ULBs)

- State purchases necessary equipments and machinery with annual O&M contract with supplier.
- The machine will be supplied to any ULB who in turn will engage another agency for providing requisite labours.
- Segregated material will be taken care by the ULB

Model 2: (Suitable for Individual medium and large ULBs)

- ULB hires necessary equipments and machinery on rent basis while its maintenance lies with supplier.
- Separate Agency is engaged with ULBs to provide labour/support.
- Segregated material to be taken care by the

Model 3: (Suitable for Large ULBs)

- ULB engages agency to carry out remediation on per tonne processing fee basis and most of the activity is undertaken by agency.
- Segregated material to be taken care by the agency with support of ULB

Contract Agreement No.: _____

IFB No.: 14 [02nd Call]/TSCCL/PROJECTS/TO/2018

Ref: TSCCL/Projects/56(SWM – BIO-MINING)/2018

CONTRACT DOCUMENT FOR

"SOLID WASTE MANAGEMENT PROJECT – REMEDIATION OF EXISTING MSW DUMPSITE AT RAMAPURAM THROUGH BIO-MINING PROCESS UNDER IMPLEMENTATION OF THE SMART CITY MISSION IN TIRUPATI"

Issued by:

The Managing Director,
Tirupati Smart City Corporation Limited,
Tirupati Municipal Corporation,
13-29-M9-1-00, Tilak Road, East Tirupati - 517501,
Chittoor District, Andhra Pradesh.
Email: tsccltirupati@gmail.com

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TIRUPATI SMART CITY CORPORATION LIMITED
TIRUPATI

FORWARDING SLIP ACCOMPANYING TO THE AGREEMENT No:-

SLIP – A

Serial Number	Particulars		Description
1	Name of the Work	:	**SOLID WASTE MANAGEMENT PROJECT – REMEDIATION OF EXISTING MSW DUMPSITE AT RAMAPURAM THROUGH BIO-MINING PROCESS UNDER IMPLEMENTATION OF THE SMART CITY MISSION IN TIRUPATI**
2	Reference of Original Administrative Sanction	:	Minutes of Meeting of the 11th Board of Directors of the TSCCL held on September 06th, 2018
3	Name of the Contractor & Address	:	**Mr. Nagesh Prabhu Chinivartha,** Director, **M/s. ZIGMA GLOBAL ENVIRON SOLUTIONS PRIVATE LIMITED,,** H-Office : 24, Kalaimagal Kalvi Nilayam Road, Erode – 638 001. Tamil Nadu State, India. Telephone : +091 4242 225 157 Mobile : +091 8220 005 157 e-mail : connect@zigma.in nagesh@zigma.in Secondary Contact Person : **Mr. Mohan Kumaar S,** Assistant General Manager – Marketing Mobile :+091 9949 571 110 E-mail: mohan@zigma.in
4	Original or Supplemental	:	Original
5	Approximate Value of work to be done under this agreement (TCV)	:	**Rs.18,64,00,000**/- [Rupees Eighteen Crore Sixty Four Lakh only] for 2,00,000 MT
6	If supplemental, upto date value of work done under original agreement	:	Nil

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

7	Agreement Period	:	18 Months. The DLP after issue of project completion certificate 02 years
8	Are Tenders / RFPs have been called for and is this lowest Tender / RFP accepted? If not, are reasons recorded	:	Yes
9	Tender ID	:	232955
10	Call	:	02nd Call
11	Time allowed in the Tender / RFP notice for submission of Tender / RFP	:	08 Calendar Days
12	Total number of Tenders / RFPs received	:	02 [Two] Numbers
13	Authority and reference in which the Tender / RFP was approved	:	Superintending Engineer [FAC] Tirupati Smart City Corporation Limited
14	Technical opinion	:	302/T4/AE2/TPT/SmartCity/BioMining/2018, Dated: November 30th , 2018
15	Details of Government Order issued	:	G. O. RT. No.: 1131, Municipal Administration & Urban Development (UBS) Department, Dated: December 14th, 2018
16	Details of Bank Guarantee	:	Bank Guarantee No. : **267071119000014** Dated : **January 10th, 2019** Amount : **Rs. 93,20,000/-** Issuing Authority : **Indian Overseas Bank, Large Corporate Branch, Coimbatore** **Ms. Sasikala B. Prabhu, Assistant General Manager** Valid from : **January 10th, 2019** Valid upto : **July 10th, 2020**

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR | **TECHNICAL OFFICER** | **MUNICIPAL ENGINEER-2** | **MUNICIPAL ENGINEER-1** | **SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

VOLUME - 01

To be continued

CONTRACT AGREEMENT

To be continued

Contract Agreement

THIS AGREEMENT made the _____th day of _____, **2019** between "**Tirupati Smart City Corporation Limited"** - (hereinafter "the Authority / Client / Employer/ TSCCL"), having its registered / Principal Office at Tirupati Municipal Corporation, 13-29-M9-1-00, Tilak Road, East Tirupati - 517501, Chittoor District, Andhra Pradesh, India e-mail: tsccltirupati@gmail.com which expression shall mean and include, unless repugnant to the context, its successor; and permitted assigns of the one part.

and

To be continued

Mr. Nagesh Prabhu Chinivartha, Director, on behalf of **M/s. ZIGMA GLOBAL ENVIRON SOLUTIONS PRIVATE LIMITED**, (hereinafter "the Supplier / Implementing Agency / Contractor") having its registered / principal office at H. Office. : 24, Kalaimagal Kalvi Nilayam Road, Erode – 638 001. Tamil Nadu State, India. Telephone : +091 4242 225 157 Mobile : +091 8220 005 157 e-mail : connect@zigma.in, nagesh@zigma.in, and which expression shall mean and include unless repugnant to the context, its successor and permitted assigns, here as the TSCCL has invited bids for "**Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati**" and whereas the successful bidder desirous of undertaking the works has bid and TSCCL has accepted the bid for execution of works for a sum of **Rs.18,64,00,000**/- [Rupees Eighteen Crore Sixty Four Lakh only] for 2,00,000 MT (Contract Price) (Hereinafter called "the Contract Price").

Now therefore, it is hereby agreed by and between the TSCCL and the successful bidder as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
   - (i) The Contract Agreement
   - (ii) the Letter of Acceptance
   - (iii) The price schedule submitted by the bidder
   - (iv) the Letter of Bid
   - (v) the Conditions of Contract, including appendix;
   - (vi) the scope of work and the specification
   - (vii) any other listed in the Tender Document as forming part of the Contract,

To be continued

3. The successful bidder shall be bound by the details furnished by him /her to the TSCCL while submitting the tender or at subsequent stage, upon selection of the successful bidder, if at any stage, the document furnished by him /her is found to be false or the quality of the work / services or rate are found of poor quality or different specifications, it would be deemed to be a breach of terms of contract, the contract shall be cancelled and Performance Security shall be stand forfeited.
4. The rate quoted by the selected successful bidder and as approved by the TSCCL, shall remain valid throughout the period of contract and the request to increase the rates for any or all items, during the period of contract, shall not be entertained at any stage.
5. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
6. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
7. The successful bidder hereby agrees to deliver the works as mentioned above within contract period of **18 Months.**
8. That in the event of any dispute arising between the parties; the same shall be referred to the adjudicator for reaching to amicable solution. In case of failure to reach an agreement from adjudicator shall be settled by arbitration.

This agreement will take effect from ……day of …… Two Thousand ……

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

IN WITNESS whereof both the parties hereto have entered, their respective common seals to be here unto affixed / (or have unto set their respective hands and seals) into this Agreement to be executed in accordance with the laws of INDIA on the day, month and year specified above.

Signed by:
for and on behalf of the Employer

……

Sri. V. Vijay Rama Raju, I.A.S.,
Managing Director,

Tirupati Smart City Corporation Limited,
Tirupati Municipal Corporation,
Tilak Road, East Tirupati - 517501
Chittoor District, Andhra Pradesh,
India.

in the presence of:

Witness, Name, Signature, Address, Date

Signed by:
for and on behalf the Implementing Agency

……

Mr. Nagesh Prabhu Chinivartha,
Director

M/s. ZIGMA GLOBAL ENVIRON SOLUTIONS PRIVATE LIMITED,
H. Office. : 24, Kalaimagal Kalvi Nilayam Road,
Erode – 638 001.
Tamil Nadu State, India.
Telephone : +091 4242 225 157
Mobile : +091 8220 005 157
e-mail : connect@zigma.in, nagesh@zigma.in

in the presence of:

Witness, Name, Signature, Address, Date

To be continued

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LETTER OF ACCEPTANCE

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	**TECHNICAL OFFICER**	**MUNICIPAL ENGINEER-2**	**MUNICIPAL ENGINEER-1**	**SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	**TECHNICAL OFFICER**	**MUNICIPAL ENGINEER-2**	**MUNICIPAL ENGINEER-1**	**SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

LETTER OF BID

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

DISCLAIMER

The information contained in this Request for Proposal document (the "RFP") or subsequently provided to Bidder(s), whether verbally or in documentary or any other form by or on behalf of the Employer or any of their employees or advisors, is provided to Bidder(s) on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

This RFP is not an agreement and is neither an offer nor invitation by the Employer to the prospective Bidders or any other person. The purpose of this RFP is to provide interested entities with information that may be useful to them in preparing their bids (the "Bid") including all the necessary submissions and the financial offers pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the Employer in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFP may not be appropriate for all persons, and it is not possible for the Employer, its employees or advisors to consider the investment objectives, financial situation and particular needs of each party who reads or uses this RFP. The assumptions, assessments, statements and information contained in this RFP may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP and obtain independent advice from appropriate sources.

Information provided in this RFP to the Bidder(s) is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Employer accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

The Employer, its employees and advisors make no representation or warranty and shall have no liability to any person, including any Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way during the Bidding Process.

To be continued

The Employer also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this RFP.

The Employer may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this RFP.

The issue of this RFP does not imply that the Employer is bound to select a Bidder or to appoint the Selected Bidder for the Project and the Employer reserves the right to reject all or any of the Bidders or Bids without assigning any reason whatsoever.

The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Employer or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and the Employer shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Bidding Process.

To be continued

CONTRACT AGREEMENT

Conditions of Contract

General Conditions of Contract

A. General

To be continued

1. GENERAL PROVISIONS	
1.1 DEFINITIONS	In the Conditions of Contract ("these Conditions"), which include Special Conditions of Contract, Parts A and B, and these General Conditions, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise
1.1.1 THE CONTRACT	1.1.1.1 "Bill of Quantities" mean the documents so named (if any) which are comprised in the Schedules. 1.1.1.2 "Contract" means the Contract Agreement, the Letter of Award, the "Work Order", "Letter of Bid" these Conditions, the Specification, the Drawings, the Schedules, and the further documents (if any) which are listed in the Contract Agreement or in the Letter of Award between the Employer and the Contractor. 1.1.1.3 "Contract Agreement" means the contract agreement referred to in Sub-Clause 1.6 [Contract Agreement]. 1.1.1.4 "Contract Data" means the pages completed by the employer entitled contract data which constitutes Part-A of the Special Conditions of the Contract. 1.1.1.5 "Drawings" means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract. 1.1.1.6 "Key Dates" means the sheet titled "Key dates" released along with the RFP giving important dates pertaining to Contract like Bid opening and closing date, Pre Bid meeting date, submission date etc.

To be continued

	1.1.1.7 "Letter of Award" means the letter of formal acceptance, signed by the Employer, indicating formal acceptance of the Most Advantageous Bid and intention of entering into contract with the successful bidder 1.1.1.8 "Letter of Bid" means the document entitled letter of bid, which was completed by the Contractor and includes the signed offer to the Employer for the Works. 1.1.1.9 "Letter of Acceptance" means the letter of formal acceptance, signed by the bidder after the receipt of Letter of Award confirming their acceptance. 1.1.1.10 "Tender" means the Letter of Bid and all other documents which the Contractor submitted with the Letter of Bid, as included in the Contract. 1.1.1.11 "Schedules" means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Bid, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices. 1.1.1.12 "Specification" means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works. 1.1.1.13 "Work Order" means the letter of formal award of work, signed by the Employer given after the signing of the Contract Agreement by both Parties.
1.1.2 PARTIES AND PERSONS	1.1.2.1 The "Adjudicator" is the person appointed jointly by the Employer and the Implementing Agency to resolve

To be continued

	disputes in the first instance, as provided for in GCC 20.2 [Appointment of Adjudicator] hereunder. 1.1.2.2 "Contractor" means the person(s) named as contractor in the Letter of Bid accepted by the Employer and the legal successors in title to this person(s). 1.1.2.3 "Contractor's Personnel" means the Contractor's Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works Contractor's Personnel includes Key Personnel as named in "Contract Data. 1.1.2.4 "Contractor's Representative" means the person named by the Contractor in the Contract or appointed from time to time by the Contractor under Sub-Clause 4.3 [Contractor's Representative], who acts on behalf of the Contractor. 1.1.2.5 "Employer" means the person named as employer in the Contract Data and the legal successors in title to this person. 1.1.2.6 "Employer's Personnel" means the Engineer, the assistants referred to in Sub-Clause 3.2 [Delegation by the Engineer] and all other staff, labour and other employees of the Engineer and of the Employer; and any other personnel notified to the Contractor, by the Employer or the Engineer, as Employer's Personnel. 1.1.2.7 "Engineer" means the person appointed by the Employer to act as the Engineer for the purposes of the Contract and named in the Contract Data, or other person appointed from time to time by the Employer.

To be continued

	1.1.2.8 "GoAP" means Government of Andhra Pradesh. 1.1.2.9 "Subcontractor" means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works; and the legal successors in title to each of these persons. 1.1.2.10 "Party" means the Employer or the Contractor, as the context requires. 1.1.2.11 "PMC" means Project Management Consultant as appointed by the Employer to oversee policy, design, implementation of the works as the case may be.
1.1.3 DATES, TESTS, PERIODS AND COMPLETION	1.1.3.1 "Base Date" means the date 14 days prior to the latest date for submission of the Tender 1.1.3.2 "Commencement Date" means the date notified under Sub-Clause 8.1 [Commencement of Works]. 1.1.3.3 "Completion" means the new facility / work as defined in the Scope of work completed in accordance with the Specifications / Scope of Work as given in Section V and the Contractor is entitled to have Completion Certificate issued from the Employer 1.1.3.4 "Completion Certificate" means certificate issued by the Employer on successful completion of "Tests on Completion" 1.1.3.5 "Day" means a calendar day and "year" means 365 days. 1.1.3.6 "Defects Liability Period" means the period for notifying defects in the Works or a Section (as the case may be) under Sub- Clause 11.1 [Completion of

To be continued

	Outstanding Work and Remedying Defects], which extends to 1 years except if otherwise stated in the Contract Data (with any extension under Sub-Clause 11.3 [Extension of Defects Liability Period]), calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections]. 1.1.3.7 "Performance certificate" means the certificate issued under sub-clause 11.7 [performance certificate]. 1.1.3.8 "Taking-Over Certificate" means a certificate issued under Clause 10 [Employer's Taking Over]. 1.1.3.9 "Tests after Completion" means the tests (if any) which are specified in the Contract and which are carried out in accordance with the Specification after the Works or a Section (as the case may be) are taken over by the Employer. 1.1.3.10 "Time for Completion" means the time for completing the Works or a Section (as the case may be) under Sub-Clause 8.2 [Time for Completion], as stated in the Contract Data (with any extension under Sub-Clause 8.4 [Extension of Time for Completion]), calculated from the Commencement Date. 1.1.3.11 "Tests on Completion" means the tests which are specified in the Contract or agreed by both Parties or instructed as a Variation, and which are carried out under Clause 9 [Tests on Completion] before the Works or a Section (as the case may be) are taken over by the Employer
1.1.4 MONEY AND PAYMENTS	1.1.4.1 "Accepted Contract Amount" means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects. 1.1.4.2 "Contract Price" means the price defined in Sub-Clause 14.1 [The Contract Price], and includes adjustments in accordance with the Contract. 1.1.4.3 "Cost" means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the

To be continued

	Site, including overhead and similar charges, but does not include profit. 1.1.4.4 "Final Payment Certificate" means the payment certificate issued under Sub-Clause 14.11 [Issue of Final Payment Certificate]. 1.1.4.5 "Final Statement" means the statement defined in Sub-Clause 14.9 [Application for Final Payment Certificate]. 1.1.4.6 "Interim Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment], other than the Final Payment Certificate. 1.1.4.7 "Local Currency" means the currency of the Country. 1.1.4.8 "Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment]. 1.1.4.10 "Provisional Sum" means a sum (if any) which is specified in the Contract as a part of the Works or for the supply of Plant, Materials or services 1.1.4.11 "Retention Money" means the accumulated retention moneys which the Employer retains under Sub-Clause 14.3 [Application for Interim Payment Certificates] and pays under Sub-Clause 14.7 [Payment of Retention Money]. 1.1.4.12 "Statement" means a statement submitted by the Contractor as part of an application, under Clause 14 [Contract Price and Payment], for a payment certificate
1.1.5 WORKS AND GOODS	1.1.5.1 "Approval / Approved" shall mean and include documents checked, vetted and approved by the Employer 1.1.5.2 "BIS / Bureau of Indian Standards" means the statutory regulatory authority responsible for fixing standards and

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	whenever it is referred in the contract it shall imply reference to the latest version of the standard. 1.1.5.3 "Contractor's Equipment" means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor's Equipment excludes Temporary Works, Employer's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works. 1.1.5.4 "Goods" means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate. 1.1.5.5 "Materials" means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract. 1.1.5.6 "Permanent Works" means the permanent works to be executed by the Contractor under the Contract. 1.1.5.7 "Plant" means the apparatus, machinery and other equipment intended to form or forming part of the Permanent Works, including vehicles purchased for the Employer and relating to the construction or operation of the Works. 1.1.5.8 "Section" means a part of the Works specified in the Contract Data as a Section (if any). 1.1.5.9 "Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects. 1.1.5.10 "Works" mean the Permanent Works and the

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	Temporary Works, or either of them as appropriate
1.1.6 OTHER DEFINITIONS	1.1.6.1 "Contractor's Documents" means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract. 1.1.6.2 "Employer's Equipment" means the apparatus, machinery and vehicles (if any) made available by the Employer for the use of the Contractor in the execution of the Works, as stated in the Specification; but does not include Plant which has not been taken over by the Employer. 1.1.6.3 "Force Majeure" is defined in Clause 19 [Force Majeure]. 1.1.6.4 "Laws" means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority. 1.1.6.5 "Notice of Dissatisfaction" means the notice given by either Party to the other under Sub- Clause 20.3 [Obtaining Adjudicator's Decision] indicating its dissatisfaction and intention to commence arbitration 1.1.6.6 "Performance Security" means the security (or securities, if any) under Sub-Clause 4.2 [Performance Security]. 1.1.6.7 "Site" means the places where the Permanent Works are to be executed, including storage and working areas, and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site. 1.1.6.8 "Unforeseeable" means not reasonably foreseeable by an experienced contractor by the Base Date. 1.1.6.9 "Variation" means any change to the Works, which is

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	instructed or approved as a variation under Clause 13 [Variations and Adjustments].
1.2 INTERPRETATION	In the Contract, except where the context requires otherwise: (a) words indicating one gender include all genders; (b) words indicating the singular also include the plural and words indicating the plural also include the singular; (c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing; (d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record; and (e) the word "tender" is synonymous with "bid" and "tenderer" with "bidder" and the words "tender documents" with "bidding documents." The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.
1.3 COMMUNICATIONS	Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be: (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Contract Data; and (b) Delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract Data. However: (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and (ii) if the recipient has not stated otherwise when requesting

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	an approval or consent, it may be sent to the address from which the request was issued. Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be
1.4 LAW AND LANGUAGE	The Contract shall be governed by the laws of Union of India. Indian Contract Act,1872 Sale of Goods Act, 1930 The Arbitration and Conciliation Act, 1996 The ruling language of the Contract shall be English
1.5 PRIORITY OF DOCUMENTS	The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence: the Concision Agreement (a) the Letter of Acceptance, (b) the Letter of Award, (c) the Letter of Bid, (d) the Special Conditions of Contract – Part A, (e) the Special Conditions of Contract – Part B (f) these General Conditions (g) the Specification, (h) the Drawings, and (i) The Schedules and any other documents forming part of the Contract.

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	If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.
1.6 CONTRACT AGREEMENT	The Parties shall enter into a Contract Agreement within 10 days after the Contractor receives the Letter of Award unless the Special Conditions of Contract establish otherwise. The Contract Agreement shall be based upon the form annexed to the Special Conditions of Contract. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Successful Bidder
1.7 ASSIGNMENT	Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract
1.8 CARE AND SUPPLY OF DOCUMENTS	The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, two copies of the Contract and of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor. Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents. The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times. If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

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1.9 DELAYED DRAWINGS OR INSTRUCTIONS	The Contractor shall give notice to the Engineer whenever the Works are likely to be delayed or disrupted if any necessary drawing or instruction is not issued to the Contractor within a particular time, which shall be reasonable. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and the nature and amount of the delay or disruption likely to be suffered if it is late.
1.10 EMPLOYER'S USE OF CONTRACTOR'S DOCUMENTS	As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor. The Contractor shall be deemed (by signing the Contract) to give to the Employer a non-terminable transferable non-exclusive royalty-free licence to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This licence shall apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works
1.11 CONTRACTOR'S USE OF EMPLOYER'S DOCUMENTS	As between the Parties, the Employer shall retain the copyright and other intellectual property rights in the Specification, the Drawings and other documents made by (or on behalf of) the Employer. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Employer's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract
1.12 CONFIDENTIAL DETAILS	The Contractor's and the Employer's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify compliance with the Contract and allow its proper implementation. Each of them shall treat the details of the Contract as private

To be continued

	and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects
1.13 COMPLIANCE WITH LAWS	The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Special Conditions of Contract the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so, unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence
1.14 JOINT AND SEVERAL LIABILITIES	If the Contractor constitutes (under applicable Laws) a LIABILITIES joint venture, consortium or other unincorporated grouping of two or more persons: (a) these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract; (b) these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons; and (c) The Contractor shall not alter its composition or legal status without the prior consent of the Employer.
THE EMPLOYER	

To be continued

2.1 RIGHT OF ACCESS TO THE SITE	The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within reasonable times to enable the contractor to proceed without disruption execution of the Work. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access the Employer shall do so in the time and manner stated in the Specification. However, the Employer may withhold any such right or possession until the Performance Security has been received
2.2 PERMITS, LICENSES OR APPROVALS	The Employer shall provide, at the request of the APPROVALS Contractor, such reasonable assistance as to allow the Contractor to obtain properlyany permits, licenses or approvals required by the Laws of the Country: (i) which the Contractor is required to obtain under SubClause1.13 [Compliance with Laws], (ii) for the delivery of Goods, including clearance through customs, The Contract price shall include all transportation charges and other expenses that may be incurred in this connection.
2.3 EMPLOYER'S PERSONNEL	The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer's other contractors on the Site: (a) co-operate with the Contractor's efforts underSub-Clause 4.6 [Co-operation], and (b) Take actions similar to those which the Contractor is required to take under sub- paragraphs (a), (b) and (c) of Sub-Clause 4.8 [Safety Procedures] and under Sub-Clause 4.18 [Protection of the Environment].
2.4 Employer's Claims	If the Employer considers himself to be entitled to any payment

To be continued

	under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Liability Period, the Employer or the Engineer shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Employer's Equipment and Free-Issue Materials], or for other services requested by the Contractor. The notice shall be given as soon as practicable and no longer than 28 days after the Employer became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Liability Period shall be given before the expiry of such period. This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause
The Engineer	
3.1 ENGINEER'S DUTIES AND AUTHORITY	The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties. The Engineer shall have no authority to amend the Contract. The Engineer may exercise the authority attributable to the

To be continued

	Engineer as specified in or necessarily to be implied from the Contract. If the Engineer is required to obtain the approval of the Employer before exercising a specified authority, the requirements shall be as stated in the Special Conditions of Contract. The Employer shall promptly inform the Contractor of any change to the authority attributed to the Engineer. However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval. Except as otherwise stated in these Conditions: (a) whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Engineer shall be deemed to act for the Employer; (b) the Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract; (c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances ; and (d) Any act by the Engineer in response to a Contractor's request except as otherwise expressly specified shall be notified in writing to the Contractor within 28 days of receipt The following provisions shall apply: The Engineer shall obtain the specific approval of the Employer before taking action under the-following Sub-Clauses of these Conditions:

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	(a) Sub-Clause 4.12: agreeing or determining an extension of time and/or additional cost. (b) Sub-Clause 13.1: instructing a Variation, (c) Sub-Clause 13.2: Approving a proposal for Variation submitted by the Contractor in accordance with Sub Clause 13.1 Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer
3.2 DELEGATION BY THE ENGINEER	The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Engineer shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.5 [Determinations]. Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Contractor to the extent defined by the

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	delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer. However: (a) any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials; (b) if the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction
3.3 INSTRUCTIONS OF THE ENGINEER	The Engineer may issue to the Contractor (at any time) instructions and additional or modified Drawings which may be necessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply. The Contractor shall comply with the instructions given by the Engineer or delegated assistant, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing
3.4 REPLACEMENT OF THE ENGINEER	If the Employer intends to replace the Engineer, the Employer shall have the right to replace the Engineer
3.5 DETERMINATIONS	Whenever these Conditions provide that the Engineer shall proceed in accordance with this Sub-Clause 3.5 to agree or determine any matter, the Engineer shall consult with each

To be continued

	Party in an Endeavour to reach agreement. If agreement is not achieved, the Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances. The determination arrived by the Engineer shall be final and binding unless and until revised under Clause 20 [Claims, Disputes and Arbitration].
4. The Contractor	
4.1 CONTRACTOR'S GENERAL OBLIGATIONS	The Contractor shall design (to the extent specified in the Contract), execute and complete the Works in accordance with the Contract and with the Engineer's instructions, and shall remedy any defects in the Works. The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects. The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (i) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item of Plant and Materials as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the design or specification of the Permanent Works. Prior to the commencement of the Tests on Completion, the Contractor shall submit to the Engineer the "as-built" documents and, if applicable, operation and maintenance manuals in accordance with the Specification and in sufficient

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	detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until these documents and manuals have been submitted to the Engineer
4.2 PERFORMANCE SECURITY	The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount stated in the Contract Data and denominated in the currency (ies) of the Contract. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply. The Contractor shall deliver the Performance Security to the Employer within 10 days after receiving the Letter of Award, and shall send a copy to the Engineer. The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied. The Employer shall return the Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate. Without limitation to the provisions of the rest of this Sub-Clause, whenever the Engineer determines an addition to the Contract Price as a result of a change in cost and/or legislation, or as a result of a Variation, amounting to more than 15 percent of the portion of the Contract Price payable in a specific currency, the Contractor shall at the Engineer's request

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	promptly increase, the value of the Performance Security in that currency by an equal percentage. Penalties / Liquidated damages including for delays [if any] at the time project execution will be levied as per the prevailing latest G.O. of Govt., of Andhra Pradesh
4.3 CONTRACTOR'S REPRESENTATIVE	The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract. Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Engineer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked in terms of Sub-Clause 6.9 [Contractor's Personnel], or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint a replacement. The whole time of the Contractor's Representative shall be given to directing the Contractor's performance of the Contract. If the Contractor's Representative is to be temporarily absent from the Site during the execution of the Works, a suitable replacement person shall be appointed, subject to the Engineer's prior consent, and the Engineer shall be notified accordingly. The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 [Instructions of the Engineer]. The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at

To be continued

	any time revoke the delegation. Any delegation or revocation shall not take effect until the Engineer has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked
4.4 SUBCONTRACTORS	The Contractor shall not subcontract the Works. The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. Unless otherwise stated in the Special Conditions of Contract: (a) the Contractor shall not be required to obtain consent to suppliers solely of Materials, or to a subcontract for which the Subcontractor is named in the Contract; (b) the prior consent of the Engineer shall be obtained to other proposed Subcontractors; (c) each subcontract shall include provisions which would entitle the Employer to require the subcontract to be assigned to the Employer under Sub-Clause 4.5 [Assignment of Benefit of Subcontract] (if or when applicable) or in the event of termination under Sub-Clause 15.2 [Termination by Employer]. The Contractor shall ensure that the requirements imposed on the Contractor by Sub-Clause 1.12 [Confidential Details] apply equally to each Subcontractor
4.5 ASSIGNMENT OF BENEFIT OF SUBCONTRACT	If a Subcontractor's obligations extend beyond the expiry date of the relevant construction period and the Engineer, prior to this date, instructs the Contractor to assign the benefit of such obligations to the Employer, then the Contractor shall do so
4.6 CO-OPERATION	The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

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	(a) the Employer's Personnel, (b) any other contractors employed by the Employer, and (c) the personnel of any legally constituted public authorities, who may be employed in the execution on or near the Site of any work not included in the Contract
4.7 SETTING OUT	The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.
4.8 SAFETY PROCEDURES	The Contractor shall: (a) comply with all applicable safety regulations, (b) take care for the safety of all persons entitled to be on the Site, (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons, (d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and (e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.
4.9 QUALITY ASSURANCE	The Contractor shall institute a quality assurance system to

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	demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer shall be entitled to audit any aspect of the system. Details of all procedures and compliance documents shall be submitted to the Engineer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself. Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.
4.10 SITE DATA	To the extent which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation): (a) the form and nature of the Site, including sub- surface conditions, (b) the hydrological and climatic conditions, (c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects, (d) the applicable Laws of Country.

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	(e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.
4.11 SUFFICIENCY OF THE ACCEPTED CONTRACT AMOUNT	The Contractor shall be deemed to: (a) have satisfied himself as to the correctness and sufficiency of the Accepted Contract Amount, and (b) have based the Accepted Contract Amount on the data, interpretations, necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.10 [Site Data]. Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract and all things necessary for the proper execution and completion of the Works and the remedying of any defects.
4.12 UNFORESEEABLE PHYSICAL CONDITIONS	In this Sub-Clause, "physical conditions" means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions. If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Engineer as soon as practicable.
4.13 RIGHTS OF WAY AND FACILITIES	Unless otherwise specified in the Contract the Employer shall provide effective access to and possession of the Site including special and/or temporary rights-of-way which are necessary for the Works. The Contractor shall obtain, at his risk and cost, any additional rights of way or facilities outside the Site which he may require for the purposes of the Works.

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4.14 AVOIDANCE OF INTERFERENCE	The Contractor shall not interfere unnecessarily or improperly with: (a) the convenience of the public, or (b) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others. The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.
4.15 ACCESS ROUTE	The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site at Base Date. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes. Except as otherwise stated in these Conditions: (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes; (b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions; (c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route;

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	(d) the Employer does not guarantee the suitability or availability of particular access routes; and (e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.
4.16 TRANSPORT OF GOODS	Unless otherwise stated in the Special Conditions of Contract: (a) the Contractor shall give the Engineer not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site; (b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and (c) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.
4.17 CONTRACTOR'S EQUIPMENT & MACHINERY	The Contractor shall be responsible for all Contractor's Equipment and Machinery. When brought on to the Site, Contractor's Equipment and machinery shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any major items of Contractor's Equipment and machinery without the consent of the Engineer. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.
4.18 PROTECTION OF THE ENVIRONMENT	The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise

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	and other results of his operations.
4.19 ELECTRICITY ANDWATER	Unless otherwise stated in Special Conditions of Contract, the Contractor shall, be responsible for the provision of all power, water and other services he may require for his construction activities and to the extent defined in the Specifications, for the tests.
4.20 EMPLOYER'S FREE-ISSUE MATERIALS	The Employer shall supply, free of charge, the "free- issue materials" (if any) in accordance with the details stated in the Specification. The Employer shall, at his risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them, and shall promptly give notice to the Engineer of any shortage, defect or default in these materials. After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor.
4.21 PROGRESS REPORTS	Unless otherwise stated in the Special Conditions of Contract, monthly progress reports shall be prepared by the Contractor and submitted to the Engineer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates. Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works. Each report shall include:- (a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by

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	each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]), (b) photographs showing the status of manufacture and of progress on the Site; (c) the details described in Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment]; (d) copies of quality assurance documents, test results and certificates of Materials; (e) list of notices given under Sub-Clause 2.4 [Employer's Claims] and notices given under Sub- Clause 20.1 [Contractor's Claims]; (f) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and (g) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.
4.22 SECURITY OF THE SITE	The Contractor will be responsible for safety and security of all authorised persons available on site. No unauthorized personnel shall be available on site
4.23 CONTRACTOR'S OPERATIONS ON SITE	The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Engineer as additional working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these

To be continued

	additional areas, and to keep them offadjacent land. During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required. Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Project execution Period, such Goods as are required for the Contractor to fulfill obligations under the Contract
4.24 FOSSILS	All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings. The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it
5. NOMINATED SUBCONTRACTORS	
5.1 DEFINITION OF "SUBCONTRACTOR"	In the Contract, "nominated Subcontractor" means a Subcontractor who is stated in the Contract as being a nominated Subcontractor

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5.2 PAYMENTS TO NOMINATED SUBCONTRACTORS	Unless otherwise specifically stated in this contract all payments will be made to the Contractor and the Contractor is liable to the Sub contractors for payments they are eligible for the work done. If however a sub-contractor to the Contractor brings to the notice of the Engineer the failure of Contractor to pay eligible sums due to it after receipt of corresponding payments from the Employer by the Contractor, then the Employer may (at his sole discretion) pay, direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed pay subject to evidence given by the subcontractor. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.
6. STAFF AND LABOUR	
6.1 ENGAGEMENT OF STAFF AND LABOUR	Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, feeding, transport, and, appropriate, housing.
6.2 RATES OF WAGES AND CONDITIONS OF LABOUR	The Contractor shall pay to labour employed by him either directly or through Sub-Contractors wages not less than fair wages as defined in the relevant Central / Local Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act 1970 and the Contract Labour Regulation and Abolition of Central Rules 1971, wherever applicable. He shall also abide by the minimum wages and other regulations applicable to the labour engaged in the Work, as laid down by the concerned Central / local authorities (State, District or other local Authorities.

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6.3 PERSONS IN THE SERVICE OF EMPLOYER	The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.
6.4 LABOUR LAWS	The Contractor shall be wholly and solely responsible for full compliance with the provisions under all labour laws and /or regulations such as Payment of Wages Act 1948, Employees Liability Act 1938, Workmen's Compensation Act 1923, Employees State Insurance Act 1948, Employees Provident Fund Act 1952, Industrial Disputes Act 1947, the Maternity Benefit Act 1961, the Contract Labour (Regulation and Abolition) Act 1970 and the Factories Act 1948 or any modifications thereof or any other law relating thereto and rules there under introduced from time to time. The Contractor shall assume liability and shall indemnify the Employer & the Engineer from every expense, liability or payment by reason of the application of any labour law, act, rules or regulations existing or to be introduced at a future date during the term of the Contract. In general, in respect of all labour directly or indirectly employed in the Work for the performance of Contractor's part of the Contract, the Contractor shall comply with all the rules framed by the Government authorities concerned from time to time for Protection of the health and welfare of the workers. The Contractor shall at his own cost obtain a valid license for himself and the Employer under the Contract Labour (R & A) Act 1970 and the Contract labour (Regulation and Abolition) Central Rules 1971 and under any other applicable rules before the commencement of the Work and continue to have a valid licenses until the completion of the Work

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6.5 WORKING HOURS	No work shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours stated in the Contract Data, unless: (a) otherwise stated in the Contract, (b) the Engineer gives consent, or (c) The work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.
6.6 FACILITIES FOR STAFF AND LABOUR	Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification. The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.
6.7 HEALTH AND SAFETY	The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. The Contractor shall at his own expense arrange for all the safety provisions as listed in (i) Safety codes of C.P.W.D. and

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	Bureau of Indian Standards, (ii) The Electricity Act, (iii) The Mines Act, and Regulations, (iv) Regulations of employment & conditions of service Act 1996, Rules and Orders made there under and such other acts as applicable The Contractor shall appoint a Safety Officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority. The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.
6.8 CONTRACTOR'S SUPERINTENDENCE	Throughout the execution of the Works, and as long thereafter as is necessary to fulfil the Contractor's obligations, the Contractor shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the work.
6.9 CONTRACTOR'S PERSONNEL	The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Engineer may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who: (a) persists in any misconduct or lack of care, (b) carries out duties incompetently or negligently, (c) fails to conform with any provisions of the

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	Contract, (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment, or (e) Based on reasonable evidence, is determined to have engaged in Fraud and Corruption during the execution of the Works. If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person
6.10 RECORDS OF CONTRACTOR'S PERSONNEL AND EQUIPMENT	The Contractor shall submit, to the Engineer, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Engineer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.
6.11 SUPPLY OF WATER	The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.
6.12 PROHIBITION OF CHILD LABOUR	The Contractor shall not employ any children/ child labour below the age of 18 years.
6.13 EMPLOYMENT RECORDS OF WORKERS	The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment].
6.14 CONTRIBUTION TOWARDS EMPLOYEE BENEFITS, FUNDS	The Contractor shall include in the Contract Price all expenses

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ETC.	necessary to meet his obligations for making contributions toward employee benefits funds such as Employee Provident fund (EPF), Employee State Insurance Scheme (ESI) benefits, old age pension and/or any other benefits/compensation legally payable in compliance with all the statutory regulations and requirements. All records in this connection shall be properly maintained by the Contractor and produced for scrutiny by the concerned authorities and the Engineer and the Employer when called for.
7. PLANT, MATERIALS AND WORKMANSHIP	
7.A DESIGNS BY THE EMPLOYER	The Contractor should carry out the work as per the designs and Good For Construction drawings given by the Employer for all elements of the project. The Employer shall provide the drawings as per the Construction programme of the Contractor. It is the responsibility of the Contractor to collect the Good for Construction drawings from the Employer by submitting Request for Information (RFI). The Employer shall reply and share the drawings upon the receipt of RFI within 7 days from the day of raising the RFI
7.1 MANNER OF EXECUTION	The Contractor shall carry out the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works: (a) in the manner (if any) specified in the Contract, (b) in a proper workmanlike and careful manner, in accordance with recognised good practice, and (c) with properly equipped facilities and non- hazardous Materials, except as otherwise specified in the Contract.
7.2 SAMPLES	The Contractor shall submit samples of materials and relevant information to the Engineer as per Section V

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7.3 INSPECTION	The Employer's Personnel shall at all reasonable times: (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and (b) During production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials. The Contractor shall give the Employer's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility. The Contractor shall give notice to the Engineer whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Engineer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer, uncover the wo rk and thereafter reinstate and make good, all at the Contractor's cost
7.4 TESTING	This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any). Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified

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	tests efficiently. The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed, the Engineer shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect.
7.5 REJECTION	If, as a result of an examination, inspection, measurement or testing, any Plant, Materials or workmanship is found to be defective or otherwise not in accordance with the Contract, the Engineer may reject the Plant, Materials or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract. If the Engineer requires this Plant, Materials or workmanship to be retested, the tests shall be repeated under the same terms and conditions. If the rejection and retesting cause the Employer to incur additional costs, the Contractor shall subject to Sub- Clause 2.4 [Employer's Claims] pay these costs to the Employer.
7.6 REMEDIAL WORK	Notwithstanding any previous test or certification, the Engineer may instruct the Contractor to: (a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract, (b) remove and re-execute any other work which is not in accordance with the Contract, and (c) Execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise. The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the

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	instruction, or immediately if urgency is specified under sub-paragraph (c). If the Contractor fails to comply with the instruction, the Employer shall be entitled to employ and pay other persons to carry out the work. Except to the extent (a) that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.4 [Employer's Claims] pay to the Employer all costs arising from this failure
7.7 OWNERSHIP OF PLANT AND MATERIALS	The machinery engaged by the Contractor will be the Property of himself.
7.8 ROYALTIES	Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other payments for: (a) natural Materials obtained from outside the Site, and (b) The disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal areas within the Site are specified in the Contract.
8. COMMENCEMENT, DELAYS AND SUSPENSION	
8.1 COMMENCEMENT OF WORKS	The commencement of the work will be as per Special Conditions of Contract. The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date, and shall then proceed with the Works with due expedition and without delay
8.2 TIME FOR COMPLETION	The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including: (a) achieving the passing of the Tests on Completion

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	and (b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections]. The Time for completion will be as per Special Conditions of Contract.
8.3 PROGRAMME	The Contractor shall submit a detailed time programme to the Engineer within 28 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]. The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include: (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing, (b) the sequence and timing of inspections and tests specified in the Contract, and (c) a supporting report which includes resource statement to be deployed to achieve the progress of work The Contractor shall promptly give notice to the Engineer of specific probable future events or circumstances which may adversely affect the work, increase the Contract Price or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal under Sub-Clause 13.2 [Variation Procedure].

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	If, at any time, the Engineer gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Engineer in accordance with this Sub-Clause
8.4 EXTENSION OF TIME FOR COMPLETION	The Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 [Taking Over of the Works and Sections] is or will be delayed by any of the following causes: (a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.2 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the Contract, (b) exceptionally adverse climatic conditions, If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with Sub-Clause 20.1 [Contractor's Claims].
8.5 DELAY DAMAGES	If the Contractor fails to comply with Sub-Clause 8.2 [Time for Completion], the Contractor shall subject to notice under Sub-Clause 2.4 [Employer's Claims] pay delay damages to the Employer for this default. These delay damages shall be the sum stated in the Contract Data, which shall be paid for every day which shall elapse between the relevant Time for Completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Contract Data.

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	These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Sub-Clause 15.2 [Termination by Employer] prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.
8.6 SUSPENSION OF WORK	The Engineer may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage. The Engineer may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, then Sub-Clauses 8.7 shall not apply
8.7 CONSEQUENCES OF SUSPENSION	If the Contractor suffers delay and/or incurs Cost from complying with the Engineer's instructions under Sub- Clause 8.6 [Suspension of Work] and/or from resuming the work, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion] After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters. The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship

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	or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.6 [Suspension of Work].
8.8 RESUMPTION OF WORK	After the permission or instruction to proceed is given, the Contractor and the Engineer shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension after receiving from the Engineer an instruction to this effect.
9. TESTS ON COMPLETION	
9.1 CONTRACTOR'S OBLIGATIONS	The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4 [Testing], after providing the documents in accordance with sub-paragraph (d) of Sub-Clause 4.1 [Contractor's General Obligations]. The Contractor shall give to the Engineer not less than 7 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 7 days after this date, on such day or days as the Engineer shall instruct. In considering the results of the Tests on Completion, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the results of these Tests to the Engineer
9.2 DELAYED TESTS	If the Tests on Completion are being unduly delayed by the Contractor, the Engineer may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Tests on such day or days

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	within that period as the Contractor may fix and of which he shall give notice to the Engineer. If the Contractor fails to carry out the Tests on Completion within the period of 21 days, the Employer's Personnel may proceed with the Tests at the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted as accurate
9.3 RETESTING	If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.5 [Rejection] shall apply, and the Engineer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.
9.4 FAILURE TO PASS TESTS ON COMPLETION	If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause 9.3 [Retesting], the Engineer shall be entitled to: (a) order further repetition of Tests on Completion under Sub-Clause 9.3; (b) if the failure deprives the Employer of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Employer shall have the same remedies as are provided in sub- paragraph (c) of Sub-Clause 11.4 [Failure to Remedy Defects].
10. EMPLOYER'S TAKING OVER	
10.1 TAKING OVER OF THE WORKS AND SECTIONS	Except as stated in Sub-Clause 9.4 [Failure to Pass Tests on Completion], the Works shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 [Time for Completion] and except as allowed

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	in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause. The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section. The Engineer shall, within 28 days after receiving the Contractor's application: (a) issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract or (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause
10.2 TAKING OVER OF PARTS OF THE WORKS	The Engineer may, at the sole discretion of the Employer, issue a Taking-Over Certificate for any part of the Permanent Works. After the Engineer has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Liability Period
10.3 SURFACES REQUIRING REINSTATEMENT	Except as otherwise stated in a Taking-Over Certificate, a certificate for a Section or part of the Works shall not be deemed to certify completion of any ground or other surfaces requiring reinstatement.

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11. DEFECTS LIABILITY PERIOD	
11.1 COMPLETION OF OUTSTANDING WORK	In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by in accordance with the Contract, including the matters described in Sub-Clause 8.2 [Time for Completion] and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section. The Engineer shall, within 28 days after receiving the Contractor's application: (a) issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract or (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause
11.2 COST OF REMEDYING DEFECTS	All work referred to in sub-paragraph (b) of Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects] shall be executed at the risk and cost of the Contractor.
11.3 EXTENSION OF DEFECTS LIABILITY PERIOD	The Employer shall be entitled subject to Sub-Clause 2.4 [Employer's Claims] to an extension of the Defects Liability Period for the Works or a Section if and to the extent that the

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	Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or by reason of damage attributable to the Contractor.
11.4 FAILURE TO REMEDY DEFECTS	If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date. If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub- Clause 11.2 [Cost of Remedying Defects], the Employer may (at his option): (a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub- Clause 2.4 [Employer's Claims] pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage; or (b) if the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works, terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.
11.5 REMOVAL OF DEFECTIVE WORK	If the defect or damage cannot be remedied expeditiously on the Site and the Employer gives consent, the Contractor may

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	remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items.
11.6 RIGHT OF ACCESS	Until the Performance Certificate has been issued, the Contractor shall have such right of access to the Works as is reasonably required in order to comply with this Clause, except as may be inconsistent with the Employer's reasonable security restrictions.
11.7 PERFORMANCE CERTIFICATE	Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract. The Engineer shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defects Liability Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer. Only the Performance Certificate shall be deemed to constitute acceptance of the Works.
11.8 UNFULFILLED OBLIGATIONS	After the Performance Certificate has been issued, each Party shall remain liable for the fulfilment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force
11.9 CLEARANCE OF SITE	Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

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	If all these items have not been removed within 28 days after receipt by the Contractor of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site. Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer
12. MEASUREMENT AND EVALUATION	
12.1 WORKS TO BE MEASURED	The Works shall be measured, and valued for payment, in accordance with this Clause. The Contractor shall show in each application under Sub-Clauses 14.3 [Application for Interim Payment Certificates], 14.8 [Statement on Completion] and 14.9 [Application for Final Payment Certificate] the quantities and other particulars detailing the amounts which he considers to be entitled under the Contract. Whenever the Engineer requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall: (a) promptly either attend or send another qualified representative to assist the Engineer in making the measurement, and (b) supply any particulars requested by the Engineer. If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) the Engineer shall be accepted as accurate
12.2 METHOD OF MEASUREMENT	To measure the under this Contract the standard method of measurement in accordance with the Standards laid down by Bureau of Indian Standards (IS: 1200) shall be followed.

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	However, if definite methods of measurements are stipulated in the Specifications, then the same shall supersede BIS methods and shall be followed
12.3 EVALUATION	Except as otherwise stated in the Contract, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 and 12.2 and the appropriate rate or price for the item. For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contract OR, if there is no such item, specified for similar work. Any item of work included in the Bill of Quantities for which no rate or price was specified shall be considered as included in other rates and prices in the Bill of Quantities and will not be paid for separately. However, a new rate or price shall be appropriate for an item of work if: (a) (i) the measured quantity of the item is changed by more than 25% from the quantity of this item in the Bill of Quantities or other Schedule, (ii) this change in quantity multiplied by such specified rate for this item exceeds 5% of the Accepted Contract Amount, (iii) this item is not specified in the Contract as a "fixed rate item"; or (b)(i) the work is instructed under Clause 13 [Variations and

To be continued

	Adjustments], (ii) no rate or price is specified in the Contract for this item, and no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract. Each new rate or price shall be derived from any relevant rates or prices in the Contract, with reasonable adjustments to take account of the matters described in sub-paragraph (a) and/or (b), as applicable. If no rates or prices are relevant for the derivation of a new rate or price, it shall be derived from the reasonable Cost of executing the work, together with profit, taking account of any other relevant matters. Until such time as an appropriate rate or price is agreed or determined, the Engineer shall determine a provisional rate or price for the purposes of Interim Payment Certificates as soon as the concerned work commences.
13. VARIATIONS AND ADJUSTMENTS	
13.1 RIGHT TO VARY	Variations may be initiated by the Engineer at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal. The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Engineer stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, or (ii) such Variation triggers a substantial change in the sequence or progress of the Works. Upon receiving this notice, the Engineer shall cancel, confirm or vary the instruction.

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	Each Variation may include: a)changes to the quantities of any item of work included in the Contract (however, such changes do not necessarily constitute a Variation), b)changes to the quality and other characteristics of any item of work c)changes to the levels, positions and/or dimensions of any part of the Works, d)omission of any work unless it is to be carried out by others.any additional work, Plant, Materials or services necessary for the Permanent Works, including any associated Tests on Completion, boreholes and other testing and exploratory work, or e) changes to the sequence or timing of the execution of the Works. f)The Contractor shall not make any alteration and/or modification of the Permanent Works, unless and until the Engineer instructs or approves a Variation. g) The Engineer-in-Charge shall have power (i) to make any alterations in, omissions from, additions to or substitutions for, instructions that may appear to him to be necessary during the progress of the work, (ii) to omit part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions, or substitutions shall form part of the contract as if originally provided therein and any altered, additions or substituted works which the contractor may be directed to do in the manner specified above as part of the work, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work.
13.2 VARIATION PROCEDURE	If the Engineer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if

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	this is the case) or by submitting: (a) a description of the proposed work to be performed and a programme for its execution, (b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 [Programme] and to the Time for Completion, and (c) the Contractor's proposal for evaluation of the Variation. The Engineer shall, as soon as practicable after receiving such proposal respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response. Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Engineer to the Contractor, who shall acknowledge receipt. Each Variation shall be evaluated in accordance with Clause 12 [Measurement and Evaluation], unless the Engineer instructs or approves otherwise in accordance with this Clause.
13.3 ADJUSTMENTS FOR CHANGES IN COST/ PRICE ADJUSTMENT	If this Sub-Clause applies, the amounts payable to the Contractor shall be adjusted for rises or falls in the cost of labour, Goods and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in Special Conditions of Contract Section VII
14. CONTRACT PRICE AND PAYMENT	
14.1 THE CONTRACT PRICE	Unless otherwise stated in the Special Conditions of Contract: (a) the Contract Price shall be agreed or determined under Sub-Clause 12.3 [Evaluation] and be subject to adjustments in

To be continued

	accordance with the Contract; (b) the Contractor shall pay all statutory taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs (c) any quantities which may be set out in the Bill of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities: (i) of the Works which the Contractor is required to execute, or (ii) for the purposes of Clause 12 [Measurement and Evaluation]; and (d) the Contractor shall submit to the Engineer, within 28 days after the Commencement Date, a proposed breakdown of each lump sum price in the Schedules. The Engineer may take account of the breakdown when preparing Payment Certificates, but shall not be bound by it
14.2 MOBILIZATION ADVANCE	The Employer shall make a mobilization advance to the contractor if requested by the Contractor, at an interest rate specified in Contract Data of Special Conditions of Contract towards mobilization and cash flow support, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment, the number and timing of installments (if more than one), and the applicable currencies and proportions, shall be as stated in the Contract Data. Unless and until the Employer receives this guarantee, or if the total Mobilization Advance is not stated in the Contract Data, this Sub-Clause shall not apply.

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	Unless stated otherwise in the Contract Data, the Mobilization Advance payment shall be repaid through percentage deductions from the interim payments determined by the Engineer in accordance with Sub- Clause 14.6 [Issue of Interim Payment Certificates]
14.3 APPLICATION FOR INTERIM PAYMENT CERTIFICATES	The Contractor shall submit a Statement in 3 (three) copies to the Engineer after the end of each month, in a form approved by the Engineer, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month in accordance with Sub-Clause 4.21 [Progress Reports]. The Statement shall include the following items in the sequence listed: (a) the estimated contract value of the Works executed and the Contractor's Documents produced up to the end of the month (including Variations but excluding items described in sub- paragraphs (b) to (g) below); (b) any amount to be deducted for advance payment, retention, calculated by applying the percentage of retention stated in the Contract Data to the total of the above amounts, until the amount so retained by the Employer reaches the limit of Retention Money (if any) stated in the Contract Data; (c) any other additions or deductions which may have become due under the Contract or otherwise, including those under Clause 20 [Claims, Disputes and Arbitration]; and (d) the deduction of amounts certified in all previous Payment Certificates.
14.4 SCHEDULE OF PAYMENTS	If the Contract includes a schedule of payments specifying

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	the instalments in which the Contract Price will be paid, then unless otherwise stated in this schedule: (a) the instalments quoted in this schedule of payments shall be the estimated contract values for the purposes of sub-paragraph (a) of Sub- Clause 14.3 [Application for Interim Payment Certificates]; and (b) if these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less than that on which this schedule of payments was based, then the Engineer may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine revised instalments, which shall take account of the extent to which progress is less than that on which the instalments were Previously based
14.5 ISSUE OF INTERIM PAYMENT CERTIFICATES	No amount will be certified or paid until the Employer has received and approved the Performance Security. Thereafter, the Engineer shall, within 28 days after receiving a Statement and supporting documents, deliver to the Employer and to the Contractor an Interim Payment Certificate which shall state the amount which the Engineer fairly determines to be due, with all supporting particulars for any reduction or withholding made by the Engineer on the Statement if any. The Engineer may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A Payment Certificate shall not be deemed to indicate the Engineer's acceptance, approval, consent or satisfaction.
14.6 PAYMENT	The Employer shall pay to the Contractor: (a) the amount certified in each Interim Payment Certificate within 30 days after the Engineer receives the Statement

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	and supporting documents and the payment based on the input quantity of waste processed from the Dumpyard. (b) the amount certified in the Final Payment Certificate within 45 days after the Employer receives this Payment Certificate
14.7 PAYMENT OF RETENTION MONEY	When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Engineer for payment to the Contractor. Promptly after the latest of the expiry dates of the Defects Liability Periods, the outstanding balance of the Retention Money shall be certified by the Engineer for payment to the Contractor. However, if any work remains to be executed under Clause 11 [Defects Liability], the Engineer shall be entitled to withhold certification of the estimated cost of this work until it has been executed
14.8 STATEMENT AT COMPLETION	Unless given more specifically in the Special Conditions of the Contract, the Contractor within 30 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Engineer three copies of a Statement at completion with supporting documents, in accordance with Sub-Clause 14.3 [Application for Interim Payment Certificates], showing the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works
14.9 APPLICATION FOR FINAL PAYMENT CERTIFICATE	Within 60 days after receiving the Performance Certificate, the Contractor shall submit, to the Engineer, three copies of a draft final statement with supporting documents showing in detail in a form approved by the Engineer the value of all work

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	done in accordance with the Contract, and If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require within 28 days from receipt of said draft and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".
14.10 DISCHARGE	When submitting the Final Statement, the Contractor shall submit a discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract.
14.11 ISSUE OF FINAL PAYMENT CERTIFICATE	Within 28 days after receiving the Final Statement and discharge in accordance with Sub-Clause 14.9 [Application for Final Payment Certificate] and Sub- Clause 14.10 [Discharge], the Engineer shall deliver, to the Employer and to the Contractor, the Final Payment Certificate which shall state: (a) the amount which he fairly determines is finally due, and (b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be. If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.9 [Application for Final Payment Certificate] and Sub- Clause 14.10 [Discharge], the Engineer shall request the Contractor to do so. If the Contractor fails to submit an application within a period of 28

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	days, the Engineer shall issue the Final Payment Certificate for such amount as he fairly determines to be due
14.12 CESSATION OF EMPLOYER'S LIABILITY	The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it in the Final Statement
15. TERMINATION BY EMPLOYER	
15.1 NOTICE TO CORRECT	If the Contractor fails to carry out any obligation under the Contract, the Engineer may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time
15.2 TERMINATION BY EMPLOYER	The Employer shall be entitled to terminate the Contract if the Contractor: (a) fails to comply with Sub-Clause 4.2 [Performance Security] or with a notice under Sub-Clause 15.1 [Notice to Correct], (b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract, (c) subcontracts the whole of the Works or assigns the Contract without the required agreement, (d) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, (e) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward: (i) for doing or forbearing to do any action in relation to the Contract, or (ii) for showing or forbearing to show favour or disfavour to

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	any person in relation to the Contract, In any of these events or circumstances, the Employer may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (e), the Employer may by notice terminate the Contract immediately. The Employer's election to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise. The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Engineer. Notwithstanding anything stated here in above, the employer may terminate this agreement for conveyance. The termination shall take effect 30(Thirty) days from the date of notice.
15.3 VALUATION AT DATE OF TERMINATION	As soon as practicable after a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract
15.4 PAYMENT AFTER TERMINATION	After a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Employer may: (a) proceed in accordance with Sub-Clause 2.4 [Employer's Claims],

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	(b) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or (c) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3 [Valuation at Date of Termination]. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor
16. SUSPENSION AND TERMINATION BY CONTRACTOR	
16.1 CONTRACTOR'S ENTITLEMENT TO SUSPEND WORK ENTITLEMENT TO SUSPEND WORK	If the Engineer fails to certify in accordance with Sub-Clause 14.5 [Issue of Interim Payment Certificates] or Sub-Clause 14.6 [Payment], the Contractor may, after giving not less than 21 days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice. If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.
16.2 TERMINATION BY CONTRACTOR CONTRACTOR	The Contractor shall be entitled to terminate the Contract if: a. the Engineer fails, within 30 days after receiving a Statement and supporting documents, to issue the relevant

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	Payment Certificate, b. the Contractor does not receive the amount due under an Interim Payment Certificate within 42 days after the expiry of the time stated in Sub- Clause 14.6 [Payment] within which payment is to be made (except for deductions in accordance with Sub-Clause 2.4 [Employer's Claims]), c. the Employer substantially fails to perform his obligations under the Contract in such manner as to materially and adversely affect the economic balance of the Contract and/or the ability of the Contractor to perform the Contract, d. the Employer fails to comply with Sub-Clause 1.6 [Contract Agreement] or Sub-Clause 1.7 [Assignment] In any of these events or circumstances, the contractor may upon giving 14 days notice to the Employer terminate the Contract
16.3 CESSATION OF WORK AND REMOVAL OF CONTRACTOR'S EQUIPMENT	After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] or Sub-Clause 19.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly: (a) cease all further work, except for such work as may have been instructed by the Engineer for the protection of life or property or for the safety of the Works, (b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and (c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

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16.4 PAYMENT ON TERMINATION	After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the Employer shall promptly: (a) return the Performance Security to the Contractor, (b) pay the Contractor in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release], and (c) pay to the Contractor the amount of any loss or damage sustained by the Contractor as a result of this termination.
17. RISK AND RESPONSIBILITY	
17.1 INDEMNITIES	The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of: (a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and (b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, wilful

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	act or breach of the Contract by the Employer, the Employer's Personnel, their respective agents, or anyone directly or indirectly employed by any of them
17.2 CONTRACTOR'S CARE OF THE WORKS	The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 [Taking Over of the Works and Sections]) for the Works, when responsibility for the care of the Works shall pass to the Employer. If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 [Employer's Risks], the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract. The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.
17.3 EMPLOYER'S RISKS	The risks referred to in Sub-Clause 17.4 [Consequences of Employer's Risks] below, insofar as they directly affect the execution of the Works in the Country, are: (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, (b) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or

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	usurped power, or civil war, within the Country, (c) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel, (d) any operation of the forces of nature which is Unforeseeable or against which an experienced contractor could not reasonably have been expected to have taken adequate preventive precautions
17.4 CONSEQUENCES OF EMPLOYER'S RISKS	If and to the extent that any of the risks listed in Sub- Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer. If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to: (a) an extension of time for any such delay, if completion is or will be delayed, under Sub- Clause 8.4 [Extension of Time for Completion], and (b) payment of any such Cost, which shall be included in the Contract Price. In the case of sub- paragraphs (f) and (g) of Sub-Clause 17.3 [Employer's Risks], Cost plus profit shall be payable. After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.
17.5 INTELLECTUAL AND INDUSTRIAL PROPERTY RIGHTS	In this Sub-Clause, "infringement" means an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark, trade name, trade secret or other

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	intellectual or industrial property right relating to the Works; and "claim" means a claim (or proceedings pursuing a claim) alleging an infringement. The Contractor shall indemnify and hold the Employer harmless against and from any other claim which arises out of or in relation to (i) the manufacture, use, sale or import of any goods or (ii) any design for which the Contractor is responsible. If a Party is entitled to be indemnified under this Sub- Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party
17.6 USE OF EMPLOYER'S ACCOMMODATION / FACILITIES	The Contractor shall take full responsibility for the care of the Employer provided accommodation and facilities, if any, as detailed in the Specification, from the respective dates of hand-over to the Contractor until cessation of occupation (where hand-over or cessation of occupation may take place after the date stated in the Taking-Over Certificate for the Works). If any loss or damage happens to any of the above items while the Contractor is responsible for their care arising from any cause whatsoever other than those for which the Employer is liable, the Contractor shall, at his own cost, rectify the loss or damage to the satisfaction of the Engineer
18. INSURANCE	

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18.1 INSURANCE FOR WORKS AND CONTRACTOR'S EQUIPMENT	Before the commencement of the work, the Contractor shall take and maintain insurances under this Sub- Clause: The Insurance (a) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated to the Party actually bearing the costs of rectifying the loss or damage, (b) shall cover all loss and damage from any cause not listed in Sub-Clause 17.3 [Employer's Risks], (c) shall also cover, to the extent specifically required in the bidding documents of the Contract, loss or damage to a part of the Works which is attributable to the use or occupation by the Employer of another part of the Works, and loss or damage from the risks listed in sub- paragraphs (c), (g) and (h) of Sub-Clause 17.3 [Employer's Risks], excluding (in each case) risks which are not insurable at commercially reasonable terms The Contractor should take Contractor's All Risk Insurance and Extensions on first loss basis: Policy to inter alias cover the following: • Contract works for entire Contract Value plus cost of Owner supplied material valid for the completion period and any extension thereof. • Earthquake, Civil commotion, riots, war and other disturbances. • Debris removal. • Extended Maintenance Cover till completion of Defects Liability Period and any extension thereof.

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18.2 INSURANCE AGAINST INJURY TO PERSONS AND DAMAGE TO PROPERTY (THIRD PARTY)	The Contractor shall insure against any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.1 [Insurance for Works and Contractor's Equipment]) or to any person (except persons insured under Sub- Clause 18.3 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate. This insurance shall be for a limit per occurrence of not less than the amount stated in the Contract Data, with no limit on the number of occurrences. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply. Unless otherwise stated in the Special Conditions of Contract, the insurances specified in this Sub-Clause: (a) shall be effected and maintained by the Contractor as insuring Party, (b) shall be in the joint names of the Parties, (c) shall be extended to cover liability for all loss and damage to the Employer's property (except things insured under Sub-Clause 18.1) arising out of the Contractor's performance of the Contract, and (d) may however exclude liability to the extent that it arises from: (i) the Employer's right to have the Permanent Works executed on, over, under, in or through any land, and to occupy this land for the Permanent Works, (ii) damage which is an unavoidable result of the Contractor's obligations to execute the Works and remedy any defects, and

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	(iii) a cause listed in Sub-Clause 17.3 [Employer's Risks], except to the extent that cover is available at commercially reasonable terms
18.3 INSURANCE FOR CONTRACTOR'S PERSONNEL	The Contractor shall effect and maintain Workmen's Compensation Insurance / equivalent insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel. The insurance shall cover the Employer and the Engineer against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel. The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, the insurance may be affected by the Subcontractor, but the Contractor shall be responsible for compliance with this Clause
18.4 FAILURE TO INSURE	If the Contractor fails to comply with the terms of Sub clause 18, the Engineer may effect and / or keep current (but without obligation to do so) the insurance at the cost and expense of the Contractor and at two times the expenses incurred, deduct the expenses from any moneys that may be or become payable to the Contractor or may use his option, refuse payment of any certificate to the Contractor until the Contractor complies with this condition
19. FORCE MAJEURE	

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19.1 DEFINITION OF FORCE MAJEURE	In this Clause, "Force Majeure" means an exceptional event or circumstance: (a) which is beyond a Party's control, (b) which such Party could not reasonably have provided against before entering into the Contract, (c) which, having arisen, such Party could not reasonably have avoided or overcome, and (d) which is not substantially attributable to the other Party. Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied: (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, (ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war, (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel, (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and (v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity
19.2 NOTICE OF FORCE MAJEURE	If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure. The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.

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	Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.
19.3 DUTY TO MINIMIZE DELAY	Each Party shall at all times use all reasonable endeavors to minimize any delay in the performance of the Contract as a result of Force Majeure. A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure
19.4 CONSEQUENCES OF FORCE MAJEURE	If the Contractor is prevented from performing his substantial obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to: (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and (b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 19.1 [Definition of Force Majeure] and, in sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 18.1 [Insurance for Works and Contractor's Equipment]. After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters
19.5 FORCE MAJEURE AFFECTING SUBCONTRACTOR	If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause
19.6 OPTIONAL TERMINATION, PAYMENT AND RELEASE	If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], or for multiple periods which total more

To be continued

	than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment]. Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include: (a) the amounts payable for any work carried out for which a price is stated in the Contract; (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal; (c) other Cost or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works.
19.7 RELEASE FROM PERFORMANCE	Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 19.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause 19.6.
20. CLAIMS, DISPUTES AND ARBITRATION	

To be continued

20.1 CONTRACTOR'S CLAIMS	If the Contractor considers himself to be entitled to any extension of the Time for Completion under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance. If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended. The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the extension all as relevant to such event or circumstance. The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Employer's liability, the Engineer may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.
20.2 APPOINTMENT OF THE ADJUDICATOR	The Adjudicator shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the SCC, to appoint the Adjudicator within 14 days of receipt of such request. Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the

To be continued

	Contract, a new Adjudicator shall be jointly appointed by the Employer and the Implementing Agency. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority at the request of either party, within 14 days of receipt of such request.
20.3 PROCEDURE FOR DISPUTES	If the Contractor believes that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Engineer's decision. The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute. The Adjudicator shall be paid by the hour at the rate specified in the SCC, together with reimbursable expenses of the types specified in the SCC, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision shall be final and binding. The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place specified in the SCC.
20.4 VOID	
20.5 ARBITRATION	Any dispute between the Parties arising out of or in connection with the Contract not settled amicably in accordance with Sub-Clause 20.5 above and in respect of which the Adjudicator's decision (if any) has not become

To be continued

	final and binding shall be finally settled by arbitration. Arbitration shall be conducted in accordance with The Arbitration and Conciliation Act, 1996 The place of arbitration shall be Tirupati as specified in the Contract Data; and the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language]. The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, and any decision of the Adjudicator relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Engineer from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute
20.6 VOID	
20.7 VOID	

To be continued

Particular Conditions of Contract

Except where otherwise specified, all PCC *should be filled in by the* Employer *prior to issuance of the Bidding Documents. Schedules and reports to be provided by the* Employer *should be annexed.*

Part A - Contract Data		
Sub - Clause	**Conditions**	**Data**
1.1.2.2 & 1.3	Employer's name and address	The Managing Director Tirupati Smart City Corporation Limited, Tilak Road, Tirupati, 517501, AP, India
1.1.2.4 & 1.3	Employer's name and address	The Managing Director Tirupati Smart City Corporation Limited, Tilak Road, Tirupati, 517501, AP, India
1.1.5.6	Sections	Sections Not allowed
1.6	Time for the Parties entering into a Contract Agreement	The successful bidder(s) shall execute contract for the fulfilment of the contract on Rs.100/- non judicial stamp paper in the format enclosed, within 10 days (ten days) from the date of issuance of Letter on Award to the successful bidder. The successful Bidder shall have to submit Letter of Acceptance within 04(four days) working days, from the date of issuance of Letter of Award (LoA). The successful bidder shall complete all the formalities including depositing performance guarantee equivalent to 5% of cost quoted by the bidder including the consideration of Performance Security amount to enter into the contract agreement. After the receipt of the PBG the Employer will enter into agreement with the Contractor and Issue a Work Order within 3 working days from entering into the contract agreement duly indicating the commencement date. The incidental expenses of execution of agreement/contract shall be borne by the successful

To be continued

		bidder.
3.1(b)(ii)	Engineers Duty and Authority	Any Variations resulting in an increase of the Accepted Contract Amount in excess of Contract Price shall require approval of the Employer
4.2	Performance Security	5% of the contract value will be the performance security (PBG) in the form of a Bank Guarantee from a Nationalized/Scheduled/Commercial Bank issued in favour of the Managing Director, Tirupati Smart City Corporation Limited, Tirupati.
4.19	Electricity and water	The client / authority / employer will provide the electricity at the source point and Contractor has to make its own arrangement for internal electricity at the site and contractor has to pay the electricity monthly bills. The Contractor can drill bore wells of required depth for water supply and connect it to the pipe line for water supply which was included in the BoQ
6.5	Normal working hours	8:00 AM to 5:00 PM
7.A	Designs by the Employer	Employer shall give all the required Good for Construction drawings within 15 days from the commencement of the Contract.
7.3	Inspection	All works are to be executed in conformity to the relevant BIS Code of Practice. PMC will inspect for quality control as per the latest relevant BIS / IS code. This clause supersedes any other codes specified earlier in the document.
8.1	Commencement of Works	The Commencement date of the work will be the date of issue of the signing of the Contract Agreement.
8.2	Time for Completion	18 months
8.5	Delay damages for the Works	Delay damages for the works/ Liquidated damages will be applicable as per table given at the end of this section Part A-Contract Data.
8.5	Maximum amount	Equal to the PBG

To be continued

	of delay damages	
11	Defects Liability Period	NIL
14	Mobilisation Advance	Mobilisation Advance will be as per the following GOs 1. GO. Ms. No. 94, Irrigation and CAD (PW-COD) Department, dated: July 01st, 2003 and its amendments. 2. GO. RT. No. 1474 MA&UD (A1) Department, dated: December 12th, 2007 and as per Memo No. 1708/E.IN.C/P.H/ Mobilisation/2008-09, Dated: - 06 – 2008 of Engineer-In-Chief (PH), Hyderabad. The contractors are permitted to avail the facility of Mobilisation Advance of 10% towards Labour and Material Mobilisation against an 100% Unconditional and irrecoverable Bank Guarantee acceptable to the Department, to facilitate the agencies in procurement of materials to achieve better progress of works. **The interest rate will be +2%of prevailing PLR of Banks** A form of Bank Guarantee acceptable to MD, TSCCL The advance mobilization loan shall be used by the contactor exclusively for labour and material mobilization expenditures, in connections with the works. Should the contractor misappropriate any portion of the advance loan, it shall become due to the employer/ employer's representative and payable immediately in one lump by the contractor and no further loan will be considered thereafter. The above advance shall bear an interest of prevailing SBI PLR + 2% per annum. The interest on the amounts paid as advance is chargeable from the date the amount is paid. However, if completion is delayed by circumstances beyond control of the contractor for which an extension has been granted by the MD, TSCCL the interest charges on such advances shall be waived for

To be continued

		the period of extension. In case of contractor not maintaining the progress of works as agreed programme the interest of mobilsation advance shall be levied at prevailing SBI PLR + 4% per annum for the period in which the progress is not maintained. In case the progress is made good as per the programme the rate of interest shall be at prevailing SBI PLR + 2% per annum. The value of Bank Guarantee for the advance payment given to the contractor can be progressively reduced by the amount repaid by the contractor as certified by the Managing Director, TSSCL. Recovery of Mobilisation Advance paid against it aforesaid, shall be recovered by TSSCL from each monthly running bill payment due to contractor on pro-rata basis at rate of 6 to 8 installments. Retention Money at 7.5% will be deducted from each monthly bills generated by the contractor.
18.2	Minimum amount of third party insurance	As per the prevailing rules of AP Govt.
20.2	The Adjudicator shall be	The Adjudicator proposed by the Employer is: The experts from the reputed nearby Engineering college in and around Tirupati. The hourly fee for this proposed Adjudicator shall be: Rs 1000/-. The biographical data of the proposed Adjudicator is as follows: Engineering professional, with more than 20 years' experience with post graduate degree in Environmental Engineering.

Part B - Specific Provisions

There are no specific provisions of contract pertaining to the work for which the bid is called for.

To be continued

Scope of Work including schedule of Supply, Functional & Technical Specifications

A. Work Requirements

1. SCOPE OF WORK – GENERAL

1.1 Sorting & Segregation

a. The Contractor after agreement should prepare and submit detailed project report covering a comprehensive Bio-mining & Reclamation Plan. This would also include a plan for reducing the inert should be treated properly as per MSW Rules 2016.

b. The Contractor shall take necessary steps and processes that would bring in control of odour and leachate in the region.

c. The Contractor shall set up sorting system flexible enough and convenient for segregation of dumped material.

d. The Contractor should maximize the separation of recyclables viz. glass, metal etc. as well other components for generation of RDF from the dump site.

e. The responsibility of the Contractor includes providing adequate number of sorting machines for achieving the daily target as per the capacity quoted in the bid.

f. The Contractor will be required to provide at site storage facility for various wastes processed.

g. The bidder shall handover any domestic hazardous waste, biomedical, C & D waste if found during excavation, sorting / segregation. He shall handover the waste to nearest biomedical, C & D facility, waste management facility. The Sanitary Inspector should make necessary arrangements to transport the same to the concerned.

h. The bidder shall handover any valuable items like gold, diamonds and all precious metals other than iron scrap material to TSCCL

1.2 RECOVERY OF CITY COMPOST

a. The Contractor should target to separate the compost from the biodegradable component of the solid waste at the dump site.

b. The Contractor should ensure total stabilization of the waste dump so that it releases

To be continued

no offensive odours and generates no leachates, so as to have the reclaimed land fit for any other purpose including construction after the settling period as approved scientifically.

c. The Contractor should take precaution of minimizing flies, rodents and bird menace and fire hazards.

d. The Contractor should as in above section deal with pre-process output such as RDF, while recyclables be sold to appropriate vendors. The pre-process and post composting process rejects shall be handled as per SWM Rules, 2016. The bidder should explore the possibility of minimizing the quantum of inert with alternatives. The accumulated inert /rejects should not sent for any other applications/uses.

e. The plastic material segregated from the compost shall be handled as per Solid Waste Management rules-2016.

f. After the removal of clump, the site shall be reclaimed to its natural ground level.

g. The transportation and storage of the inert material and the compost material shall entirely be under the scope of the bidder under this project.

1.2.1 Site Development & Facilities

a. The TMC shall assist successful bidder in getting the access to the dumpsite with a license to the Contractor to implement the project "Remediation of Ramapuram Dumpsite through Bio-mining process"system.

b. The Contractor should carry out necessary geotechnical surveys for considering the hydrological and flooding potential at sites, in order to mitigate any effect on the activities during bio-mining in terms of leachate transport.

c. The site which shall be utilised for Machinery and material under Bio-Mining process shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.

d. Contractor should provide weighbridge to measure quantity of various components of waste at dumpsite is processed in terms of sorting and segregated

To be continued

materials, RDF, compost material, and inerts going out of the site.

e. The Contractor shall also provide fire protection measures and safety equipment.

f. The Contractor shall provide utilities such as drinking water facilities and sanitary facilities (preferably washing/bathing facilities for workers) and lighting arrangements for easy operations during night hours shall be provided and safety provisions including health inspections of workers at site shall be carried out.

g. In order to prevent environmental impacts of the activities the Contractor as per the SWM Rules 2016 adopt guidelines for development of land fill as per Schedule -I of the Rules.

h. Contractor shall set a soil and ground water baseline so that the same will be available to evaluate post Bio- mining and bioremediation/ reclamation of the site.

i. Contractor shall monitor ground water quality, work zone air quality and ambient air quality monitoring within the site from authorized laboratories/agencies and submit the report on monthly basis.

j. The Contractor shall monitor and measure noise levels at the site and interface of the facility with plant boundary and surrounding area.

1.2.2 Operation & maintenance of infrastructure and equipment for 18 months

The Contractor shall be responsible for construction, operation of site, maintenance of transportation trucks, mechanical lifting arrangements to transfer the by products into trucks, parking facilities, weighbridge, CCTV, hook loaders, on Design Build Operate (DBO) basis. The Contractor should maintain the facility and machinery in order to operate for the Contract period

1.2.3 Awareness & Extension activities

a. The Contractor shall undertake a mass awareness/ sensitization programme, in surrounding residential/ villages area, so as to ensuring the local people are aware and taken into confidence of the bio-reclamation activities.

To be continued

b. The Contractor shall create a sustained system of information, education and communication for Bio-Mining& reclamation through collaborations with expert institutions and civil societies and also disseminate through their own website.

c. The Contractor shall device appropriate measures in consultation with expert institutions for Bio-Mining& reclamation and for sale of recycle products in the best possible manner.

d. The Contractor can keep a track of the progress of its activities and establish a database and update on a regular basis in-order to optimize its activities

e. The Contractor can coordinate with the TMC for successful engagement of this Contract.

f. The Contractor will involve community participation and discuss with the citizen community in order to ensure a free flow of information.

1.3 COMPLETION & EXIT

At the end of the Contract period, the Contractor will leave the site along with all his equipment's and facilities used and handover the clean area and capped area of inerts without claiming any compensation of whatever nature.

Note:

The Bidder shall consider the conveyance from the dumping site to the location shown by the TSCCL authorities which is around 10 Kms.

The land will be allotted by TSCCL / TMC for the Remediation process on lease basis after discussion with successful bidder (Reference:- G.O Ms. No:-56, dt:-05-02-2011).

To be continued

B. Specification

In preparing the Technical Offer, Bidders are advised to review the RFP in full including the Project Information Memorandum and Draft Contract Agreement.

Bidders are requested to undertake required reconnaissance studies and field level studies required by the Bidder to ensure that their Technical Proposal addresses the issues and meets the requirements of the project as outlined in the RFP. Bidders are open to carryout independent studies to confirm the validity of the information provided in the RFP.

The Bidder shall submit a Technical Proposal setting out the approach to the Project. The Technical Proposal shall comply with the Construction Requirements and O&M Requirements as set out in Schedules of the Draft Contract Agreement. The design and approach for implementing the Project shall also be in compliance with the Applicable Law, including the MSW Rules.

The Technical Proposal shall set out the following components:

a) Methodology Statement
b) Concept design for development of Project Facilities
c) PERT/CPM Chart
d) Resource Utilization Statement
e) Area Allocation Statement
f) Operations & Maintenance Scheme
g) Project Schedule
h) Environment, Health & Safety Policy and Practice

a) **Methodology Statement**

The Bidder shall provide a methodology statement, which broadly sets out the approach to the Project. The methodology statement shall include the Bidder's appreciation of the Project, the sequencing of activities to be performed, the facilities to be provided, design standards and basis for calculations of capital and operating costs. The methodology statement should clearly demonstrate the compliance of the approach to be adopted by the Bidder for the implementation of the Project to the minimum specifications set out in the Draft Contract Agreement.

To be continued

b) Process Flow Chart and Material Balance Statement

The Bidder shall provide a process flow chart and a material balance statement setting out the activities and the outputs at each stage. The Bidder should indicate supporting calculations and assumptions, if any.

c) Resource Utilization Statement

A statement indicating the procurement, deployment and utilization of the resources shall be provided. The statement shall include proposed organizational structure, employee deployment, equipment procurement and utilization, contracting activities, utilization of office and other facilities.

d) Area Allocation Statement

The Bidder shall set out the area utilization plan for the Project Site and Project Facilities including the sorting, segregation, composting, any other facilities and common areas etc.

e) Operations and Maintenance Scheme

The Bidder shall separately set out the operations and maintenance scheme for Project Site and Project Facilities. The maintenance (regular & emergency) schedules should also be indicated over the Contract Period.

f) Time Schedule

The Bidder shall indicate an activity schedule over the Contract period including the construction activities and O&M activities.

g) Environment, Health & Safety Policy and Practice

The Bidder shall indicate the environment, health and safety policy and practices, which are proposed to be adopted during the Contract Period. The aspects relating to employee and worker safety, control mechanisms of litter, pest, odor, fire, surface runoffs etc. needs to be elaborated.

The broad format for Technical Proposal is outlined below:

To be continued

Annexure – I (A)

Technical plan – Remediation of Ramapuram MSW Dumpsite through Bio-Mining Process in Tirupati on "Design –Build – Operate (DBO)" system

The Technical Plan shall comprise:

1. Proposed Strategy

   a. Process management diagrams for Bio-mining, reclamation, bioremediation of soil and terrain after activity.

   b. Detailed Methodology and/or Mechanism giving the entire O&M procedures and also the implementation plan for Bio-mining, reclamation, bioremediation of soil and terrain after activity.

   c. Calculations and methodology for operations in two (one /or two shifts) with respect to for Bio-mining, reclamation, bioremediation of soil and terrain after activity.

   d. Proposed plan for communicating with the staff of service provider.

   e. Service provider shall be required to submit a chart setting out the process flow for the activities envisaged.

2. Timelines and frequency for carrying out and completion of various activities

Activity	Frequency	Start Time	Completion Time
Private player shall list out every activity to be carried out			

3. Infrastructure (tools, equipment and vehicles) to be provided for execution of the Project

To be continued

Sl. No.	Equipment's/Implement	Quantity	Replacement Frequency
1.			
2.			

Sl. No.	**Vehicle Type**	**Number**			**Capacity in terms of Volume**
		Owned	**Leased**	**Total**	
1.					
2.					
3.					
4.					
5.					

4. Equipment Mobilization and Deployment Plan

   a. Schedule for procuring, installing, deploying equipment including machines, for segregation, transportation of biproducts waste etc,
   b. The above Schedule shall also be submitted in a Bar Chart and PERT – CPM network format.

5. Information, Education, and Communication (IEC) Awareness campaigns to be initiated
   a. Number of campaigns envisaged; and b. Mode of implementing campaigns
6. Mechanism for Grievance Redressal and/or Customer Service
7. Manpower Deployment for the project
   a. Calculation of manpower requirements.
   b. Details of proposed manpower and organization chart.

Sl.No.	**Staffing Aspect**	**Details**
1.	Total number of people deployed*	
2.	Type of Staff	
a)	Operational Staff	
b)	Supervisory Staff	
3)	Any other	

*Describing role and activities performed

To be continued

8. Mechanism for addressing any emergency situation
9. Suggestions on improvements and additions to project components

   Bidders are requested to outline suggestions on improvements and additions to project components outlined in the RFP

10. Innovative measures proposed

    Bidders are requested to outline any additional improvements to project components outlined in the RFP in order to rationalize costs without affecting service levels.

To be continued

Annexure – I (B)

Technical Plan - Remediation of Ramapuram MSW Dumpsite through Bio-Mining Process in Tirupati on "Design –Build – Operate (DBO)" system.

Bio-mining and dumpsite reclamation:

Bidders are requested to prepare a detailed step wise work plan for and should include the following.

1. Detailed Design & Specifications of Project Facilities:

   a. Design of proposed sorting/segregating capacity, RDF and compost recovery capacity with detail calculations; and

   b. Table giving List of machinery and equipment along with detailed calculation, specification, catalogues, make and model, proposed quantity to be provided at site.

2. Bio-mining & reclamation:

   a. The Bidder shall provide a detailed schedule consistent with the prescribed Contract period as specified in the Bid documents. The Bidder shall indicate the milestones and would describe when the various milestones of the Project will be achieved. This Construction Schedule shall form part of the Contract Agreement; and

   b. The Bidder shall also indicate the pre-conditions for achieving the milestones indicated in the Bio-Mining and reclamation schedule and significant conditions or events, which may delay achieving a milestone. The schedule shall also indicate identification and acquisition of major Clearances. The above schedule shall also be submitted in a Bar Chart and PERT – CPM network format; and

   c. Table giving List of all other civil works and facilities to be provided; and

   d. Detailed design, specifications and drawings of various civil and mechanical installations proposed in the Project Facilities; and

   e. Detailed design, specifications and drawings of various utilities proposed viz. Control room, Workshop facility etc.

To be continued

3. Manpower and Equipment Mobilization & Deployment Plan vis-à-vis the above construction schedule. This should include:

   a. Calculation of manpower requirement, and

   b. Details of proposed manpower and organization chart for Authorized person of company, and

   c. Details of equipment mobilization and deployment plan.

   The above plans should adhere to the overall timeframes for completion of construction and timeframe for Project Commissioning outlined in the Bid documents.

A. Operation & Maintenance

As part of the O&M Plan, Bidders should detail the specific activities that they intend to carry with respect to Operations and Maintenance to ensure that the service level obligations are met as set out in the draft Contract agreement are maintained. Specifically, the O&M Plan should cover

a. Asset Management Plan;

b. Maintenance Plan/Schedule – regular and preventive of plant, equipment and vehicle;

c. Organizational Plan during maintenance;

d. Cost management covering power and consumables;

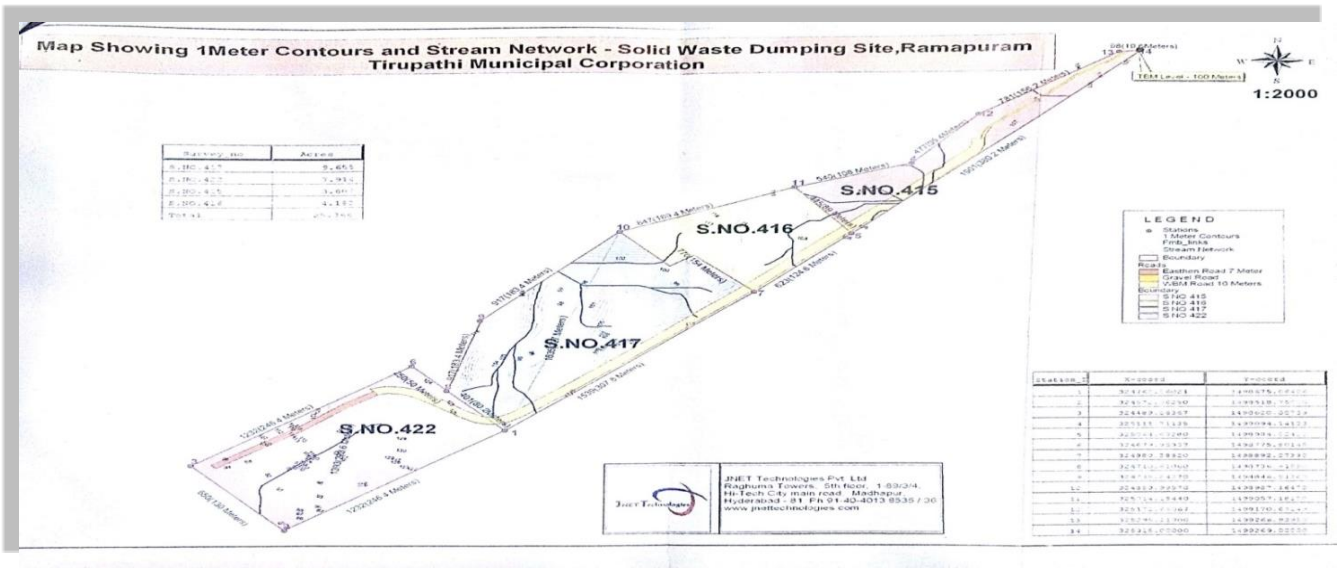
e. Stakeholder management, communication and grievance redressal;

f. Overall Project Quality Assurance; and

g. The Bidder must describe in detail how it proposes to meet the safety requirements and environmental standards.

To be continued

C. Drawings & Photographs



To be continued

VOLUME - 02

TENDER DOCUMENT

PAPER NOTIFICATION

పారు. దరఖాస్తుల సమర్పణకు ఆఖరు తేదీ ఫిబ్ర వరి 28 అని, మరిన్ని వివరాలు www.vit.ac.in వెబ్‌సైట్ ద్వారా తెలుసుకోవచ్చన్నారు. విజయవాడ పాతబస్తీలోని ప్రధాన తపాలా కార్యాలయంలో విట్ వైస్ ప్రెసిడెంట్ డాక్టర్ శేఖర్ విశ్వనాథన్ దర ఖాస్తు ఫారాలను విడుదల చేశారు.

పేర్కొన్న ముగ్గురు తమ వృత్తివివరాలలో వారికి అధికారిక ప్రతినిధిగా వ్యవహరించేందుకు ఎంపిక చేసుకుని, ఫారం పీఏలో పూరించవచ్చు. వర్తించదు.

కైయిముల కోసం తప్పుడు లేదా తప్పుదారిపట్టించే రుజువులు లేఖలు చేస్తే అది అరెస్టులకు దారితీస్తాయి.

తేదీ: 02.11.2018
స్థలం: విజయవాడ

ఎం. శివరాం ప్రసాద్
మధ్యంతర కీర్తన వృత్తివివరాలు
రిజిస్టర్ నెం. IBBI/IPA-002/IP-N00422 /2017-18/11198

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వాలు

ర్‌కుమార్,
భాస్కర్

, 28 తేదీల్లో
కు సుపథం

నం
ంది భక్తులు
చామన్నారు.
ం లభించిం
రు.

TIRUPATI SMART CITY CORPORATION LIMITED

C/o Tirupati Municipal Corporation
13-29-M9-1-00, Tilak Road, East Tirupati, Pin Code - 517501
Chittoor District, Andhra Pradesh, India
Email : tsccltirupati@gmail.com

Managing Director, Tirupati Smart City Corporation Limited, Tirupati invites Tender and RFP on e-Procurement platform from the "eligible contractors" for the following works :

NOTICE INVITING TENDER

IFB No.	Name of the Work	Estimated Amount
60/18-19/Smart City/TO, Dated : November 02nd, 2018	Tender for Solid Waste Management Project - Procurement of light weight garbage vehicle Box Tipper type (for door to door collection of waste) under implementation of the Smart City Mission in Tirupati	**Rs. 1,98,00,000/-**
19/TSCCL/Projects/TO/ 2018-19, Dated : November 02nd, 2018	Request for Proposal for "Procurement, Installation, Commissioning and including Operation and maintenance for 03 Years of Dynamic Messaging Displays at Multiple Locations in Tirupati" under implementation of Smart City Mission in Tirupati.	
14 (02nd call)/TSCCL/ Projects/TO/2018-19, Dated : November 02nd, 2018	Request for Proposal for "Solid Waste Management Project - Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process" under Implementation of the Smart City Mission in Tiruapti - (02nd Call)	

Tirupati Smart City Corporation Limited hereby issued this notice for inviting Tenders and RFP for the attention of all potential bidders for the above said Tenders and RFP to participate and for other particulars please contact Municipal Engineer during office working hours and above said detailed Tenders and RFP document can be downloaded from the e-procurement market place at **https://tender.apeprocurement.gov.in**

Sd/- V. Vijay Rama Raju, Managing Director, Tirupati Smart City Corporation Limited, Tirupati

భారత ప్రభుత్వం
అణుశక్తి శాఖ
న్యూక్లియర్ ఫ్యూయల్ కాంప్లెక్స్

ఆంధ్రజ్యోతి Sat, 03 November 2018
www.readwhere.com/read/c/33673237

To be continued

TIRUPATI SMART CITY CORPORATION LIMITED,

C/O. TIRUPATI MUNICIPAL CORPORATION,
13-29-M9-1-00, TILAK ROAD, EAST TIRUPATI, PIN CODE: 517501
CHITTOOR DISTRICT, ANDHRA PRADESH, INDIA. E-MAIL: tsccltirupati@gmail.com

Managing Director, Tirupati Smart City Corporation Limited, Tirupati invites Tender and RFP on e-Procurement platform from the "eligible contractors" for the following Works:

NOTICE INVITING TENDER

IFB No.:	Name of the work	Estimated Amount
60/18-19/ Smart City/TO, Dated: November 02nd, 2018	Tender for Solid Waste Management Project - Procurement of light weight garbage vehicle Box Tipper type (for door to door collection of waste) under Implementation of the Smart City Mission in Tirupati	Rs. 1,98,00,000/-
19/TSCCL/Projects/TO /2018-19, Dated: November 02nd, 2018	Request for Proposal for "Procurement, Installation, Commissioning and including Operation and Maintenance for 03 years of Dynamic Messaging Displays at Multiple Locations in Tirupati" under implementation of Smart City Mission in Tirupati	
14[02nd call] /TSCCL/Projects/ TO/2018-19, Dated: November 02nd 2018	Request for Proposal for "Solid Waste Management Project - Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process" under Implementation of the Smart City Mission in Tirupati - [02nd Call]	

Tirupati Smart City Corporation Limited hereby issued this notice for inviting Tender and RFP for the attention of all potential bidders for the above said Tender and RFP to participate and for other particulars please contact Municipal Engineer during office working hours and above said detailed Tender and RFP document can be downloaded from the e-procurement market place at **https://tender.apeprocurement.gov.in**

Sd/ V.Vijay Rama Raju
Managing Director, Tirupati Smart City Corporation Limited.

PAPER NOTIFICATION IN DECCAN CHRONICLE ON NOVEMBER 04th, 2018

TIRUPATI SMART CITY CORPORATION LIMITED

Ref: TSCCL/Projects/56(SWM – BIO-MINING)/2018

Tirupati Smart City Corporation Limited ("TSCCL") desires to invite Request for Proposal [RFP] for selection of "**Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati**". The detailed RFP including EMD, TOR, Eligibility criteria etc., can be downloaded from website of www.tender.apeprocurement.gov.in from 03-11-2018 onwards.

The last date for online submission of bids is 12-11-2018 before 16:00 hrs Indian Standard Time ("IST"). Opening of Bid is schedule at 15-11-2018 at 17:00 hrs IST. All other details including any extension, clarifications, amendments, corrigendum, addendum etc., will be uploaded on the below mentioned website and may not be published in any other sources. Therefore, the bidders are advised to regularly visit the websites to keep themselves updated and privy to the latest information.

For more details contact:

Tirupati Smart City Corporation Limited,
Tirupati Municipal Corporation, 13-29-M9-1-00, Tilak Road,
East Tirupati - 517501, Chittoor District, Andhra Pradesh.

Website:
https://tender.apeprocurement.gov.in

For any queries related to the Bidding Documents please send an email to
E-mail : tsccltirupati@gmail.com
cc : Rajendra.Raut@aecom.com

Sd/-

Managing Director
Tirupati Smart City Corporation Limited
Tirupati

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

Important Dates

S. No.	Activity	Deadline
1	Release of RFP	03-11-2018
2	Last date of receipt of Pre-Bid queries	05-11-2018 at 13:00 Hrs
3	Posting of response to Pre-Bid queries	06-11-2018 at 17:00 Hrs
4	Last date for online submission of Bids	12-11-2018 at 16:00 Hrs
5	Date of submission of Hard Copies of documents - Demand Draft of Bid Processing Fee + [EMD / Bid Security] - Original Bank Guarantee + 02 Sets of Photostat copies + 01 set of Soft Copy (Non-Writeable CD/DVD Copy)	15-11-2018 at 16:00 Hrs
6	Date of opening of Pre-qualification Bids	15-11-2018 at 17:00 Hrs
7	Declaration eligible / qualified bidders	Will be notified later
8	Date of Technical presentation	Will be notified later
9	Date of opening of Financial bids	Will be notified later
10	Validity of Bid	180 days from Bid Due Date

Note:

1. All above events shall be held at "Tirupati Municipal Corporation / TUDA Office, Tirupati"
2. In the event of the date specified above being declared as a state holiday the due date shall be the next following working day.
3. Request to all the aspirant Bidders to submit their bids through online on AP e-procurement web portal : https://tender.apeprocurement.gov.in on or before the time as specified in Sl. No.: 04
4. Sealed Bids [Sl. No.: 05 - Hard Copies submission] received after due date and time will be rejected.

1.0 PROJECT DETAILS

1.1 BACKGROUND

With the India Smart Cities Challenge, the Government of India has taken the first step towards realizing its vision of building 100 smart cities across the nation. As part of the India Smart Cities Challenge under Ministry of Urban Development, Government of India, Tirupati is one of the cities that was selected in Round 2 and was ranked 4th amongst a nation-wide competition between 67 cities.

Under Indian Smart Cities Mission, the projects focus is on retrofitting a selected area within the city known as Area-Based Development (ABD). Additionally projects at PAN City level has also been taken up. The projects focus is multi-sectoral. The emphasis is on creating livable cities, Holistic development of the selected area such that it catalyzes the development of other areas and sets an example for other cities.

Tirupati is now working on an implementation plan to convert the Smart City Proposal (SCP) ideas into reality, beginning with retrofitting of the ABD that will catalyse future scalability to entire city and projects at PAN City. Tirupati Smart City ABD area is known as "Tirupati Town Center (TTC)

Tirupati is known as the spiritual center of Andhra Pradesh with about daily 75,000 pilgrims visit Tirumala for darshan of Lord Venkateshwara., besides other historical temples, and is referred to as the "Spiritual Capital of Andhra Pradesh". It was named the "Best Heritage City" for the year 2012-13 by Ministry of Tourism. Tirupati has strong cultural heritage and is a melting pot of various festivals, is considered the Medical Hub of Andhra Pradesh and is home to numerous hospitals.

Tirupati city is located in Chittoor district in the state of Andhra Pradesh. The Municipal Corporation Tirupati (MCT) spread is around 27.44Sq Km and includes 50 Wards. According to 2011 census, the City's population is around 3.74,260. TTC (ABD) area is around 3.01 sq Km with a population of around 1,12,000. The TTC area covers around 11% of MCT area and includes 30% of City's population.

The Smart City Plan for Tirupati revolves around the vision of creating - **"A 21st century pilgrimage city that promotes Arts, Innovation & Sustainable Growth".**

To be continued

Municipal Corporation Tirupati

Tirupathi Municipal Corporation is the 1st largest ULB in the Chittoor district. It is locate d 420 Km from Capital city and 71 Km from District Headquarters. It was established as 3rd grade Municipality in the year 01/04/1886 and upgraded as Municipal Corporation with w.e.f. 02/03/2007.

It is spread over an area of 27.44 Sq.Kms. With a population of 3,74,260 (2011 census). MCT is also the headquarters of Tirupati (urban) mandal, and of the Tirupati revenue division. It is the 9th most populous city in Andhra Pradesh and seventh most urban agglomerated city in the state, with a population of 459,985.

The Project

1.1 About the Tirupati Smart City Corporation Limited (TSCCL)

A Special Purpose Vehicle (SPV) was incorporated with the name "Tirupati Smart City Corporation Limited" (TSCCL) on 28th November 2016, to implement the projects proposed under the SCP.

1.2 Name of Work

"SOLID WASTE MANAGEMENT PROJECT – REMEDIATION OF EXISTING MSW DUMPSITE AT RAMAPURAM THROUGH BIO-MINING PROCESS UNDER IMPLEMENTATION OF THE SMART CITY MISSION IN TIRUPATI"

1.3 The Project:

The Tirupati Smart City Corporation Limited ("TSCCL") intends to enter into a "DESIGN-BUILD- OPERATE" (DBO) system contract with a Private Service Provider to implement the project on "Remediation of Ramapuram Dumpsite through Bio-mining process" (herein after referred as Project). The project would involve Design, Construction, Operation and Maintenance of the Bio-mining and Reclamation of existing solid waste dumpsite in the said process in a scientific manner at Ramapuram dumpsite in TMC area. The duration of the Contract will be for 18 Months. TSCCL is inviting proposals from the interested parties as per the laid down norms in this Request for Proposal (RFP).

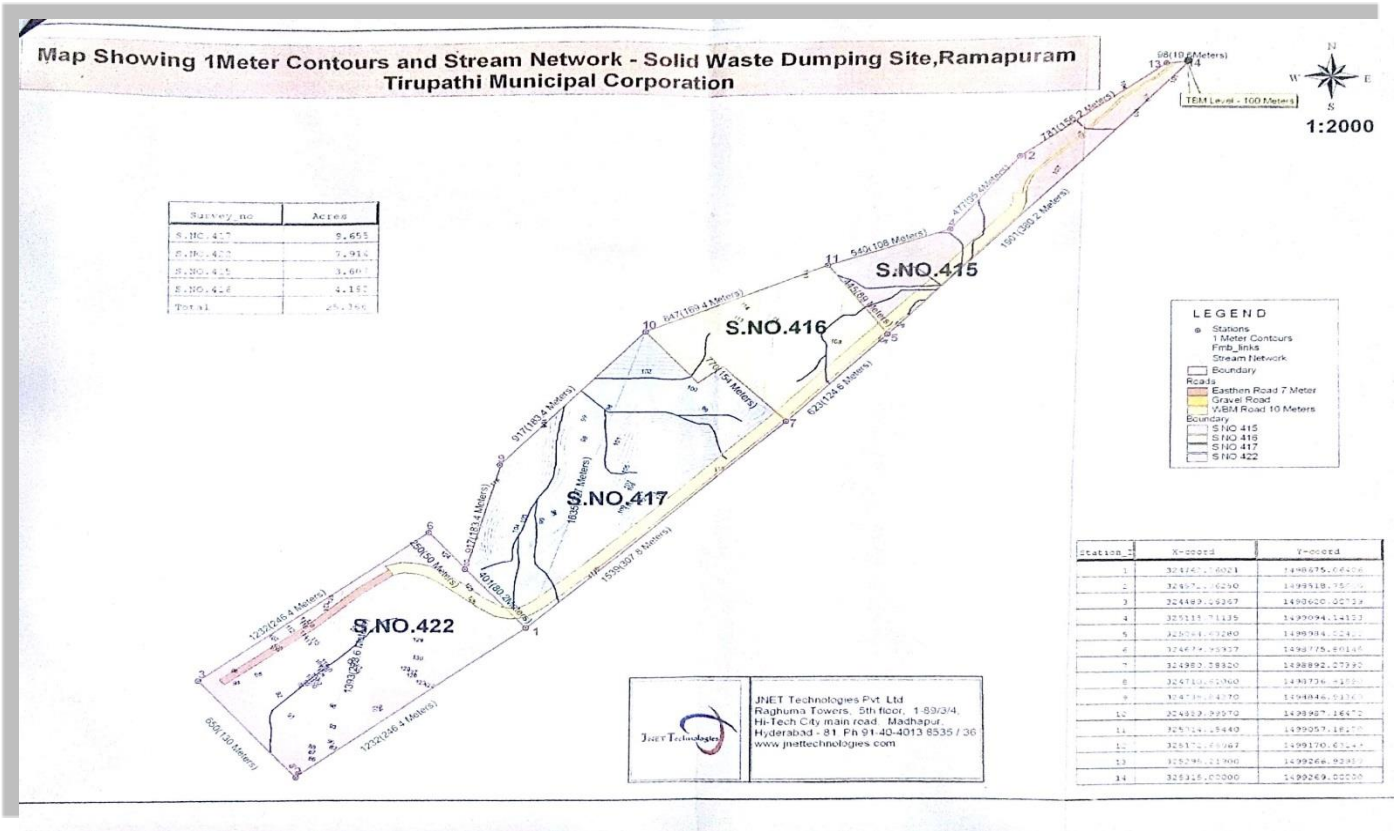
The MSW is not processed and dumped at the compost yard in Ramachandrapuram. TSCCL proposes to excavate the compacted MSW by using suitable mechanical sieving, separating machines or any other equipment, retrieving compostable material, recyclable material by

To be continued

segregating, sorting, storing and selling. The work envisages economically viable and environmentally sustainable method in 25.26 acres, TSCCL intends to reclaim at-least 90% of the total dumpsite area.

TSCCL is committed for finding a sustainable solution for reclaiming the dumpsite, so as to enable generation of reusable and recoverable material as well as cleaning the site and further use the land parcel for development activities.

The land will be allotted by TSCCL / TMC for the Remediation process on lease basis after discussion with successful bidder (Reference:- G.O Ms. No:-56, dt:-05-02-2011).



To be continued

1.4 Salient Features

Salient details of the said dumpsite are as below:

- Location of Dumping yard site : Ramapuram
- Period from dumping was done : since 2005
- Size of land: 25.26 acres
- Estimated amount of waste already collected at dumpsite: 1.5 to 2.0 Lakh MT
- Current remediation efforts (Bio-Mining, Sanitary Land filling)

1.5 RFP Format

The intent of this RFP is to invite bids from the Bidders for **"Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** for the Authority.

The Request for Proposal (RFP) consists of three volumes viz.

To be continued

1. **RFP Volume 1: Instruction to Bidders**
   Volume 1 details the instructions with respect to the bid process management, technical evaluation framework and the technical & financial forms.

2. **RFP Volume 2: Scope of work including Functional & Technical Specifications**
   Volume 2 of the RFP provides information regarding the Project Implementation Plan, business requirements/applications to be covered and corresponding process related documentation, scope of work for the selected bidder and functional requirements.

3. **RFP Volume 3: Conditions of Contract and Contract Forms**
   Volume 3 contains the contractual, legal terms & conditions applicable for the proposed engagement.

To be continued

Instruction to Bidders

1.1. Fact sheet

This RFP is meant for the exclusive purpose of submitting the e-bid in accordance with the terms and conditions specified herein and this RFP shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued

Sl #	Item	Description
1.	Method of Selection	The method of selection is Quality cum Cost based selection (QCBS) is 80:20 percent Technical score : 80%, Financial Score : 20%
2.	Availability of RFP Documents	Download from www.tender.apeprocurement.gov.in
3.	Date of RFP Issuance	03-11-2018
4.	Bid Processing fee (Non-refundable and Not – exempted)	Indian Rupees 25,000 (Indian Rupees Twenty Five Thousand only) shall be paid online or via Demand Draft in favour of the "Managing Director, Tirupati Smart City Corporation Limited", Payable at Tirupati.
5.	Bid Security/Earnest Money Deposit (EMD)	Indian Rupees 5,00,000 (Indian Rupees Five Lakh only) by online payment /Bank Guarantee (as per format attached in Annexure 5(b))
6.	Last date and time for Submission of Pre-Bid Queries	05-11-2018 at 16.00 Hrs
7.	Posting of responses to queries (on website)	06-11-2018 at 17:00 Hrs Respective bidder's e-mail ID's / *www.tender.apeprocurement.gov.in*
8.	Last Date and time for Bid submission (On or before)	12 -11 -2018 at 16.00 Hrs
9.	Date, time for opening of Pre-Qualification Bids	15-11-2018 at 17:00 Hrs
10.	Bid validity	Bid must remain valid up to 180 (One Hundred and Eighty) days from the actual date of submission of the Bid.
11	Project Duration	18 Months All the dates are from the date of issue of LOA
12.	Currency	***Indian Rupees (INR) only***
13.	Name and Address for Correspondence	Attention: **Managing Director,** **Tirupati Smart City Corporation Limited (TSCCL), Tirupati Municipal Corporation,** **13-29-M9-1-00, Tilak Road, East Tirupati,** **Chittoor District, Andhra Pradesh. Pin Code : 517501** Electronic mail address: tsccltirupati@gmail.com with a copy to Rajendra.Raut@aecom.com

To be continued

1.2 Definitions/Acronyms

Terms	Meaning
ABD	Area Based Development
Authority / Client / Employer/ TSCCL	Tirupati Smart City Corporation Limited
BIS	Bureau of Indian Standards
BOM	Bill of Material
BOQ	Bill of Quantities
BS	Bid Security
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CC	Capital Cost
CEA	Central Electricity Authority
CEO	Chief Executive Officer
CVg /CV	Curriculum Vitae
DC	Direct Current
DD	Demand Draft
DSCR	Debt Service Coverage Ratio
EMD	Earnest Money Deposit
EPC	Equipment, Procurement and Commissioning
EPS	Expanded Polyesterene
GCC	General Conditions of Contract
GHI	Global Horizontal Irradiation
GoAP	Government of Andhra Pradesh
GoI	Government of India
HDPE	High Density Poly Ethylene
HOD	Head of Department
INR	Indian Rupee
IRR	Internal Rate of Return
ISO	International Standards Organisation
KVA	Kilo Volt Amps
KWh	Kilo-Watt Hour
KWp	Kilo-Watt Peak
LOA	Letter of Acceptance
MCT / TMC	Municipal Corporation Tirupati
MD	Managing Director, Tirupati Smart City Corporation Limited
NASDAQ	National Association for Securities Dealers Automated Quotations
NIT	Notice Inviting Tender
NPV	Net Present Value
OEM	Original Equipment Manufacture
O&M	Operations & Maintenance
PBG	Performance Bank Guarantee / Performance Security

To be continued

PCC	Particular Conditions of Contract
PDD	Proposal Due Date
PoC	Proof of Concept
PPP	Public Private Partnership
PQ	Pre-Qualification
RFP	Request for Proposal
SCP	Smart City Proposal of Tirupati
SNA	State Nodal Agency
SOP	Standard Operating Procedures
SPV	Special Purpose Vehicle
Supplier/ Implementing Agency / Contractor	Successful Bidder
TEC	Technical Evaluation Committee
TOR	Terms of Reference
TQ	Technical Qualification
TTC	Tirupati Town Center
UAT	User Acceptance Testing
USD	US Dollars

"ACT" means the Environment (Protection) Act, 1986 (29 of 1986) as amended up-to-date

“Appointed Day” means the date of signing of this Agreement by the Parties or the date of handing over the Project Site to the Contractor, whichever is later.

"Authority / Client / Employer/ TSCCL" shall mean Tirupati Smart City Corporation Limited.

"Authorization” means the consent given by the Andhra Pradesh Pollution Control Board to the "Operator of a Treatment/Disposal Facility".

"Bidder" means a single entity or consortium of members submitting the proposals.

"Bid Security" shall mean the Security furnished by the Bidder. “City” means the city of Tirupati

"Contractor / Implementing Agency / Supplier" shall mean the Selected Bidder which enters into the Contract Agreement with Authority pursuant to issuance the LOA.

"Contract Agreement” shall mean the agreement entered between the Authority and the Contractor pursuant to this RFP.

"Contract Period" is as defined in Fact Sheet of this RFP.

To be continued

"Consortium" shall mean two or more parties coming together for submission of Bid in response to "this RFP" pursuant to Memorandum of Understanding signed between them.

"Damages" shall mean the damages payable by either Party to the other of them, as set forth in the Contract Agreement.

"Disposal" means final disposal of inert(s) that are left after bio-mining and reclamation at the dumping site which further would be capped.

"Document" or "Documentation" means documentation in printed or written form, or in tapes, discs, drawings, computer programmes, writings, reports, photographs, films, cassettes, or expressed in any other written, electronic, audio or visual form in relation to this Project.

"Financial Bid" shall mean a document quoting Percentage of revenue as royalty on sale of compost to the Nodal Agency i.e. Fertilizer Company or agricultural department by the Contractor in response to the RFP including clarifications and/or amendments and modifications made till the date of submission.

"Letter of Award" or "LoA" means the letter issued by the Authority to the Selected Bidder whose Bid has been accepted by Authority pursuant to this RFP for undertaking and executing the Project in conformity with the terms and conditions as set forth in this RFP and the Contract Agreement.

"TMC" mean Tirupati Municipal Corporation.

"TSCCL" mean Tirupati Smart City Corporation Limited.

"Letter of Intent" or "LoI" means the letter issued by the TSCCL to the shortlisted Bidder inviting their acceptance for undertaking and executing the Project in conformity with the terms and conditions as set forth in this RFP and the Contract Agreement.

"Liquidated Damage" shall mean any loss/losses caused or sustained by TSCCL, Authority due to non-performance of any act as per the Scope of Work of this RFP or performance or carrying out of any act expressly or impliedly prohibited by the TSCCL / TMC, Authority as per the terms and conditions of Contract Agreement

To be continued

"Local Authority" shall mean Tirupati Smart City Corporation Limited ("TSCCL").

"Municipal Authority" shall mean Tirupati Municipal Corporation ("TMC").

"Operation & Maintenance" means the operation and maintenance of the Project and includes all matters connected with or incidental to such operation and maintenance, provision of services and facilities in accordance with the provisions of this RFP and Contract Agreement;

"Operation & Maintenance Period" means the period commencing from the date of signing of the Contract Agreement and ending on the last day of the Contract Period unless terminated earlier.

"Operator of a Facility" means the Contractor or his authorized representative duly approved by the Authority, who operates the bio-mining and reclamation activity at the dumpsite.

"Parties" means the parties to the Contract Agreement collectively and "Party" shall mean any of the parties to the Contract Agreement individually;

"Performance Security" means the guarantee for performance of its obligations to be procured by the Contractor in accordance with the Contract Agreement.

“Project” means all the activities envisaged to be carried out under this RFP;

"Request for Proposal” or "RFP" means invitation of bids setting forth technical and commercial terms and conditions, of the bid and includes this document, the Contract Agreement and all the Annexure and appendices attached to RFP and addendums issued by TSCCL
"Schedule” means a schedule annexed to the SWM Rules 2016

"Service provider” means authorities who provide services like water, sewerage, electricity, telephone, roads, drainage etc.

"Specifications and Standards" means the specifications and standards relating to the quality, quantity, capacity and other requirements for the Project and any modifications thereof, or additions thereto expressly approved by, the Authority;

"SPV" means a special purpose vehicle company, to be incorporated by Selected Bidder (in case of Consortium,) under the provisions of the Companies Act 2013, pursuant to issuance of the LOA, for

To be continued

implementation of the Project in terms of Contract Agreement.

"Storage" means the temporary containment of compost prevent

"Selected Bidder" shall mean the Bidder to whom the LOA has been issued.

"Taxes" means any Indian Taxes including Service Tax, Excise duties, Customs duties, Value added tax, Sales tax, Local taxes, Cess and any impost or Surcharge of like nature (whether Central, State or local) on the goods, materials, equipment and services incorporated in and forming part of the Project charged, levied or imposed by any Government Instrumentality or Municipal Authority or Tirupati Smart City Corporation Limited but excluding any interest, penalties and other sums in relation thereto imposed on any account whatsoever

"Termination" means termination of this Contract Agreement pursuant to Termination Notice in accordance with the provisions of the Contract Agreement but shall not, unless the context otherwise requires, include the expiry of the Contract Agreement due to efflux of time in the normal course.

To be continued

Interpretations:

1. Words comprising the singular shall include the plural and vice versa.
2. A reference to any gender includes the other gender.
3. An applicable law shall be constructed as reference to such applicable law including its amendments or re-enactments from time to time.
4. A reference to any agreement is a reference to that agreement and all annexes, attachments, exhibits, schedules, appendices and the like incorporated therein, as the same may be amended, modified, supplemented, waived, varied, added to, substituted, replaced, renewed or extended, from time to time, in accordance with the terms thereof
5. The terms "include" and "including" shall be deemed to be followed by the words "without limitation", whether or not so followed.
6. Any date or period set forth in this RFP shall be such date or period as may be extended pursuant to the terms of this RFP; A time of day shall save as otherwise provided in any agreement or document be constructed as a reference to Indian Standard Time.
7. Any reference to a person shall include such persons successors and assignees.
8. Different parts of this contract are to be taken as mutually explanatory and supplementary to each other and if there is any differentiation between or among the parts of this contract, they shall be interpreted in a harmonious manner so as to give effect to each part.
9. A reference to a "writing" or "written" includes printing, typing, lithography, scanned and other means of reproducing words in a visible form
10. The terms "hereof, "herein", "hereto", "hereunder" or similar expressions used in this RFP mean and refer to this RFP and not to any particular Article.
11. In case of any inconsistency between the terms mentioned in the RFP and the literary term, the meaning best construed in furtherance of the objectives of this RFP shall prevail
12. Where there is a discrepancy between amount in figures and in words, the latter shall prevail
13. The table of contents and any headings or sub headings in the contract has been inserted for case of reference only & shall not affect the interpretation of this agreement.

To be continued

2. Instruction to Bidders

Preamble:

This Volume of the Bidding Documents provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the TSCCL. It also provides information on bid submission, opening and on contract award.

Further in all matters arising out of the provisions of Volume of I, II and III of the Bidding Documents, the laws of the Union of India shall be the governing laws and courts of Tirupati shall have exclusive jurisdiction.

2.1 Back ground:

a) The Tirupati Smart City Corporation Limited (the "Authority / Client / Employer / TSCCL ") is engaged in the implementation of the Smart City Mission projects in Tirupati and as part of this endeavor, the Authority has decided to undertake to procurement and service requirement for **"Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** (The "Project") and has, therefore, decided to carry out the bidding process for selection of an entity as the bidder to whom the Project may be awarded.

b) The selected Bidder (the "Contractor/ Implementing Agency") shall be responsible for, procurement and operation of the Project under and in accordance with the provisions (the "Contract") to be entered into between the Implementing Agency and the Authority in the form provided by the Authority as part of the Bidding Documents pursuant hereto. The Implementing Agency shall also be responsible for the maintenance of the project during the Defect Liability Period, which is expected to be as per clause 2.1.c).

c) The "Contract" shall mean and include the general conditions, specification, schedules, drawings, form of Bid, covering letter, schedule of prices, or the final general conditions, any special conditions applying to the particular contract specification and drawings and the agreement to be entered into [A formal agreement shall be entered into between the bidder and the Authority for the proper fulfilment of the contract] of these general conditions, all of which must be accepted under the signatures and stamp of the bidder in order to construe the same within the meaning of Contract.

To be continued

d) The Agreement sets forth the detailed terms and conditions for award of the project to the Implementing Agency, including the scope of the Implementing Agency's services and obligations.

e) The statements and explanations contained in this RFP are intended to provide a better understanding to the Bidders about the subject matter of this RFP and should not be construed or interpreted as limiting in any way or manner the scope of services and obligations of the Implementing Agency set forth in the Agreement or the Authority's rights to amend, alter, change, supplement or clarify the scope of work, the work to be awarded pursuant to this RFP or the terms thereof or herein contained. Consequently, any omissions, conflicts or contradictions in the Bidding Documents including this RFP are to be noted, interpreted and applied appropriately to give effect to this intent, and no claims on that account shall be entertained by the Authority.

f) The Authority shall receive BIDs pursuant to this RFP in accordance with the terms set forth in this RFP and other documents to be provided by the Authority pursuant to this RFP (collectively the "Bidding Documents"), and all BIDs shall be prepared and submitted in accordance with such terms on or before the BID due date specified in Important Dates / Fact Sheet for submission of BIDs (the "BID Due Date").

g) "Plant Work or Works" shall mean and include plant and materials to be provided and work to be done by the bidder under the contract.

h) Tech "Specification" shall mean the specification annexed to these general conditions and the schedules there to (if any).

i) "Tests on completion" shall mean such tests as prescribed by the requirements of specification and performance & operation of the plant to be made by the bidder before the plant is taken over by the authority.

j) "Taking over" shall mean taking over of the plant by the authority after completion of "tests on completion" and completion of 72 hours/three days of continuous trouble-free operation of the plant without any outages/ breakdowns attributable to the implementing Agency.

k) "Commercial use "shall mean that use of the work, which the contract contemplates or of

To be continued

which it is to be commercially capable.

l) "Month" shall mean calendar month.

m) "Writing" shall include any manuscript, typewritten or printed statement, under or over signature or seal as the case may be.

n) Words importing persons shall include firms, companies, Department, and other bodies whether incorporated or not.

o) Words importing the singular only shall also include the plural and vice versa where the context requires.

p) "Governmental Approval" means any approval, consent franchise, permit certificate, resolution, concession, license or authorization issued by or on behalf of any applicable Governmental Authority for the purpose of setting up of the project and / or for sale and purchase of the project pursuant to the agreement.

q) " Governmental Authority" means any central, state, regional, district town city, or municipal government, whether domestic or foreign, or any development agency, bureau or other administrative, regulatory or judicial body of any such government.

2.2 Brief description of Bidding Process

a) The Authority has adopted a single stage two part system (referred to as the "Bidding Process") for selection of the Bidder for award of the Project. Under this process, the bid shall be invited under two parts. Eligibility and qualification of the Bidder will be first examined based on the details submitted under first part (Technical Bid) with respect to eligibility and qualifications criteria prescribed in this RFP. (The "Bidder", which expression shall, unless repugnant to the context, include the members of the Consortium). The Financial Bid under the second part shall be opened of only those Bidders whose Technical Bids are responsive to eligibility and qualifications requirements as per this RFP.

b) Interested bidders are being called upon to submit their BID in accordance with the terms specified in this Bidding Document. The Bid shall be valid for a period of 180 days from the date specified in Important Dates / Fact Sheet for submission of BIDs (the "Bid Due Date").

To be continued

c) The complete Bidding Documents including the draft Agreement and other annexures / schedules for the Project is enclosed for the Bidders. Subject to the aforesaid documents and any addenda issued subsequent to this RFP Document, will be deemed to form part of the Bidding Documents.

d) Bidders are advised to examine the Project in greater detail, and to carry out, at their cost, such studies as may be required for submitting their respective BIDs for award of the contract including implementation of the Project.

e) Other details of the process to be followed under this bidding process and the terms thereof are spelt out in this RFP.

2.3 General

i. While every effort has been made to provide comprehensive and accurate background information, requirements and envisaged proposal(s) specifications, Bidders must form their own conclusions about the proposal(s) needed to meet the Authority's requirements. Bidders and recipients of this RFP may wish to consult their own legal advisers in relation to this RFP.
ii. All information supplied by Bidders as part of their bids in response to this RFP, may be treated as contractually binding on the Bidders, on successful award of the assignment by the Authority on the basis of this RFP.
iii. No commitment of any kind, contractual or otherwise shall exist unless and until a formal written contract has been executed by or on behalf of Authority. Any notification of preferred bidder status by Authority shall not give rise to any enforceable rights by the Bidder. Authority may cancel this public procurement at any time prior to a formal written contract being executed by or on behalf of Authority.
iv. Bids shall be received by the Authority on the e-Procurement portal www.tender.apeprocurement.gov.in before the time and date specified in the schedule of the RFP notice. In the event of the specified date for the submission of Bid offers being declared a public holiday by the Government of Andhra Pradesh, the offers will be received up to the appointed time on the next working day. The Authority may, at its discretion, extend this deadline for submission of offers by issuing corrigendum and uploading the same on e-Procurement portal.
v. Telex, cable or facsimile offers will be rejected.
vi. **Source of Fund:** The TSCCL are empowered with grant of funds from Govt. of India and Government of Andhra Pradesh to be utilized for execution of this Project. All eligible payments

To be continued

under the contract(s) for the package for which this Invitation for Bids is issued shall be made by the TSCCL.

2.4 Eligible Bidders

Please refer 3.5 Clause of Pre-Qualification Criteria for Eligible Bidders.

2.5 Compliant Bids / Completeness of Response

a. Bidders are advised to study all instructions, forms, terms, requirements and other information in the RFP documents carefully. Submission of the bid shall be deemed to have been done after careful study and examination of the RFP document with full understanding of its implications.
b. Failure to comply with the requirements of this paragraph may render the bid non-compliant and the Bid may be rejected. Bidders must:
    i. Include all documentation specified in this RFP, in the bid.
    ii. Follow the format of this RFP while developing the bid and respond to each element in the order as set out in this RFP.
    iii. Comply with all requirements as set out within this RFP.

2.6 Bidder to Inform

The Bidder shall be deemed to have carefully examined the Terms & Conditions, Scope, Specifications, and Schedules of this RFP. If bidder has any doubts / clarifications as to the meaning of any portion of the Conditions or the specifications they shall, before the last date for Submission of Pre-Bid Queries, set forth the particulars thereof and submit them to Authority in writing in order that such doubt may be removed or clarifications are provided.

2.7 Bid Preparation and Presentation costs

The Bidder shall bear all costs associated with the preparation and submission of its bid, including visits for the purpose of clarification of the bid, if so desired / any Presentation as may be required in accordance with the conditions of this RFP and the authority shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

2.8 Pre-bid Clarification
Bidders Queries

Any clarification regarding the RFP document and any other item related to this project can be

To be continued

submitted to Authority as per the submission mode and timelines mentioned in the Fact Sheet. The pre-bid queries should be submitted in excel sheet format, along with name and details of the organization submitting the queries.

Authority shall not be responsible for ensuring that the bidders' queries have been received by them. Any requests for clarifications post the indicated date and time shall not be entertained by Authority.

Bidders must submit their queries as per the format mentioned in Section 5 - Annexure I
Queries should be submitted at <<email ID>> with cc to <<email ID>> within the date and timelines as specified in the Fact Sheet

Bidders are advised to share the Pre-Bid queries in two formats, one is in excel sheet (in *.xls Format) and as well as another in signed and scanned copy of the file (in *.pdf format) and format as per in Section 5 - Annexure I

Responses to Pre-Bid Queries and Issue of Corrigendum

Authority will not organize pre-bid meeting.

Authority will respond to any request for clarification or modification of the bidding documents. Authority shall formally respond to the pre-bid queries. No further clarifications shall be entertained after the date and time of submission of queries.

Authority shall endeavor to provide timely response to all queries. However, Authority makes no representation or warranty as to the completeness or accuracy of any response made in good faith. Authority does not undertake to answer all the queries that have been posed by the bidders.

Any modifications of the RFP Documents, which may become necessary as a result of the Pre-Bid queries, shall be made by Authority exclusively through a corrigendum. Any such corrigendum shall be deemed to be incorporated into this RFP. However, in case of any such amendment, the bid submission date may be extended at the discretion of Authority.

To be continued

Any corrigendum/notification issued by Authority, subsequent to issue of RFP, shall only be available / hosted on the website URL mentioned in the fact sheet. Any such corrigendum shall be deemed to be incorporated into this RFP.

2.9 Bid Processing Fee / Bid Document Fee and Transaction Fee

RFP can be downloaded from the website URL mentioned in the fact sheet.

Bid Processing Fee / Bid Document Fee ***as mentioned in the FACT Sheet*** shall be paid via Demand Draft in favour of the "Managing Director, Tirupati Smart City Corporation Limited", Payable at Tirupati. The Bid Processing Fee / Bid document fee is mandatory and non-refundable.

Without the payments of Bid document fee the bids will be taken as incomplete and non-responsive and shall not be considered.

Transaction Fee (As per G.O. Ms. No. 4, dated 17-02-2015 IT&C Dept.,)**.:** It is mandatory for all the participating bidders to pay electronically the transaction fee to M/s Vupadi Technologies through "Payment Gateway Service on E-Procurement platform". The Electronic Payment Gateway accepts all Master and Visa cards issued by any bank and Direct Debit facility / Net Banking of ICICI Bank, HDFC to facilitate the transaction. As prevalent Government GST Norms + Bank Charges for Credit Card Transaction Amount payable to M/s. Vupadi Technologies (Vupadi) shall be applicable.

Corpus fund charges towards 'e' procurement services at 0.0345% of estimated contract value with a cap of Rs.10,000/- for all works with estimated contract value up to Rs.50.00 Crores and Rs. 25,000/- for works with estimated contract value above Rs. 50.00 Crores from successful bidder payable in the shape of DD drawn in favour of Managing Director, APTS, Hyderabad payable at Hyderabad at the time of concluding agreement.

2.10 Bid Security/Earnest Money Deposit (EMD)

Bid Security/EMD ***as mentioned in the FACT Sheet*** shall be through a Bank Guarantee from a nationalized bank in India. No exemption for submitting the Bid Security/ EMD will be given to any agency. Bid security/EMD in any other form will not be entertained.

For Unsuccessful bidders: The bid security of all unsuccessful bidders would be refunded without

To be continued

interest by Authority on finalization of the bid in all respects by the successful bidder.

For Successful bidders: The bid security, for the amount mentioned above, of successful bidder would be returned without interest upon submission of Performance Bank Guarantee / Performance Security by the successful bidder. The successful bidder should however pay the PBG / Performance Security at 5% on Bid Contract Value / EMD whichever is higher at the time of signing the agreement in the shape of Bank Guarantee from a nationalised Bank or unconditional in the form given in the RFP document from any Nationalised Bank.

In case bid is submitted without the bid security then Authority reserves the right to reject the bid without providing opportunity for any further correspondence to the bidder concerned.

The E.M.D /PBG/ Performance Security given in the form of bank guarantee on a nationalized shall be valid for the duration of contract period plus defect liability period and in case any valid extension of contract period is granted, the validity of BG shall also be extended for the corresponding period. The bank guarantee on nationalized bank furnished by the bidder towards additional security amount shall be valid till the work is completed in all respects.

The Bid Security/ EMD shall be forfeited and appropriated by the authority as mutually agreed genuine pre-estimated compensation and damages payable to Authority for the time, cost and efforts of the authority, without prejudice to any other right or remedy that may be available to the authority under the RFP or in law under the following conditions:

a. If a bidder withdraws or modifies its bid during the period of bid validity or any extension agreed by the bidder thereof;
b. If a bidder is disqualified in accordance with clause 2.2;
c. If the bidder tries to influence the evaluation process or engages in corrupt, fraudulent, coercive or undesirable practice or restrictive practice;
d. If the bidder is declared as the successful bidder and it
    - Withdraws its proposal during negotiations. However, failure to arrive at a consensus between authority and the successful bidder shall not be constructed as withdrawal of proposal by successful bidder;
    - Fails to sign and return, as acknowledgement, the duplicate copy of the letter of award;
    - Fails to submit the performance bank guarantee / Performance Security and/or sign the contract in accordance with this RFP;
    - Fails to fulfil any other condition precedent to the execution of the contract, as

To be continued

specified in the letter of award;

- Fails to execute the contract.

2.11 Bid Validity Period

The EMD submitted along with the bid will remain valid for validity period mentioned in the Fact Sheet.

In exceptional circumstances, prior to expiry of the bid validity period, the authority may request that the bidders to extend the period of validity for a specified additional period at Bidder's cost. The request and the responses to the request shall be made in writing. If validity of their Bids is extended the Earnest Money Deposit (EMD) shall also be extended for a corresponding-period. A bidder may refuse the request without risking forfeiting the EMD, but in this case, the bidder will be out of the competition for the award. Bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to ensure that the bid remains secured for a correspondingly longer period.

On completion of the validity period, unless the Bidder withdraws his/her/their bid in writing, it will be deemed to be valid until such time that the Bidder formally (in writing) withdraws bid.

2.12 Contents of Bid

The hard copy bids should be submitted in separate envelopes which in turn shall be packed in a separate envelope and sealed as "Request for Proposal for selection of **"Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** and not to be opened except in the presence of Bid Evaluation Committee.

The four sets of documents (each enveloped separately and packed in a master envelope are required to be submitted for evaluation. The Sets will comprise of:

Document Set	Name of Document	Content
One	RFP Document fee & Bid Security / Earnest Money Deposit (EMD)	a. Scanned copy of payment of RFP Document Fee b. Scanned Copy of bank Guarantee taken for Bid Security/Earnest Money Deposit (EMD) / Online payment Receipt c. Mode of Submission: Online + Hard Copy + Soft copy (non-writable CD/DVD)

To be continued

Two	Pre-Qualification Bid	a. Pre-Qualification bid as per Section 6.1 and 6.2 along with the required supporting documents. b. No Deviation Certificate as per Section 6.5 c. Total Responsibility declaration as per Section 6.6 d. Mode of Submission: Online + Hard Copy + Soft copy (non-writable CD/DVD)
Three	Technical bid	a. Technical Bid b. Mode of Submission: Online + Hard Copy + Soft copy (non-writable CD/DVD)
Four	Financial bid	a. Financial bid **b. Mode of Submission: ONLY ONLINE**

a. The Bidder shall provide all the information sought under this RFP. The Authority will evaluate only those Bids that are received in the required formats and complete in all respects.

b. Please note that Prices should NOT be indicated in the Technical Bid but should only be indicated in the Financial Bid.

c. The Financial Proposal shall be submitted only on www.apeprocurement.gov.in and not by any other means, failing which the Authority shall reject the Bid.

d. Technical Proposals will be opened online at www.tender.apeprocurement.gov.in the specified address, date and time. The Price Proposals shall remain sealed and will be held in custody on online portal. The Technical Proposals will be evaluated. No amendments or changes to the Technical Proposals will be permitted once bid get validated online. Technical Proposals, which does not conform, to the specified requirements will be rejected as deficient Bids.

e. Documents Establishing the Conformity of the Goods to the Bidding Document

- To establish the conformity of the Goods and Related Services to the Bidding Document, the Bidder shall furnish as part of its Technical Proposal the documentary evidences
- The documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to those requirements
- Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by Bidder in the Schedule of Supply, are intended to be descriptive only and not restrictive

f. The Technical Proposal shall contain the following:

- Technical Proposal Submission Sheet;
- Written confirmation authorizing the signatory of the Bid.
- Documentary evidence establishing the Bidder's eligibility to bid as per clause 3.6.
- Documentary evidence that the Goods and Related Services conform to the Bidding Document;
- Information in Appendix's of Technical proposal Submission Sheet
- Documentary evidence establishing the Bidder's qualifications to perform the contract.
- Manufacturers authorization if applicable
- Any other document required as per the Bid Data Sheet and Tender

g. Each bid must be typed or written in indelible ink and an authorized representative of the bidder shall sign the bid and physically initial and stamp all pages of the bid. The authorization shall be by way if a written power of attorney executed in the format attached as Annexure -8. The name and position held by the person signing of the proposal must be typed or printed below.

h. All the pages of the bid must be sequentially numbered. The bid documents must contain in the beginning of the document, a list of contents with page numbers. Any deficiency in the documentation may result in the rejection of the Bid.

i. The original bid shall be prepared in indelible ink. It shall contain no interlineations or overwriting, except as necessary to correct errors made by the Bidder itself. Any such corrections must be initialed by the person (or persons - Power of Attorney) who sign(s) the bids.

j. Failure to submit the bid before the submission deadline specified in the Fact Sheet / Important Dates would cause a bid to be disqualified.

k. The physical submission of the bid has to be accompanied by soft copy [Non-Writable CD/DVD].

l. The Bidder shall submit the Technical Proposal and the Price Proposal online using the appropriate Submission Sheets furnished in Bidding Forms. These forms must be completed without any alterations to their format, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

m. Interested bidders shall submit completed RFP in sealed envelope along with soft copy, DD of Bid Processing Fee, Bid security / EMD and super-scribed the project title with all supporting documents like – Design Intent in brief identifying suitable technology, qualifications, Profile of Organization, financial strength (certified financial statements as per RFP) and expertise to undertake the project. The bidders must furnish the details on the technology adopted and success elsewhere. The bidder shall also submit a conceptual

To be continued

financial model for the project with proper justifications and proofs along with financial statements to demonstrate the bidder's capability of carrying out such project either individually or jointly in consortium with others. All the documents duly signed by the authorized signatory of the bidder, must be delivered to the undersigned through Speed Post / Courier service / by person so as to reach the office of Managing Director, TSCCL at the address, not later than last date of bid submission date and it shall be the responsibility of the bidder to send it on time. Authority will not take any responsibility for any delay or non-receipt.

n. Authority will not accept delivery of bid by fax or e-mail.
o. This RFP's enclosed formats / Annexures/ Documents, no document should be left unfilled; otherwise the RFP filing will not be valid and the incomplete RFP response will not be considered for any evaluation. All the pages of the documents should be signed by the authorised signatory of the lead Bidder and the scanned copies of the documents should be uploaded in the e-procurement portal.
p. A prospective bidder requiring any clarification on RFP documents may contact the RFP Inviting officer at the address indicated in the NIT. The RFP inviting officer will also respond to any request for clarification, received through post / e-mail.
q. The bidders who are desirous of participating in e-procurement shall submit their technical bids, financial bids etc., in the standard proscribed in the RFP documents displayed at e-market place.
r. The bidders should upload the scanned copies of all the relevant certificates, documents etc., in the e-market place in support of their technical bids. The bidders shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness / authenticity.
s. Even while execution of the work, if found that the bidder had produced false / fake certificates in the bidding process for his selection, he will be black listed and the contract will be terminated.
t. All duties, taxes, and other levies payable by the contractor as per State / Central Government rules, shall be included in the RFP percentage quoted by the bidder, however keeping in view the maximum reimbursable amounts specified in Financial Bid.
u. The documents shall be prepared and scanned in different files (in *.pdf or *.jpeg format) and uploaded during the online submission of Bid.
v. The Bidder must also upload certificates stating that the information furnished by him is genuine and he must also give self-declaration regarding value of ongoing works. The documents are to be uploaded in *.zip format only.

To be continued

w. The authority will not hold any risk and responsibility for the loss in transit during uploading of the scanned document, for the invisibility of the scanned document online, and any other problem(s) encountered by the bidders while submitting his bids online.

x. Related certificates, documents etc., duly self-attested are to be scanned and uploaded on to the e-procurement platform at www.apeprocurement.gov.in in support of items mentioned in clause.

y. Any other condition regarding receipt of bidders in conventional method appearing in RFP document may be treated as Non-applicable.

z. Any incorrectness / deviation noticed in the soft copies will be viewed seriously and apart from cancelling the RFP duly forfeiting the EMD, criminal action will be initiated including suspension of business.

aa. If any discrepancy found between the online submission and the physical submission, the bid submitted online shall prevail and be considered as final.

bb. Both physical and online bid submission are mandatory, if anyone is not submitted, the bid shall be considered as non-responsive bid.

cc. The Bidders shall be responsible for all of the costs associated with the preparation of their Bids and their participation in the Bidding Process. The Authority will not be responsible or in any way liable for such costs, regardless of the conduct or outcome of the Bidding Process.

dd. Bidder shall quote for full quantity against all items. Part bids are liable for rejection. Therefore, the bidder is advised to study all terms and conditions of the RFP including technical specifications for submitting complete and comprehensive bid.

ee. Failure to comply with any of the terms and conditions or instructions of the offer with insufficient particulars which are likely to render fair comparison of tender as a whole impossible may lead to rejection even if otherwise it is a competitive offer/ Bid.

ff. **Local Conditions**: It will be imperative on each Bidder to fully inform himself of all local conditions and factors which may have any effect on the execution of the works covered under these documents and specifications. The Authority will not entertain any request for clarifications from the Bidders, regarding such local conditions. It must be understood and agreed that such factors have properly been investigated and considered while submitting the proposals. No claim for financial adjustment to the contract awarded under these specifications and documents will be entertained by the authority neither any change in the time schedule of the contract nor any financial adjustment arising thereof which are based on the lack of such clear information, its effect on the cost of the works to the Bidder shall be permitted by the authority.

To be continued

gg. The three envelopes shall be placed in an outer envelope, which shall be sealed. Each of the three envelopes shall clearly bear the following identification:

Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati" and shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the right hand top corner of each of the envelopes.

Each of the envelopes shall be addressed to:

ATTN. TO : The Managing Director,
Tirupati Smart City Corporation Limited,
c/o. Tirupati Municipal Corporation, Tilak Road, Tirupati – 517501,
Chittoor District, Andhra Pradesh, India E-mail: tsccltirupati@gmail.com

If the envelopes are not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted and consequent losses, if any, suffered by the Bidder.

hh. Bids submitted by fax, telex, telegram or e-mail shall not be entertained and shall be rejected

ii. **Note to the bidder for e-tendering**:

In participation in e-tendering of Authority, it is mandatory for prospective bidder to get registered on website www.apeprocurement.gov.in. Thus, it is advised to all prospective bidders to get registration by making online registration fees. It is mandatory that the bidder is required to sign their bids online using Digital Signature Certificates, so the same should be obtained the same at the earliest if not obtained already.

For further information regarding issue of Digital Signature Certificate, the bidder may visit website www.apeprocurement.go.in it is to be noted that it may take upto 0 to 10 working days for issue of Digital Signature Certificate. Authority shall not be responsible for any delay in issue of Digital Signature Certificate.

If bidder is bidding first time for e-tendering, then it is obligatory on the part of bidder to fulfil all formalities such as registration, obtaining Digital Signature Certificate etc., well in advance. Bidder must positively complete online e-tendering procedure at www.apeprocurement.go.in

For any type clarifications bidder can visit www.apeprocurement.go.in and for helpdesk http://www.apeprocurement.gov.in/helpdesk.html

To be continued

jj. Bidder may contact the officials at TSSCL to get any other information about the equipment's and vehicles required.

kk. **One RFP per Bidder**:
Each bidder shall submit only one RFP for the work. A bidder who submits more than one RFP will cause dis-qualification of all the RFPs submitted by the Bidder. A Bidder bidding individually or as a member of a Consortium shall not be entitled to submit another bid either individually or as a member of any Consortium, as the case may be.

2.13 Bid Formats

2.13.1 Pre-Qualification Bid Format

Section #	Section Heading	Details
1	Pre-Qualification Bid Covering Letter	As per format provided in section 6.1
2	Consortium Agreement	As per format provided in Annexure 7 of this Volume
3	About Bidder	As per format provided in section 6.2 of this document.
4	Bidder Registration	Certificate of Incorporation / Registration under companies Act, 1956/2013 or any suitable Act abroad
5	Average Annual Turnover	Certificate from the Statutory auditor / CA clearly specifying the annual turnover for the specified years
6	Undertaking for non-blacklisting clause	Undertaking by the authorized signatory as per format
7	Bidder Certifications	Copies of valid certificates in the name of the sole bidder
8	Power of Attorney	Documentary evidence as per format provided in Annexure 8 and 9
9.	Project Experience	Citation details of projects as per format in Section 7.4 and 6.7 as applicable.
10.	No Deviation Certificate	As per format provided in section 6.5
11.	Total responsibility certificate	As per format in 6.6

To be continued

2.13.2 Technical Bid Format

Section #	Section Heading	Details
1.	Technical Bid Checklist	As per format provided in section 7.1
2.	Technical Bid Covering Letter	As per format provided in Section 7.2
3.	About Bidder	· Details about bidder (whether sole bidder or Consortium) · Bidder's General Information as required in Technical Criteria 3.6.
4.	Project presentation	Details as required in Technical Criteria 3.6.
5.	Project/credential summary	As per format provided in Section 7.3
6.	Bidder's Experience	Project citation as per format provided in section 7.4 and supporting documentary evidences and Self-certifications as per format in section 6.7 as Applicable
7.	Manufacturers'/Producers' Authorization Form	As per format provided in section 15
8.	Anti-Collusion Certificate	As per format provided in section 7.6
9.	Non-disclosure agreement	As per format provided in section 11 (Annexure 6)

2.13.3 Financial Bid Format

The Bidder must submit the Financial Bid is the formats specified in Section 8.

Section #	Section Heading	Details
1.	Bid Price Sheet	As per format provided in Section 8 (Annexure – 4)

2.14 Language

The bid should be prepared and submitted by the bidders in English language only. If any submitted supporting documents (like notices, certificates, correspondences, proceedings, etc.,) are in any language other than English, translation of the same in English language is to be provided (duly attested) by the Bidders. For purposes of interpretation of the documents, the English translation shall govern. Such translated documents shall be notarized and in case of any incorrectness of the translation, the bidder will be penalized. The bidder shall bear all costs of translation to the governing language and all risks of the accuracy of such translation.

To be continued

2.15 Authentication of Bids

An authorized representative (or representatives - Power of Attorney) of the Bidder shall initial all pages of the Pre-Qualification, Technical and Financial Bids.
Bid should be accompanied by an authorization in the name of the signatory (or signatories) of the Bid. The authorization shall be in the form of a written power of attorney accompanying the Bid or in any other form demonstrating that the representative has been duly authorized to sign.

2.16 Amendment of Request for Proposal

At any time prior to the due date for submission of bid, Authority may, for any reason, whether at its own initiative or in response to a clarification requested by prospective bidder(s), modify the RFP document by amendments. Such amendments shall be uploaded on the e-procurement portal website, through corrigendum and shall form an integral part of RFP document. The relevant clauses of the RFP document shall be treated as amended accordingly.

It shall be the responsibility of the prospective bidder(s) to check the Authority's website from time to time for any amendment in the RFP document. In case of failure to get the amendments, if any, Authority shall not be responsible.

In order to allow prospective bidders a reasonable time to take the amendment into account in preparing their bids, Authority, at its discretion, may extend the deadline for submission of bids. Such extensions shall be uploaded on website of the Authority.

Verbal clarifications and information given by the authority or any other person for or on its behalf shall not in any way or manner be binding on the authority.

2.17 Bid Price and quotation submission

Financial Bid shall be as per the format provided in Section 8. Bidders shall give the required details of all applicable taxes, duties, other levies and charges etc. in respect of direct transaction between Authority and the Bidder. **The financial bid must be uploaded on e-procurement only** and **should not** be printed or submitted with Prequalification / Technical Bid.

Bidders shall quote for the entire scope of contract on a "overall responsibility" basis such that the total bid price covers Bidder's all obligations mentioned in or to be reasonably inferred from the bidding documents.

To be continued

Prices quoted by the Bidder shall remain firm during the entire contract period and not subject to variation on any account.

The Bidder shall submit, as part of the Price Proposal, the Price Schedules for Goods and Related Services, equipments according to their origin as appropriate, using the forms furnished online.

The bidders shall quote in their proposals a firm lump sum price as per schedules provided for the entire scope of **"Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**.

The prices quoted by the Bidder shall be fixed.

Any conditional bid with any deviations from the terms and conditions of RFP shall be disqualified.

The prices quoted by the Bidder in the Price Proposal Submission Sheet and in the Price Schedules shall conform to the requirements specified below.

- The price of the goods quoted should be on the basis of delivery to site on for destination basis [at Tirupati] including all customs duties and taxes, Entry tax, GST, transportation, packaging, transit insurance, service tax, sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of goods quoted. The price quoted should be inclusive of all FOR Tirupati.
- The prices quoted shall be lump sum and on for destination basis inclusive of all taxes and duties. For the purpose of clarity, applicable taxes as on the date of submission of bid shall be quoted.
- **A bid submitted with an adjustable price quotation shall be treated as non-responsive and rejected**.

Note:

***Rate per Unit / Unit Price inclusive of following:**

- All priced quotations should be in Indian Rupees only.

To be continued

- Unit Price at Destination or Delivery point at Tirupati, Chittoor District, Andhra Pradesh, India.
- The price for inland transportation, insurance and other local costs incidental to delivery of the goods to their final destination (i.e., at Tirupati).
- The unit prices quoted shall be with comprehensive warranty.
- The Bidder shall quote for Estimate Schedule (along with basic price, GST and other charges such as installation and onsite comprehensive warranty maintenance service charges, if any) and Comprehensive Warranty in the specified places for all the materials, equipments & machineries having Technical Specifications mentioned in this bid document.
- The price of equipments & machineries (Ex-works, Ex-factory, Ex-showroom, Ex-warehouse or off-the-shelf, as applicable), including all duties and sales and other taxes (Inclusive of GST).
- On components and raw material used in the manufacture or assembly.
- On the previously imported equipment / machineries of foreign origin quoted ex-showroom, ex-warehouse, or off-the-shelf.
- Any Indian duties, sales and other taxes which will be payable on the goods if this Contract is awarded;
- Unit price including all customs duties and taxes, Entry tax, GST, transportation, packaging, transit insurance, service tax, sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of goods quoted.
- The prices quoted shall be lump sum and on for destination basis inclusive of all taxes and duties. For the purpose of clarity, applicable taxes as on the date of submission of bid shall be quoted.
- The bidder should quote his firm prices valid for the duration and completion of the contract i.e. "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"" under Implementation of the Smart City Mission in Tirupati. No enhancement of prices for what so ever reason will be allowed once the offer is accepted.

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2.18 Insurance

Testing and commissioning insurance is the responsibility of the bidder. Any loss or damage to the equipment for whatever reasons shall be to the account of the bidder. The bidder shall promptly make good the loss or damage by way of replacement and/or repair of the portion of the equipment damaged or lost, incidental to manufacture or acquisition, transportation, storage and delivery, irrespective of settlement of claims with the insurance underwriters. There shall be no extra cost to the authority on account of such replacement / repair of losses or damages for whatever reasons. All costs on account of insurance liabilities covered under the contract will be to the Bidder's account and principal of the insurance will be to the authority.

2.19 Deviations and Exclusions

Bids shall be submitted strictly in accordance with the requirements and terms & conditions of the RFP. The Bidder shall submit a No Deviation Certificate as per the format mentioned in Section 6.5. The bids with deviation(s) are liable for rejection.

2.20 Total Responsibility

Bidder should issue a statement undertaking total responsibility for the defect free operation of the proposal as per the format mentioned in Section 6.6.

2.21 Late Bids

RFP must be submitted not later than the date and time specified in RFP. In the event of the specified date / time for the submission of bids declared as holiday, the bids will be received on the next working day.

Late submission will not be entertained and will not be permitted by the e-Procurement Portal.

The bids submitted by telex/fax/e-mail etc. shall not be considered. No correspondence will be entertained on this matter.

Authorities shall does not be responsible for delay in submission of any online submission related or website related issues and date of submission cannot be extended for such reasons

Authority reserves the right to modify and amend any of the above-stipulated condition/criterion.

To be continued

2.22 Right to Terminate the Process

Authority may terminate the RFP process at any time and without assigning any reason. Authority makes no commitments, express or implied, that this process will result in a business transaction with anyone. This RFP does not constitute an offer by Authority.

2.23 Non-Conforming bids

A bid may be construed as a non-conforming bids and ineligible for consideration:

a. If it does not comply with the requirements of this RFP.
b. If a bid does not follow the format requested in this RFP or does not appear to address the particular requirements of the scope.

2.24 Acceptance / Rejection of Bids

a. Authority reserves the right to reject in full or part, any or all bids without assigning any reason thereof. Authority reserves the right to assess the Bidder's capabilities and capacity. The decision of Authority shall be final and binding.
b. Bid should be free of over writing. All erasures, correction or addition must be clearly written both in words and figures and attested.

In the event of any assumptions, presumptions, key points of discussion, recommendation or any points of similar nature submitted along with the Bid, Authority reserves the right to reject the Bid and forfeit the EMD.

The authority reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to bidders. In case of annulment, all bids submitted and specifically, bid securities shall be promptly returned to the bidders.

The Authority reserves the right to verify all statements, information and documents submitted by the bidder in response to the RFP. Any such verification or lack of such verification by the authority shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the authority thereunder.

If there is any discrepancy in the financial bid, it will be dealt as per the following:

a. Activities and items described in the Technical Proposal but not priced in the Financial proposal shall be assumed to be included in the prices of other activities or items and no

To be continued

corrections will be mad to the Financial Proposal / Bid.

b. If, in the price structure quoted for the required goods / services / works, there is discrepancy between the unit price and total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly.
c. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
d. If there is a discrepancy between words and figures, the amount in words shall prevail.
e. If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date up to which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of Authority, the bid is liable to be disqualified.

2.25 Confidentiality

From the time the bids are opened to the time of the contract is awarded, the bidder should not contact the client on any matter related to its qualification documents, Technical Bid and/or Financial Bid. Information relating to the evaluation of proposals and award recommendations shall not be disclosed to the bidders who submitted the bids or to any other party not officially involved with the bid process, until the publication of the contract award.

Any attempt by a bidder or anyone on behalf of the bidder to influence improperly the client in the evaluation of the bids or award of the contract may result in the disqualification of its bid.

All the material/information shared with the Bidder during the course of this procurement process as well as the subsequent resulting engagement following this process with the successful bidder, shall be treated as confidential and should not be disclosed in any manner to any unauthorized person under any circumstances. The employees of the successful Lead bidder and Consortium members who are proposed to be deployed on the project need to furnish a Non-Disclosure Agreement (NDA) as per Annexure 6 in section 11.

2.26 Disqualification

The bid is liable to be disqualified in the following cases or in case bidder fails to meet the bidding requirements as indicated in this RFP:

a. During validity of the bid, or its extended period, if any, the bidder changes its quoted prices.

To be continued

b. The bidder's bid is conditional and has deviations from the terms and conditions of RFP.
c. Bid is received in incomplete form.
d. Bid is not accompanied by all the requisite documents.
e. Information submitted in technical bid is found to be misrepresented, incorrect or false, accidentally, unwittingly or otherwise, at any time during the processing of the contract (no matter at what stage) or during the tenure of the contract including the extension period if any.
f. Financial bid is enclosed with the same document as technical bid.
g. Bidder tries to influence the bid evaluation process by unlawful / corrupt / fraudulent means at any point of time during the bid process.
h. In case any one party submits multiple bids or if common interests are found in two or more bidders, the bidders are likely to be disqualified, unless additional bids / bidders are withdrawn upon notice immediately
i. If any of the Lead Bidder is also partner in any other bid, then all the affected bids shall be disqualified.
j. Bids without EMD / Bid Security and as well as Bid Documentation / Bid Processing Fee will be disqualified.

2.27 Fraud and Corrupt Practices

TSSCL requires compliance with the Indian Penal Code 1860 and Prevention of Corruption Act 1988. TSCCL defines for the purposes of this provision the terms set forth below as follows:

a. The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this RFP, Authority shall reject a Bid without being liable in any manner whatsoever to the Bidder, if it determines that the Bidder has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the "Prohibited Practices") in the Selection Process. In such an event, Authority shall, without prejudice to its any other rights or remedies, forfeit and appropriate the EMD or PBG, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to Authority for, inter alia, time, cost and effort of Authority, in regard to the RFP, including consideration and evaluation of such Bidder's Bid.

To be continued

Without prejudice to the rights of Authority under Clause above and the rights and remedies which Authority may have under the LOA or the Agreement, if a Bidder is found by Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the LOA or the execution of the Agreement, such Bidder shall not be eligible to participate in any tender or RFP issued by Authority during a period of 3 years from the date such Bidder is found by Authority to have directly or through an agent, engaged or indulged in any Prohibited Practices.

b. For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:

i. "corrupt practice" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of Authority who is or has been associated in any manner, directly or indirectly with the Selection Process or the LOA or has dealt with matters concerning the Agreement or arising there from, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of Authority, shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or (ii) save as provided herein, engaging in any manner whatsoever, whether during the Selection Process or after the issue of the LOA or after the execution of the Agreement, as the case may be, any person in respect of any matter relating to the Project or the Award or the Agreement, who at any time has been or is a legal, financial or technical consultant /adviser of Authority in relation to any matter concerning the Project;

ii. "fraudulent practice" means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process or the execution of contract;

iii. "Collusive practices" means a scheme or arrangement between two or more bidders, with or without the knowledge of the Borrowers, designed to influence the action of any party in a procurement process or the execution of a contract.

iv. "coercive practice" means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person's participation or action in the Selection Process;

To be continued

v. "undesirable practice" means (i) establishing contact with any person connected with or employed or engaged by Authority with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or (ii) having a Conflict of Interest; and

vi. "restrictive practice" means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Selection Process.

Will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract;

Will sanction a party or its successor, including declaring ineligible, either indefinitely or for stated period of time to participate in TSCCL Bidding / Tender activities if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for, or in executing, an TSCCL contract.

2.28 Conflict of Interest

a. A bidder shall not have a conflict of interest that may affect the Selection Process or the proposal delivery (the "Conflict of Interest"). Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, Authority shall forfeit and appropriate the EMD, if available, as mutually agreed genuine pre-estimated compensation and damages payable to Authority for, inter alia, the time, cost and effort of Authority including consideration of such Bidder's Bid, without prejudice to any other right or remedy that may be available to Authority hereunder or otherwise.

b. Authority requires that the bidder provides proposals which at all times hold Authority's interests paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The bidder shall not accept or engage in any assignment that would be in conflict with its prior or current obligations to other clients, or that may place it in a position of not being able to carry out the assignment in the best interests of Authority.

c. Conflicting Activities: Conflict between consulting activities and procurement of goods, works or non-consulting services: A bidder that has been engaged by the client to provide goods, works,

To be continued

or non-consulting services resulting from or directly related to those goods, works, or non-consulting services. Conversely, a Bidder hired to provide consulting services for the preparation or implementation of a project, or any of its Affiliates, shall be disqualified from subsequently providing goods or works or non-consulting services resulting from or directly related to the consulting services for preparation or implementation.

d. Conflicting Relationships: Relationship with the client's staff: A bidder (including its Directors, stakeholders or Management) that has a close business or family relationship with a professional staff of the client who are directly or indirectly involved in any part of
   - The preparation of the RFP for the assignment
   - The Technical Specifications of the goods, works or services may not be awarded a contract, unless the conflict stemming from this relationship has been resolved in a manner acceptable to the client throughout the selection process and the execution of the contract.

2.29 Sub-Contracting

The bidder would not be allowed to sub-contract work, except for the following:

- Structure, Civil and Architectural works
- Cabling and fixtures work and all civil work during implementation.

Sub-contracting shall be allowed only with prior written approval of Authority. However, even if the work is sub-contracted, the sole responsibility of the work shall lie with the lead bidder. The lead bidder shall be held responsible for any delay / error / non-compliance etc. of its sub-contracted vendor. The details of the sub-contracting agreements (if any) between both the parties would be required to be submitted to Authority.

A list of all sub-Contractors that the bidder proposes to sub-contract the works mentioned above shall be set out as per format provided in Section 16 along with an undertaking as specified in Section 19 [Annexure -11].

2.30 Right to vary quantity by Authority

a. At the time of contract, the quantity of goods, works or services originally specified in the bidding documents may be increased or decreased. It shall be without any change in the unit prices or other terms and conditions of the Bid and the bidding documents.
b. If the authority does not procure any subject matter of procurement or procures less than the

quantity specified in the bidding documents due to change in circumstances, the bidder shall not be entitled for any claim or compensation except otherwise provided in the bidding document.

c. Repeat orders for extra items or additional quantities may be placed, if it is provided in the bidding document, on the rates and conditions given in the contract if the original order was given after inviting open competitive bids. Delivery or completion period may also be proportionally increased.

2.31 Withdrawal, Substitution, and Modification of Bids

a. No bid may be withdrawn, substituted or modified in the interval between the bid submission deadline and the expiration of the bid validity period specified by the bidder in the bid submission form, or any extension thereof agreed to by the bidder. Withdrawal of the bid during this interval may result in the forfeiture of the EMD / Bid Security.
b. Any alteration / modification in the application or additional information supplied subsequent to the bid submission date, unless the same has been expressly sought for by the client, shall be disregarded.
c. Bids withdrawn shall not be opened and processed further.
d. Alternative bid shall not be permitted.

2.32 Site Visit

a) The Bidder may wish to visit and examine the site or sites and obtain for itself, at its own responsibility and risk, all information that may be necessary for preparing the bid and entering into the Contract. The costs of visiting the site or sites shall be at the Bidder's own expense.
b) Bidders are encouraged to submit their respective bids after visiting the project site and ascertaining for themselves the site conditions, traffic, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather data, applicable laws and regulations and any other matter considered relevant by them.
c) The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose (upon a written request from bidder) of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
d) A site visit conducted by the authority ***shall be organized*** on the written request of the bidder.

To be continued

The bidder shall intimate the Employer for site visit through Electronic mail tsccltirupati@gmail.com at least three (03) days in advance.

e) Failure of a Bidder to make a site visit will not be a cause for its disqualification.

f) No site visits shall be arranged or scheduled after the deadline for the submission of the Bids and prior to the award of Contract.

2.33 Acknowledgement by Bidder

a. It shall be deemed that by submitting the bid, the bidder has:
   i. Made a complete and careful examination of the RFP.
   ii. Received all relevant information requested from the authority.
   iii. Accepted the risk of inadequacy, error or mistake in the information provided in the RFP or furnished by or on behalf of the authority relating to any of the matters referred to clause 2.30 above; and
   iv. Agreed to be bound by the undertakings provided by it under and in terms hereof.

b. The Authority shall not be liable for any omission, mistake or error in respect of any of the above or on account of any matter or thing arising out of concerning or relating to the bidding process, including any error or mistake therein or in any information or data given by the authority.

2.34 Proprietary Data

All documents and other information supplied by the authority or submitted by bidder to the authority shall remain or become the property of the authority. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their bid. The authority will not return any bid or any information provided along therewith.

2.35 Contacts during Bid Evaluation

Bids shall be deemed to be under consideration immediately after they are opened and until such time the authority makes official intimation of award / rejection to the bidders. While the bids are under consideration, bidders and / or their representatives or other interested parties are advised to refrain, save and except as required under the bidding documents, from contacting by any means, the authority and / or their employees / representatives on matters related to the bids under consideration.

2.36 Maintenance Tools and Tackles

The proposal shall include all special tools and tackles required for the operation and maintenance of the equipment in each equipment package.

The Bidder shall indicate all the above items in the proposal sheets in the form of a schedule giving therein the description and the quantity of each item. The item wise Price to be quoted by the Bidder shall be furnished in the format, which will be delivered with the first shipment of the main equipment.

2.37 Drawings, Data and Literature to be furnished

The Bidder shall include in his offer the following:

Undertaking to furnish details of special precautions and instructions to be followed and check list for erection, testing and commissioning of the plant.

Undertaking to furnish all required drawings, documentations for assembly, erection, testing and commissioning of the plant. Instructions regarding storage, handling, precautions etc., and checklists at various stages, till the plant is installed.

Time schedule for design, manufacture, testing, shipment, installation and commissioning is to be enclosed.

2.38 Governing Law and Jurisdiction

The contract and the transaction contemplated therein shall be governed by and construed in accordance with the laws of India.

The contract and the transactions contemplated therein shall be subject to the exclusive jurisdiction of the competent courts in Tirupati, Andhra Pradesh, India.

If any disputes arises between the parties hereto during the subsistence or thereafter, in connection with the validity, interpretation, implementation or alleged material breach of any provision of the agreement or regarding a question, including the questions as to whether the

To be continued

termination of contract Agreement by one party hereto has been legitimate, both parties hereto shall endeavor to settle such dispute amicably. The attempt to bring about an amicable settlement is considered to have failed as soon as one of the parties hereto, after reasonable attempts gives 15 days' notice thereof to the other party in writing.

The place of arbitration shall be Tirupati, Andhra Pradesh, India.

The arbitration proceeding shall be governed by the Arbitration and Conciliation Act of 1996 as amended from time to time.

The Proceeding of arbitration shall be in English Language.

3. Selection Process for Bidder

3.1 Opening of Bids

Bids are invited from the prospective bidders for the capacity specified in this section.

The Bids shall be opened by Authority in presence of those Bidders or their representatives who may be present at the time of opening.

The representatives of the bidders should be advised to carry the identity card or a letter of authority from the bidder firms to identify that they are bonafide representatives of the bidder firm, for attending the opening of bid.

There will be bid-opening as follows,

1. Set 1 – RFP Processing Fee & Bid Security / EMD
2. Set 2 – Pre-qualification Bid
3. Set 3 – Technical Bid

The date and time for opening of Technical &Financial bid would be as mentioned in the Fact Sheet.

The Technical Bids of only those bidders who clears the Pre-qualification stage shall be opened.

The Financial Bids of only those bidders will be opened who score equal to or more than 70% in Technical Evaluation.

3.2 Preliminary Examination of Bids

Authority shall examine the bids to determine whether they are complete, whether the documents have been properly signed and whether the bids are generally in order. Any bids found to be nonresponsive for any reason or not meeting any criteria specified in the RFP, shall be rejected by Authority and shall not be included for further consideration.

Authority shall examine the Technical Proposal to confirm that all documents and technical documentation requested have been uploaded on online portal, and to determine the completeness of each document submitted.

To be continued

Initial Bid scrutiny shall be held and bids will be treated as non-responsive, if bids are:

a. Not submitted in format as specified in the RFP document
b. Received without the Letter of Authorization (Power of Attorney)
c. Transaction Fee
d. Bid documentation / Bid Processing Fee.
e. Earnest Money Deposit (EMD) / Bid Security.
f. Technical Proposal Submission Sheet.
g. Found with suppression of details
h. With incomplete information, subjective, conditional offers and partial offers submitted
i. Submitted without the documents requested
j. Non-compliant to any of the clauses mentioned in the RFP
k. Manufacturer's Authorization, if applicable.
l. With lesser validity period

Examination of Terms and Conditions; Technical Evaluation of Bids

Authority shall examine the Bids to confirm that all terms and conditions specified in Bid Document have been accepted by the Bidder without any material deviation or reservation.

Authority shall evaluate the technical aspects of the Bid submitted in accordance to confirm that all requirements specified in Schedule of Supply of the Bidding Document have been met without any material deviation or reservation.

If, after the examination of the terms and conditions and the technical evaluation, authority determines that the Technical Proposal is not substantially responsive it shall reject the Bid.

3.3 Evaluation Process

Authority shall constitute a Bid Evaluation Committee to evaluate the responses of the bidders. The Bid Evaluation Committee shall evaluate the responses to the RFP and all supporting documents/documentary evidence. Inability to submit requisite supporting documents/documentary evidence by bidders may lead to rejection of their bids.

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The decision of the Bid Evaluation Committee in the evaluation of bids shall be final. No correspondence will be entertained outside the process of evaluation with the Committee. The Bid Evaluation Committee may ask for meetings or presentation with the Bidders to seek clarifications or conformations on their bids.

Only those Bidders who meet the eligibility criteria specified shall qualify for evaluation under this Section 3. Bids of firms/ consortia who do not meet these criteria shall be rejected.

The Bidder's competence and capability is proposed to be established by the following parameters

a) After the bidder qualifies in the Pre-Qualification, they will be considered for Technical Evaluation and only those bidders will be qualify for financial bid who score equal to or more than 70 marks out of 100 in Technical Evaluation as per clause 3.6.

b) The bidders who qualify in the Pre-Qualification will be required to apprise before the RFP evaluation Committee and make a presentation (max. 20 slides) on the scheduled date and time.

c) The presentation will be awarded marks out of 100 (hundred) marks and will prorated in overall marks mentioned clause 3.6. Technical presentation by the responsive bidder on Operation and Maintenance will be presented in the presence of Committee constituted by TSCCL and the marking for the presentation will be given by the committee members. The marks awarded by the committee members will be final.

d) The decision of the RFP Evaluation Committee in the evaluation of bids shall be final. No correspondence will be entertained outside the process of evaluation with the Committee. The RFP Evaluation Committee may ask for meetings or presentation with the Bidders to seek clarifications or conformations on their bids.

e) The RFP Evaluation Committee reserves the right to reject any or all bids without assigning any reason. Each of the responses shall be evaluated as per the criteria and requirements specified in this RFP. The steps for evaluation are as follows-:

To be continued

3.4.1 Stage 1:Pre-Qualification

a. The Bidder should be either a body incorporated in India under the Companies Act, 1956

b. . A copy of certificate of incorporation shall be furnished along with the bid in support of above.

c. Authority shall validate "RFP Document fee & Bid Security/Earnest Money Deposit (EMD)". If the contents are as per requirements, Authority shall open the "Pre- Qualification Bid**". Each of the Pre-Qualification condition mentioned in Section3.5 is MANDATORY**. In case, the Bidder does not meet any one of the conditions, the bidder shall be disqualified.

d. Technical and Financial bids for those bidders who don't pre-qualify will not be opened. Financial bid will be opened for those bidders, who qualify in the technical evaluation. Bid Security amount shall be retuned for those who don't qualify the financial evaluation stage and after PBG is submitted by successful bidder.

3.4.2 Stage 2: Technical Evaluation

a. "Technical bid" will be evaluated only for the bidders who succeed in Stage1.

b. Authority will review the technical bids of the short-listed bidders for responsiveness. If the technical proposal is found
   - Not to be complete in all respects; or
   - Not duly signed by the authorized signatory of the bidder on all pages; or
   - Not to be in prescribed format and interlineations in between the formats / lines in the prescribed formats; or
   - To contain alternation, conditions, deviations or omissions.

   then such technical bids shall be deemed to be substantially non-responsive and liable to be disqualified at Authority's discretion.

c. The bidders' technical proposal in the bid document shall be evaluated as per the requirements specified in the RFP and technical evaluation framework as mentioned in Section 3.6

d. Bidders need to submit detailed – "***Presentation of the Project"*** [If required]. Bidders who qualify the PQ stage shall be called for presentation.

To be continued

3.4.3 Responsiveness of Technical Proposal

1. Authority's determination of the responsiveness of a Technical Proposal is to be based on the contents of the Technical Proposal itself.
2. A substantially responsive Technical Proposal is one that conforms to all the terms, conditions, and specifications of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:
   a. Affects in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or
   b. Limits in any substantial way, inconsistent with the Bidding Document, Authority's rights or the Bidder's obligations under the Contract; or
   c. If rectified would unfairly affect the competitive position of other Bidders presenting substantially responsive Technical Proposals.
   d. If a Technical Proposal is not substantially responsive to the Bidding Document, it shall be rejected by authority and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation, or omission

3.4.4 Stage 3: Financial Evaluation

The financial bids for the technically qualified bidders will be notified and shall then be opened on the notified date and time and reviewed to determine whether the financial bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at Authority's discretion.

a. **Financial bids shall be uploaded on e-procurement portal only**.
b. Financial bids that are not as per the format provided in Section 8 (Annexure 4) shall be liable for rejection.
c. The bid price shall include all taxes and levies and shall be in Indian Rupees.
d. Financial Bids of only top bidders who have obtained 70 % (Seventy percentage) or above marks in the technical bid evaluation process will be opened.
e. Financial score only for the Supply and installation and Operation & Maintenance cost bid will be calculated.
f. The lowest financial proposal should be given a financial score of 100 points. The financial scores of other proposals should be determined proportionately.
g. The lowest Financial Proposal (FM) will be given a financial score (SF) of 100 points. The

To be continued

financial scores of other proposals will be computed as follows:

SF= 100 x FM/F (F= amount of Financial Proposal)

h. Proposals will finally be ranked according to their combined technical (ST) and financial (SF) scores as follows:

S= ST x Tw+ SF x FW

Where S is the combined score, and Tw and Fw are weights assigned to Technical Proposal and Financial Proposal that shall be 0.80 and 0.20 respectively.

i. The work will be awarded to the first ranked bidder (H-1, having the highest combined score). The second ranked bidder (H-2) shall be kept in reserve and may be invited for negotiation in case the first ranked bidder withdraws, or fails to comply the requirements specified in this document.

j. The Financial Bids will be opened, in the presence of Bidders' representatives who choose to attend the Financial Bid opening on date and time to be communicated to all the technically qualified Bidders. The Bidder's representatives who are present shall sign a register evidencing their attendance.

k. TSCCL reserves the right to reject all/any part of the tender without assigning any reason whatsoever and decision of the Managing Director, TSCCL in this regards shall be final and binding. The Managing Director, TSCCL is not bound to disclose the details of the evaluation process in terms of methodology, evaluation criteria and scores.

3.4.5 Correction of Arithmetical Errors

Provided that the bid is substantially responsive, the authority shall correct arithmetical errors on the following basis:

1. Only for admeasurement contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
2. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

To be continued

3. If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to this clause as stated above.
4. Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with RFP shall result in the rejection of the Bid.

3.5 Pre-Qualification Criteria

The Technical Evaluation Committee will review the PQ to determine whether the bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at Authority's discretion.

Sl. No.	Eligibility and Qualification Criteria	Compliance Requirements	Documentation
Criteria			
1.	Company Registration Certificate	• Certificate of Incorporation / Registration under companies Act, 1956/2013 or any suitable Act abroad or as amended. • Consortium agreement clearly stating the roles and responsibilities of each member • Attested by Company Secretary / Authorised Signatory if applicable	PQ_1

a. The Bidder may be a single entity (the "**Sole Bidder**") or a group of entities (the **"Consortium"**), coming together to implement the Project. Consortiums of maximum two members are allowed for this project. However, no Bidder applying individually or as a member of a Consortium, as the case may be, can be member of another Bidder. The term "**Bidder**" used herein would apply to both a single entity and a Consortium.

To be continued

b. Bidder may be a natural person private entity, or any combination of them with a formal intent to enter into a Consortium or under an existing agreement to form a Consortium. A Consortium shall be eligible for consideration subject to the conditions set out in the below Sub Clause b.i of 3.5 Pre-Qualification Criteria.

   i. The Bidder including individual or any of its Consortium should, in the last 3 (three) years, have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial TSCCL / TMC or a judicial pronouncement or arbitration award against the Bidder including individual or any of its Consortium Member, as the case may be, nor has been expelled from any project or contract by any public entity nor have had any contract terminated by any public entity for breach by such Bidder including individual or any of its Consortium Member

c. A Bidder shall not have a conflict of interest (the "Conflict of Interest") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified and liable for forfeiture of the BID Security or Performance Security as the case may be. A Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:

   i. the Bidder, its Consortium Member (or any constituent thereof) and any other Bidder, its Member or any Member of its Consortium thereof (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding of a Bidder, or its Consortium Member thereof (or any shareholder thereof having a shareholding of more than 5% (five percent) of the paid up and subscribed share capital of such Bidder, or its Consortium Member, as the case may be), in the other Bidder, its Consortium Member is less than 5% (five percent) of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in section 4A of the Companies Act 1956. For the

To be continued

purposes of this Clause b above, indirect shareholding held through one or more intermediate persons shall be computed as follows:

- (aa) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the "**Subject Person**") shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and

- (bb) subject always to sub-clause (aa) above, where a person does not exercise control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under this sub-clause (bb) if the shareholding of such person in the intermediary is less than 26% of the subscribed and paid up equity shareholding of such intermediary; or

ii. a constituent of such Bidder is also a constituent of another Bidder; or

iii. such Bidder, or any of its Consortium Member thereof receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Bidder, or any of its Consortium Member thereof or has provided any such subsidy, grant, concessional loan or subordinated debt to any other Bidder, its Member or any of its Consortium Member thereof; or

iv. such Bidder has the same legal representative for purposes of this Application as any other Bidder; or

v. such Bidder, or any of its Consortium Member thereof has a relationship with another Bidder, or any of its Consortium Member thereof, directly or through common third party/ parties, that puts either or both of them in a position to have access to each other's' information about,

To be continued

or to influence the Application of either or each other; or

vi. Such Bidder or any of its Consortium Member thereof has participated as a consultant to the TSCCL in the preparation of any documents, design or technical specifications of the Project.

d. A Bidder shall be liable for disqualification and forfeiture of BID Security, if any legal, financial or technical adviser of the TSCCL in relation to the Project is engaged by the Bidder, its Member or any Associate thereof, as the case may be, in any manner for matters related to or incidental to such Project during the Bidding Process or subsequent to the (i) issue of the LOA or (ii) execution of the Agreement. In the event any such adviser is engaged by the selected Bidder or Contractor, as the case may be, after issue of the LOA or execution of the Agreement for matters related or incidental to the project, then notwithstanding anything to the contrary contained herein or in the LOA or the Agreement and without Prejudice to any other right or remedy or the TSCCL, including the forfeiture and appropriation of the BID Security or Performance Security, as the case may be, which the TSCCL may have there under or otherwise, the LOA or the Agreement, as the case may be, shall be liable to be terminated without the TSCCL being liable in any manner whatsoever to the Selected Bidder or Contractor for the same. For the avoidance or doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated 6 (six) months prior to the date of issue of this RFP. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the date of commercial operation of the Project.

In case of consortium, the list of participants needs to be declared Consortium members cannot be changed during the project period.

If any of bidders/members of one consortium becomes members of the other consortium, both the consortiums will be disqualified.

Eligible Goods and Related Services:

To be continued

For purposes of this Clause, the term "goods" includes commodities, raw material, machinery, equipment, vehicles etc; and "related services" includes services such as transit insurance, installation and operation & maintenance. If a Bidder that does not manufacture or produce the Goods it offers to supply, he shall submit the Manufacturer's Authorization to demonstrate that he has been duly authorized by the manufacturer or producer of the Goods to supply these Goods			
2	The Bidders "Experience & Expertise (As given in Form 6.7 and 7.4) in Implementation of similar project on bio mining and reclamation of solid waste dump sites /MSW during the last 5 years.	• Undertaking by the authorized signatory of bidder (In case of Consortium to be provided by each member) as per format given in section 6.7 and 7.4 For each eligible assignment, bidder(s) should provide **copy of work order and also any one of the following document(s)**: • The experience certificates shall have been issued by the competent authority of the Institution not below rank of Executive Engineer countersigned by not below the rank of Superintending Engineer of the Municipalities / Organizations or completion certificate issued by the appropriate authority; or	PQ_2
3	The bidder should have experience in bio-mining /city compost plants/ processing of MSW in last 5 years of capacity not less than 20 MT per day. (Necessary client certificate shall	• any other document which shows the evidence of submission of final report or final deliverable to the appropriate authority; or	PQ_3

To be continued

	be enclosed for claiming the experience, Failing which the bid will be rejected).	• for on-going assignment(s)/ project(s), the progress should be completed at least 80% (eighty percent). A certificate from the appropriate authority showing the contract value, time extension and price variation if any, financial payments made, should be mentioned on the certificate issued by the appropriate authority	
4	The bidder should not be blacklisted by any Central / State Government Department or Central/State Public Sector Units (PSUs) in India as on the bid submission date	• Undertaking by the authorized signatory of bidder (In case of Consortium to be provided by each member) as per format given in Annexure 2, section 6.4	PQ_4
Financial Criteria			
5	The average annual Turnover (TO) 05 Crore in Indian Rupees for last 3 audited financial years (2015-16, 2016-17, 2017-18).	1. Certificate from the statutory auditor / CA clearly specifying the average annual turnover for the specified years. 2. The Bid must be accompanied by the Audited Annual Reports of the Bidder for the last 03 (Three) financial years, preceding the year in which the Bid is made.	PQ_5

To be continued

		3. Undertaking by the authorized signatory of bidder (In case of Consortium to be provided by each member) as per format given in section 6.2 4. In case of Consortium, all the Consortium members together should meet the total criteria cited in this clause	
6	PAN CARD & IT Returns for the last 3 financial years (2015-16, 2016-17, 2017-18).	• Scanned copy of original document	PQ_6
7	GST Registration Copy	• Scanned copy of original document	PQ_7
8	History of Contract non- performance where (a) non-performance was not challenged by the bidder, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the bidder Non-performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted and History of Litigation and Pending litigations As per format given in Annexure 2, section 6.7		PQ_8
9	Suspension based on poor execution of a Bid [if any]		PQ_9

To be continued

The Bidder is to submit audited statements of accounts for the last three (3) years, along with its bid. The Bidder has to submit accounts and certified balance sheet certified by a registered chartered accountant supported by copies of tax returns or the last three (3) years, along with its bid. In the event that the Authority in the Bidder's audited statement notes consistent losses or the risk of insolvency, the Bidder may be disqualified. Where necessary Authority will make enquiries with the Bidder's Bankers.
1. Bidder has repair and service facilities in India and shall provide an undertaking that successful bidder shall either develop its own facility or authorize service center at Tirupati for day to day maintenance of equipment's. 2. Should assure the ready availability in India of the spare parts of the proposed equipment
Technical bids along with the compliance sheet of technical specifications and with necessary documents should be filled in all respects and each paper should be signed by the authorized representative, scanned and uploaded in e-procurement portal.
International Experience to be counted while evaluating the Bids. International experience of the Bidder or any Consortium Member in the matter of design, construction and O&M of Bio mining, reclamation, bioremediation and landscaping, forward sale of various bi products count only if the company registered in India has rendered services abroad for the purpose of evaluation of Bids
Approach & Methodology : Technical Bid shall consist of following: The bidder has to give comprehensive plan, Proposed solution, detailed project schedule, team structure, manpower positioning, implementation methodology, training details [if required], management of the project, etc., in technical bid and shall give an undertaking that the proposed system shall be installed, commissioned, implemented and complete in all respects adhering to the requirements of this RFP. All the annexures also should be submitted as prescribed.
Note: **On Failure of submission of these above mentioned documents the bidder will be disqualified**

Notes:

- The Evaluation Committee will review the bids of the short-listed bidders to determine whether the bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at Authority's discretion.
- **Clarification of Bids**: To assist in the examination, evaluation, comparison and post-

To be continued

qualification of the Bids, Authority may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by authority shall not be considered. Authority's request for clarification and the response shall be in writing. No change in the prices or substance of the Bid shall be sought, offered, or permitted.

- Any bid failing to meet all of the above eligibility criteria shall be disqualified and will not be considered for technical evaluation.
- No relaxation will be given to any of the qualification criteria.
- Bidder should produce the documentary evidence for all the above. (Pre- qualification eligibility from the client / Government Agencies).
- In case the annual accounts for the latest financial year are not audited and therefore the Bidder cannot make it available, the Bidder shall give an undertaking to this effect from their directors and the statutory auditor shall certify the same. In such a case, the Bidder shall provide the Audited Annual Reports for 02 (Two) years preceding the year or from the date of incorporation if less than 2 years for which the Audited Annual Report is not being provided.
- Even though the bidders meet the above qualifying criteria, they are subject to be disqualified / debarred / suspended / blacklisted if they have:

  - Furnished false / fabricated particulars in the forms, statements and / annexures submitted in proof of the qualification requirements and/or
  - Not turned up for entering into agreement, when called upon.
  - Made misleading or false representations in the forms, statements and attachments in proof of the qualification requirements; and/or
  - Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., and/or
  - Participated in the previous bidding for the same work and had quoted unreasonable bid prices (Too high or too low) and could not furnish rational justification to the Employer.
  - Even while execution of the work, if found that the work as awarded to the contractor based on false / fake certificate of experience, the contractor will be blacklisted and work will be taken over invoking clause 61 of PS to APSS.

3.6 Technical Evaluation Framework

The Technical Evaluation Committee will review the technical bids of the short-listed bidders to determine whether the technical bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at Authority's discretion. Each Technical

To be continued

Bid will be assigned a Technical Score out of a maximum of 100 points. Only the bidders who get Technical Score of more than or equal to 70% in Technical Evaluation will qualify for Commercial Evaluation stage. Weightages methodology for evaluation of Technical bids is given below:

S.No.	Details of Technical Capability	Unit of Measure	Marks allotted per Contract	Maximum Score
1	Experience in Bio Mining / city compost plants/ processing of MSW in last 5 years as per the pollution control board norms	**Metric Tonnes per day**		30
		Less than 50	15	
		51 to 100	20	
		101 to 200	25	
		➢ 200	30	
2	Average Annual Turnover from Bio-Mining in last 5 years	Rs. (Lakhs) Upto 100 Lakhs	10	20
		Above 100 Lakhs	20	
3	Capacity of Bio-Mining plant proposed for the Project	< 300 MT/ Day	10	20
		➢ 300 MT / Day	20	
4	Technical proposal * ref Annexure-1 (A&B) along with Presentation	Proposed Technology	15	30
		Plant Design	15	
			Total	**100**

All bids will be evaluated on the Technical bid and the presentation on the bid.

1. Presentation by the Bidders on its entire project management and plan.
2. The bidder should submit the availability of machinery, equipment, vehicles etc.
3. The approach and methodology and monitoring mechanism suggested by the Bidder.
4. Commercial bids will be opened only for the bids that are technically qualified and evaluated by technical evaluation committee

To be continued

4. Award of Contract

4.1 Notification of Award

Authority will notify the successful Bidder in writing by e-mail followed by courier. To be confirmed by the Bidder in writing by email followed by courier.

4.2 Signing of Contract

After the notification of award, Authority will issue Letter of Acceptance (LOA). Accordingly, a contract shall be signed between successful bidder and Authority or the agency designated by Authority. As an acceptance of the LOA, the Bidder shall sign and return back a duplicate copy of the LOA to Authority or the agency designated by the Authority. The bidder shall return the duplicate copy along with a Performance Bank Guarantee / Performance Security within 28 working days from the date of issuance of LOA.

On receipt of the Performance Bank Guarantee / Performance Security, Authority or the agency designated by Authority shall enter into a contract with the successful bidder.

4.3 Performance Bank Guarantee (PBG) / Performance Security:

Within twenty eight (28) working days from the date of issuance of LOA, the successful Bidder shall at his own expense submit unconditional and irrevocable Performance Bank Guarantee (PBG) / Performance Security to the Authority. The PBG shall be from a Nationalized Bank in the format prescribed in Section 9 - Annexure 5 (a), payable on demand, for the due performance and fulfillment of the contract by the bidder.

This Performance Bank Guarantee / Performance Security shall be for an amount equivalent to 5% of total contract value. PBG shall be invoked by Authority, in the event the Bidder:

a. fails to meet the overall penalty condition as mentioned in RFP Volume II or any changes agreed between the parties,
b. fails to perform the responsibilities and obligations as set out in the RFP to the complete satisfaction of Authority,
c. Misrepresents facts / information submitted to Authority.

The performance bank guarantee / Performance Security shall be valid till satisfactory

completion of Post Implementation Support. The performance bank guarantee / Performance Security may be discharged / returned by Authority upon being satisfied that there has been due performance of the obligations of the bidder under the contract. However, no interest shall be payable on the performance bank guarantee / Performance Security.

In the event of the Bidder being unable to perform the contract for whatever reason(s), Authority shall have the right to invoke the PBG. Notwithstanding and without prejudice to any rights whatsoever of Authority under the contract in the matter, the proceeds of the PBG shall be payable to Authority as compensation for any loss resulting from the bidder's failure to perform/comply its obligations under the contract.
Authority shall notify the bidder in writing of the exercise of its right to receive such compensation within 40 days, indicating the contractual obligation(s) for which the bidder is in default. Authority shall also be entitled to make recoveries from the bidder's bills, performance bank guarantee / Performance Security, or from any other amount due to him, an equivalent value of any payment made to him due to inadvertence, error, collusion, misconstruction or misstatement.

In case the project is delayed beyond the project schedule as mentioned in RFP Vol 2, the performance bank guarantee / Performance Security shall be accordingly extended by the Bidder till completion of scope of work as mentioned in RFP Volume II.

This Performance Bank Guarantee / Performance Security shall be valid till (90) days beyond the expiry of the contract period of the project.

On satisfactory performance and completion of the order in all respects and duly certified to this effect by the Project Coordinator, Contract Completion Certificate shall be issued and the PBG would be returned to the Bidder.

4.4 Warranty & Maintenance

a. Bidder shall also provide complete maintenance support for all the proposed integrated solution as outlined in this RFP for a period of project duration [as stated in the Fact Sheet], as per the requirements provided in this RFP and all the acceptance tests are successfully concluded to the satisfaction of the client.

To be continued

b. During the warranty period, the bidder shall warrant that the goods supplied under the contract are new, unused of the most recent version/ models and incorporate all recent improvements in design and materials unless provided otherwise in the contract. The bidder further warrants that the goods supplied under this contract shall have no defects arising from design, materials or workmanship.

c. Client or designated representatives of the bidder shall promptly notify successful bidder in writing of any claims arising under this warranty. Upon receipt of such notice, the bidder shall within the warranty period and with all reasonable speed, repair or replace the defective systems, without costs to client and within time specified and acceptable to client.

d. If the successful bidder, having been notified, fails to remedy the defect(s) within the period specified in the contract, client may proceed to take such reasonable remedial action as may be necessary, at the successful bidder's risk and expense and without prejudice to any other rights, which client may have against the bidder under the contract.

e. During the comprehensive warranty period, the successful bidder shall provide all product(s) and documentation updates, patches/ fixes, and version upgrades within 15 days of their availability and should carryout installation and make operational the same at no additional cost to client.

f. The successful bidder hereby warrants that;
   - The implemented integrated solution / Project represents a complete, integrated solution/Project meeting all the requirements as outlined in the RFP and further amendments if any and provides the functionality and performance, as per the terms and conditions specified in the contract.
   - The proposed integrated solution/ Project shall achieve parameters delineated in the technical specification / requirement.
   - The successful bidder shall be responsible for warranty services from licensers of products included in the systems.
   - The successful bidder undertakes to ensure the maintenance of the acceptance criterion / standards in respect of the systems / project during the warranty period.
   - Failure to agree with the Terms & Conditions of the RFP
   - Failure of the successful bidder to agree with the Terms & Conditions of the RFP

To be continued

shall constitute sufficient grounds for the annulment of the award, in which event Authority may award the contract to the next best value bidder or call for new bids. In such a case, Authority shall invoke the PBG and / or forfeit the EMD.

4.5 Miscellaneous

1. The Bidding Process shall be governed by, and construed in accordance with, the laws of India and the Courts in Tirupati shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the Bidding Process.
2. The Authority, in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to;
   (a) suspend and/ or cancel the Bidding Process and/ or amend and/ or supplement the Bidding Process or modify the dates or other terms and conditions relating thereto;
   (b) consult with any Bidder in order to receive clarification or further information;
   (c) qualify or not to qualify any Bidder and/ or to consult with any Bidder in order to receive clarification or further information;
   (d) retain any information and/ or evidence submitted to the Authority by, on behalf of, and/ or in relation to any Bidder; and/ or
   (e) Independently verify, disqualify, reject and/ or accept any and all submissions or other information and/ or evidence submitted by or on behalf of any Bidder.
3. It shall be deemed that by submitting the Bid, the Bidder agrees and releases the Authority, its employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/ or performance of any obligations hereunder, pursuant hereto and/ or in connection with the Bidding Process and waives, to the fullest extent permitted by applicable laws, any and all rights and/ or claims it may have in this respect, whether actual or contingent, whether present or in future.
4. Obtaining the required statuary licenses like Consent to Establish and Consent to operate approvals from the statutory authorities (if required / directed by Client).
5. Authority may, at its discretion reserves the right to extend the RFP submission date and amending for which the RFP is invited.
6. Authority reserves the right to accept / reject any or all RFP(s)/Proposals and to annul the process without assigning any reason thereto.
7. Authority reserves the right to define the requirements and issue another RFP/s /

To be continued

Tenders as may be deemed necessary.

8. The Authority reserves the right to verify the particulars furnished by the bidders independently and also reserves the right to reject any proposal without assigning any reason thereof in the interests of effective implementation of the project.
9. After uploading the technical/financial bid, the original DDs/BG are to be submitted by the bidder to the concerned MD, TSCCL so as to reach before opening of the pre-qualification bid. Failure to furnish DDs/BG, entail rejection of the bid and forfeiture of the EMD. Similarly if any of the certificates, documents etc. furnished by the bidder are found to be false/fabricated/bogus, the bidder will be black listed and the EMD forfeited.
10. The Authority may extend the dates for issue and receipt of RFP by issuing an amendment in which case all rights and obligations of the Managing Director, Tirupati Smart City Corporation Limited.

5. Annexure- 1

Annexure 1 – Template for Pre-Bid Queries

Bidder shall submit all pre-bid queries in excel in the following format along with the name and details of the origination submitting the queries.

SL #	RFP Volume, Section	RFP page no	Content in the RFP	Clarification sought

Note:

a. In case of queries with regard to RFP document, please mention the section/clause as may be applicable.
b. In case of queries with regard to functional or technical requirements, please give reference of the corresponding FR/TR
c. **Bidders are advised to share the Pre- Bid queries in two formats, one is in excel sheet (in *.xls Format) and as well as another in signed and scanned copy of the file (in *.pdf format).**

To be continued

6. Annexure – 02 - Formats for submission of Pre-Qualification Bid

6.1 Pre-Qualification Bid Covering Letter

Dated: DD/MM/YYYY

To
The Managing Director,
Tirupati Smart City Corporation Limited,
C/o Tirupati Municipal Corporation,
Tilak Road, Tirupati – 517501, Chittoor District,
Andhra Pradesh, India

Sub: **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**
Ref: RFP No. **<<.....>> dated << .....>>**

Dear Sir,
With reference to your **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**, we hereby submit our Pre-qualification bid, Technical Bid and Financial Bid for the same.

We, the undersigned hereby declare that:

a. We have examined and have no reservations to the Bidding Document, including Addenda No.: (Insert the number and issuing date of each addenda);
b. We hereby acknowledge and unconditionally accept that the Authority can at its absolute discretion apply whatever criteria it deems appropriate, not just limiting to those criteria set out in the RFP and related documents, in short listing of Agency for providing services.
c. We offer to supply in conformity with the Bidding Document and in accordance with the delivery schedule specified in Schedule of Supply, the following Goods and Related Services:

S. No.	Description of works
1	Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati

To be continued

d. We have submitted EMD of Indian Rupees[ ] and
Bid Processing fee of Indian Rupees[ ]

e. We hereby declare that all information and details furnished by us in the Bid are true and correct, and all documents accompanying such application are true copies of their respective originals.

f. We agree to abide by our offer for a period of 180 (One Hundred and Eighty) days from the date of opening of pre- qualification bid prescribed by **Authority** and that we shall remain bound by a communication of acceptance within that time.

g. We have carefully read and understood the terms and conditions of the RFP and the conditions of the contract applicable to the RFP. We do hereby undertake to provision as per these terms and conditions.

h. In the event of acceptance of our bid, we do hereby undertake:
   i. To supply the products and commence services as stipulated in the RFP document
   ii. To undertake the project services for entire contract period from the date of signing of the contract as mentioned in the RFP document.
   iii. We affirm that the prices quoted are inclusive of design, development, delivery, installation, commissioning, training, providing facility management and handholding support, and inclusive of all out of pocket expenses, taxes, levies discounts etc.

i. We do hereby undertake, that, until a formal contract is prepared and executed, this bid, together with your written acceptance thereof and notification of award of contract, shall constitute a binding contract between us.

j. If our Bid is accepted, we commit to obtain a Performance Security in the amount of 05 percent of the Contract Price for the due performance of the Contract.

k. We are not participating, as Bidders, in more than one Bid in this bidding process.

l. We understand that the **Authority** may cancel the bidding process at any time and that **Authority** is not bound to accept any bid that it may receive without incurring any liability

To be continued

towards the bidder.

m. We fully understand and agree to comply that on verification, if any of the information provided in our bid is found to be misleading the selection process, we are liable to be dismissed from the selection process or termination of the contract during the project, if selected to do so

n. We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

In case of any clarifications please contact _____ email at _____

Thanking you,

Yours sincerely,

(Signature of the Lead bidder)

Printed Name Designation

Seal
Date:
Place:
Business Address:

To be continued

6.2 Company profile

A. Brief company profile (required for both bidder and consortium member)

Sl. No.	Particulars	Description or details
1.	Name of Bidder	
2.	Legal status of Bidder (Registered Contractor, company, Pvt. Ltd., LLP etc.)	
3.	Bidder's actual or intended country of registration (Indicate Country of Constitution)	
4.	Bidder's actual or intended year of incorporation (Incorporation / Registration date and number)	
5.	GST number	
6.	PAN details	
7.	Bidder's legal address (In country of Registration)	
7.		
8	Main business of the Bidder	
9	Registered office address	
10.	Primary Contact Person (Name, Designation, address, mobile number, fax, email)	
11.	Secondary Contact Person (Name, Designation, address, mobile number, fax, email)	
12	EMD details	
In case of consortium		
13.	Role in Consortium (if applicable)	Brief scope of work in the Consortium
14	Name of the Consortium Members	
15	Consortium Member's County of Registration	

To be continued

16	Consortium Member's year of constitution	
17	Consortium Member's legal address in country of constitution	
18	Consortium Member's authorized representative information along with address and contact details	

Note:

Attached are copies of original documents of article of incorporation (or equivalent documents of constitution or association), and / or registration documents of the legal entity named above.

Include are the organizational chart, a list of Board of Directors and the beneficial ownership

B. Certificate of Incorporation / Registration (required for both bidder and Consortium members)

C. Financial Turnover

The financial turnover of the company is provided as follows:

	2015 – 16	2016 – 17	2017– 18
Annual Turnover			

Copy of audited financial statements or declaration from the appointed statutory auditor/CA to be provided as proof of the financial turnover

Positive net worth, as on the last date of latest audited financial year.

Copy of self-certified statutory auditor certificate / CA to be submitted along with the bid

Fiscal Criteria of the Bidder

Bidder Type	Net Worth	Financial Year
Single Entity Bidder		
Consortium Member1		
Consortium Member2		

Fiscal Data

Description of Fiscal Information	Amount / Value (In ₹ , - Crore)		
	2015-16	2016-17	2017-18
Statement of Fiscal Position			
Information from Balance Sheet			
Total Assets			
Total Liabilities			
Total Equity / Net Worth (NW)			
Securities (Stocks, Bonds, Mutual Funds, etc.,)			
Insurance Policies (Cash surrender value)			
Current Assets			
Current Liabilities			
Working Capital			
Information from Income Statement			
Total Revenue			
Profits Before Taxes			
Cash Flow Information			
Cash Flow from Operating Activities			

Source of Finance

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments

To be continued

Serial Number	Source of Finance	In ₹ , - Crore
1		
2		
3		

Instructions:

1 The Bidder/Member (in case of a Consortium) shall attach copies of the balance sheets, financial statements and Annual Reports for the last financial year preceding the Bid Due Date. The financial statements shall:

(a) reflect the financial situation of the Bidder or Consortium Member;

(b) be audited by a statutory auditor;

(c) be complete, including all notes to the financial statements; and

(d) Correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

2 Net Worth shall mean (Subscribed and Paid-up Equity + Reserves) less (Revaluation reserves + miscellaneous expenditure not written off + reserves not available for distribution to equity shareholders).

3 Financial Year will be the latest completed financial year, preceding the bidding. In case the Bid Due Date falls within 3 (three) months of the close of the latest financial year.

4 In the case of a Consortium, a copy of the Jt. Bidding Agreement shall be submitted.

5 The Bidder shall provide an Auditor's Certificate specifying the Net Worth of the Bidder and also specifying the methodology adopted for calculating such Net Worth.

Turnover* of the bidder's company in last three financial years

Description	2015-16	2016-17	2017-18	Remarks
Turnover (₹ in Cr.)				
Multiplying Factor	1.30	1.20	1.10	
Amount Equivalent to Current Year				
Profit after Tax (₹ in Cr.)				

* Certified copies from a registered chartered accountant shall be enclosed.

To be continued

Names of three Clients from different departments to whom similar works are done in the last three financial years and to whom reference may be made by the Authority regarding the bidder's performance for timely completion of delivery, installation and after sales service support:

Description	Client1	Client 2	Client 3	Remarks
Name and Designation of Contact person				
Complete Address of the Buyer				
Telephone Number / Mobile Number / Fax				
E-mail Address				

Special Accreditations or Awards:

Other details – (If bidder wants to furnish relate to their capabilities)

Declaration:

(Signature, name and designation of the authorised signatory with seal and Date)

6.3 Declaration of Non-Blacklisting

(To be notarized on Non-Judicial Stamp Paper of Rs.100)

Subject: Self Declaration of not been blacklisted in response to the **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**

Ref: RFP No. **<<.....>> dated << .....>>**

Dear Sir,

I M/s. …… (Sole Applicant/Lead Member/Other Member/s), (the names and addresses of the registered office) hereby certify and confirm that we or any of our promoter/s / director/s are not barred or blacklisted by any state government or central government / department / agency /PSU in India or abroad from participating in Project/s, either individually or as member of a Consortium as on ……

We confirm that our company or firm,_____,is currently not blacklisted in any manner whatsoever by any of the State or UT and or Central Government in India on any ground including but not limited to indulgence in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

We further confirm that we are aware our Application for the captioned Project would be liable for rejection in case any material misrepresentation is made or discovered with regard to the requirements of this RFP at any stage of selection and / or thereafter during the Contract Period.

Dated this……Day of ……., 201….

Name of the Applicant

……
Signature of the Authorised Person

……
Name of the Authorised Person

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

Printed Name Designation **Seal**

Date:

Place:

Business Address:

Note:
To be executed separately by all the members in case of consortium

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

6.4 Declaration for Consortium Member:
(To be provided on the Company letter head)

{Place}

{Date}

To,

[ ]

Subject: Self Declaration of not been blacklisted in response to the **REQUEST FOR PROPOSAL FOR "<<Name of the RFP>>"**
Ref: RFP No. **<<.....>> dated << .....>>**

Dear Sir,

We confirm that our company or firm, _____, is currently not blacklisted in any manner whatsoever by any of the State or UT and or Central Government in India on any ground including but not limited to indulgence in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

(Signature of the Consortium Member)

Printed Name Designation

Seal Date:

Place: Business Address:

6.5 No Deviation Certificate

Dated: DD/MM/YYYY

To
The Managing Director,
Tirupati Smart City Corporation Limited,
C/o Tirupati Municipal Corporation,
Tilak Road, Tirupati – 517501, Chittoor District,
Andhra Pradesh, India

This is to certify that our offer is exactly in line with your RFP enquiry (including amendments) no._____dated_____. This is to expressly certify that our offer contains no deviation either Technical (including but not limited to Scope of Work, Business Requirements Specification, Functional Requirements Specification, Hardware Specification and Technical Requirements Specification) or Financial in either direct or indirect form.

(Authorized Signatory)

Signature:
Name:
Designation:
Address:

Seal:
Date:

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

6.6 Total Responsibility Certificate

Dated: DD/MM/YYYY

To
The Managing Director,
Tirupati Smart City Corporation Limited,
C/o Tirupati Municipal Corporation,
Tilak Road, Tirupati – 517501, Chittoor District,
Andhra Pradesh, India

This is to certify that we undertake the total responsibility for the defect free operation of the proposals per the requirement of the RFP for the duration mentioned in all the volumes of the RFP.

(Authorized Signatory)

Signature:
Name:
Designation:
Address:

Seal:
Date:

To be continued

6.7 Self-certificate for Project execution experience and Litigation History (In Bidding Entity's Letter Head)

This is to certify that <Name of the Bidding entity> has been awarded with < Name of the Project > as detailed under:

Name of the Project	
Client's Name, Contact no. and Complete Address	
Contract Value for the bidder (in Indian Rupees)	
Current status of the project (Completed/Ongoing)	
Activities completed by bidding entity as on bid submission date ***(N.B Only relevant activities as sought in the Criteria to be included)***	
Value of Work completed for which payment has been received from the client.	
Date of Start	
Date of Completion	
References(Name and contact details of the authorized client officials issued the project executed certifications are to be referred)	

We further confirm that we are aware our proposal for the <<**Name of the RFP**>> for implementation of Smart Solutions in Tirupati would be liable for rejection in case any material misrepresentation is made or discovered with regard to the requirements of this RfP at any stage of selection and/or thereafter during the term of the contract.

Dated this……Day of ……., 201…… .

(Authorized Signatory) Signature:

To be continued

Name:
Designation:
Bidding entity's name Address:
Seal:
Date:

Details of works on hand and, yet to be completed as on the date of submission of the RFP and works for which Tenders / RFPs has been submitted are to be furnished.

A) Existing Commitments on ongoing works:

Sl.No	Name of work	Address of Agt. Concluding authority	Agt. No. & Date	Value of contract	Stipulated period of completion	Value of work done so far.	Balance Value of works to be completed	Anticipated date of completion	Updated value of balance work
1	2	3	4	5	6	7	8	9	10

Attach certificates issued by the Executive Engineer concerned and countersigned by Superintending Engineer / respective authorized representative from client indicating the balance work to be done, and likely period of completion.

Signature of the Bidder
(Authorised Signatory)

To be continued

B) Details of works for which Tenders/ RFPs are submitted [awarded / likely to be awarded]

Sl. No.	Name of work	Address of Agt. Concluding authority	Estimated value of work	Stipulated period of completion	Date on which tender was submitted	Present stage of Tender.
1	2	3	4	5	6	7

Signature of the Bidder
(Authorised Signatory)

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR | **TECHNICAL OFFICER** | **MUNICIPAL ENGINEER-2** | **MUNICIPAL ENGINEER-1** | **SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

Experience

Date: DD/MM/YYYY

Bidder's Name : ……..
Date : ……..
Consortium Member's name : ……..
RFP No. and Title : ……..
Page_____of_____pages

Starting Year	Ending Year	Contract Identification	Role of Bidder	Status of Project
		Contract name: Brief Description of the Works performed by the Bidder: Amount of contract: Name of Employer: Address:		
		Contract name: Brief Description of the Works performed by the Bidder: Amount of contract: Name of Employer: Address:		
		(add more rows if required)		

Mention whether the project is Complete or under progress. If the project is complete than if it is under O&M then mention so with years in O&M.
If it is under progress mention % of work complete.
All above statements should be backed by corresponding experience certificate from respective Employers.
Experience will be counted for the completed works and duly enclosing completion certificates from the clients.

Specific Experience of Similar Projects

Date: DD/MM/YYYY

Bidder's Name : ……
Date : ……
Consortium Member's name : ……
RFP No. and Title : ……
Page_____of_____pages

SN	Contract Details	Elements Executed	Unit	Quantity executed	Value in Rs.
1	Contract name: Year of completion: Amount of contract: Name of Employer: Address:_ If the contract was in Consortium mention bidder responsibilities and achievement.				
2	Contract name: Year of completion: Amount of contract: Name of Employer: Address:_ If the contract was in Consortium mention bidder responsibilities and achievement.				

All quantities mentioned and the values indicated should be backed by respective certificates from the Employer.

To be continued

C) Litigation History

Date: DD/MM/YYYY
Bidder's Name:_____
Consortium Member's Name_____
RFP No. and Title:_____
Page_____of_____pages

Non-Performed Contracts			
☐ Contract non-performance did not occur since 1st January *[insert year]* ☐ Contract(s) not performed since 1st January *[insert year]*			
Year	**Non-performed portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and INR equivalent)**
		Contract Identification: Name of Employer: Address of Employer: Reason(s) for non-performance: *[indicate main reason]*	
Pending Litigation			
☐ No pending litigation ☐ Pending litigation			

Pending Litigation, in accordance with section III, Evaluation and Qualification Criteria

Year of dispute	**Amount in dispute (IN Rs.)**	**Contract Identification**	**Total Contract Amount (In Rs.)**
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	

To be continued

Information on litigation history in which Bidder is the Petitioner.

S. No	Case No. / Year	Court where filed.	Subject Matter / Prayer in the case.	Respondents i.e., SE / CE	Present Stage.
1	2	3	4	5	6

(To be provided by the Bidder/each Member/Associate for any material non-performance or contractual non-compliance in past projects, contractual disputes and litigation/ arbitration in the last 5 years preceding the Bid Due Date)

Sl. No	**Name**	**Forum and Counterparty With Contract Identification**	**Brief Description of the matter**	**Estimated financial liability**	**Current Status of Litigation**	**Orders passed against the Bidder/Member**

Bidder must not hide any information regarding litigation or blacklisting otherwise legal action may be initiated in case of wrong information submitted by the bidder.

Signature of the Bidder

To be continued

7. Annexure 3 – Formats for Submission of the Technical Bid

7.1 Technical Bid Check-List

Sl. No	Checklist Item	Compliance (Yes/No)	Page No. and Section No. in the Bid
1	Technical Bid Letter		
2	Credential summary		
3	Project Citations and Self-certifications, as applicable		
4	Detailed proposal		
5	Project plan		
6	Compliance to Requirement (Technical / Functional Specifications)		
7	Manufacturers'/Producers' Authorization Form		
8	Anti-Collusion certificate		
9	Non-disclosure agreement		

Signature of the Bidder

To be continued

7.2 Technical Bid Covering Letter

Dated: DD/MM/YYYY

To
The Managing Director,
Tirupati Smart City Corporation Limited,
C/o Tirupati Municipal Corporation,
Tilak Road, Tirupati – 517501, Chittoor District,
Andhra Pradesh, India

Subject: **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**

Ref: RFP No. **<<.....>> dated << .....>>**

Dear Sir,

I (in case of single bidder) or We, <<name of the undersigned Bidder and consortium members>>, having read and examined in detail all the bidding documents in respect of **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** do hereby propose to provide our services as specified in the bid submitted by us.

It is hereby confirmed that I / We are entitled to act on behalf of our company / corporation / firm / organization and empowered to sign this document as well as such other documents, which may be required in this connection.

We declare that all the services shall be performed strictly in accordance with the RFP documents.

We confirm that the information contained in this response or any part thereof, including its exhibits, and other documents and instruments delivered or to be delivered to Authority, is true, accurate, verifiable and complete. This response includes all information necessary to ensure that the statements therein do not in whole or in part mislead the department in its evaluation process. We also confirm that we shall not attract conflict of interest in principle.

To be continued

We hereby declare that in case the contract is awarded to us, we shall submit the contract Performance bank guarantee / Performance Security in the form prescribed at Annexure 5 (a) of Section 9 of the RFP Volume I.

We hereby declare that our bid is made in good faith, without collusion or fraud and the information contained in the bid is true and correct to the best of our knowledge and be lief.

We understand that our bid is binding on us and that you are not bound to accept a Bid you receive. This bid is valid for 180 (One Hundred and Eighty) days after opening of technical bid. We shall extend the validity of the bid if required by Authority.

Thanking you,
Yours sincerely,

(Signature of the Lead Bidder)
Printed Name Designation
Seal
Date:
Place:
Business Address:

To be continued

7.3 Credential Summary

Sl. No.	Project Name	Client Name	Client Type	Project Value (in Indian Rupees)	Project Components	Documentary evidence provided (Yes or No)	Project Status (Completed or Ongoing or Withheld)
1							
2							
3							
4							
5							
6							
7							

- *Client type – Indicate whether the client is Government or PSU or Private*

- *Documentary evidence provided – Indicate the documentary evidence provided with the detailed project credential like work order or purchase order or completion certificate or letter of appointment*

- *Project Status – Completed (date of project completion) or Ongoing (project start date)*

Signature of the Bidder

To be continued

7.4 Bidder's Experience - Client Citations

Prime Bidder or Consortium member is requested to furnish the credentials in the following format for both Pre-qualification and Technical criterion. All credentials should be followed by relevant documentary proof.

Name of the Project & Location	
Client's Name and Complete Address	
Narrative description of project Contract Value for the bidder (in Indian Rupees)	
Date of Start	
Date of Completion	
Activities undertaken by prime bidder or consortium member	

Note: If the project is ongoing, bidder must clearly specify which of the stages/phases/milestones are completed and which are ongoing and at what stage of completion and produce a self - certificate as per the format provided in Section 6.7.

Signature of the Bidder

To be continued

7.5 Project Plan

A **Detailed Project Plan** covering break-up of each phase into the key activities, along with the start and end dates must be provided as per format given below.

Activity-wise Timelines							
Sl. No.	Detailed Work Breakdown structure	Month Wise Program					
		1	2	3	4	5	...
	Project Plan						
1	Activity 1						
1.1	Sub-Activity 1						
1.2	Sub-Activity 2						
2							
2.1							
2.2							
3							
3.1							
4							

Activity-wise Timelines

Sl. No. Item of Activity Month wise Program

Note: The above activity chart is just for the purpose of illustration. Bidders are requested to provide detailed activity & phase wise timelines for executing the project with details of deliverables & milestones as per their bid.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR | **TECHNICAL OFFICER** | **MUNICIPAL ENGINEER-2** | **MUNICIPAL ENGINEER-1** | **SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

7.6 Conduct and Anti-Collusion Certificate

(To be notarized on Non-Judicial Stamp Paper of Rs.100)

I / We hereby certify and confirm that in the preparation and submission of our Bid for **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**against the RFP issued by Authority, that

I / We undertake that, in competing for the contract, I / we will strictly observe the laws against fraud and corruption in force in India namely Prevention of Corruption Act 1988.

I / We declare that our organization or our partners in the Consortium have never been blacklisted by any department / units of Government of India or State Governments or Union Territories in India for any of the reasons of committing serious misconducts or have been charged with committing criminal action(s), or dissatisfaction with the performance of our services, or violation of any terms and conditions of the Agreement. In case if such misconducts are found to have been committed by us with documentary evidences, our contract can be summarily cancelled with the forfeiture of the security and performance guarantees we have executed with the Authority.

I / We hereby certify and confirm that in the preparation and submission of our Bid, I / we have not acted in concert or in collusion with any other Bidder or other person(s) and also not done any act, deed or thing which is or could be regarded as anti-competitive.

I / We further confirm that I / We have not offered nor will offer any illegal gratification in cash or kind to any person or agency in connection with the Bid.

I / We further acknowledge that on any later date, if it was found that I / We indulged in any of the corrupt activities mentioned in Prevention of Corruption Act 1988, the Authority has the right to take necessary legal action.

Dated this .....Day of ....., 201…
Place:

.....
(Name of the Bidder)

.....
(Signature of the Bidder / Authorised Person)

.....
(Name of the Authorised Person)
Seal
Business Address:

8. Annexure 4 – Formats for Submission of the Financial Bid

A. Preamble

1. The Price Schedule shall be prepared in compliance with the Instructions to Bidders, General and Particular Conditions of Contract for "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"
2. A rate or price shall be entered against each item in the Priced schedule. The cost of Items against which the Bidder/ Service Provider has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Price Schedule and that component work shall be executed free of cost.
3. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the Priced Schedule, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

Financial Bid

The Bidder has to provide the financial bid in the formats as given here. Bidders shall give the required details of all applicable taxes, duties, other levies and charges etc. in respect of direct transaction between Authority and the Bidder. **The financial bid must be uploaded on e-procurement only** and **should not** be printed or submitted with Prequalification / Technical Bid.

Bidders shall quote for the entire scope of contract on a "overall responsibility" basis such that the total bid price covers Bidder's all obligations mentioned in or to be reasonably inferred from the bidding documents

Prices quoted by the Bidder shall remain firm during the entire contract period and not subject to variation on any account.

The bidders shall quote in their proposals a firm lump sum price as per schedules provided for the entire scope of "Solid Waste Management Project– Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"

The prices quoted shall be lump sum and on for destination basis inclusive of all taxes and

To be continued

duties. For the purpose of clarity, applicable taxes as on the date of submission of bid shall be quoted.

a) **All priced quotations should be in Indian Rupees only**. – Bidders are requested to quote the price in figures and as well as in the words in the same box / place.
b) The bidder should quote his lowest firm prices valid for the duration and completion of the contract. No enhancement of prices for what so ever reason will be allowed once the offer is accepted. Quotation should carry the name of the manufacturers for the plant offered.

The prices quoted by the Bidder shall be fixed.

A bid submitted with an adjustable price quotation shall be treated as non-responsive and rejected.

Any conditional bid with any deviations from the terms and conditions of RFP shall be disqualified.

The prices quoted by the Bidder in the Price Proposal Submission Sheet and in the Price Schedules shall conform to the requirements specified below.

- The price of the goods quoted should be on the basis of delivery to site on for destination basis [at Tirupati] including all customs duties and taxes, Entry tax, GST, transportation, packaging, transit insurance, service tax, sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of goods quoted. The price quoted should be inclusive of all FOR Tirupati.
- The prices quoted shall be lump sum and on for destination basis inclusive of all taxes and duties. For the purpose of clarity, applicable taxes as on the date of submission of bid shall be quoted.
- **A bid submitted with an adjustable price quotation shall be treated as non-responsive and rejected**.

Note:

***Rate per Unit / Unit Price inclusive of following:**

- All priced quotations should be in Indian Rupees only.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

- Unit Price at Destination or Delivery point at Tirupati, Chittoor District, Andhra Pradesh, India.
- The price for inland transportation, insurance and other local costs incidental to delivery of the goods to their final destination (i.e., at Tirupati).
- The unit prices quoted shall be with comprehensive warranty.
- The Bidder shall quote for Estimate Schedule (along with basic price, GST and other charges such as installation and onsite comprehensive warranty maintenance service charges, if any) and Comprehensive Warranty in the specified places for all the materials, equipments & machineries having Technical Specifications mentioned in this bid document.
- The price of equipments & machineries (Ex-works, Ex-factory, Ex-showroom, Ex-warehouse or off-the-shelf, as applicable), including all duties and sales and other taxes (Inclusive of GST).
- On components and raw material used in the manufacture or assembly.
- On the previously imported equipment / machineries of foreign origin quoted ex-showroom, ex- warehouse, or off-the-shelf.
- Any Indian duties, sales and other taxes which will be payable on the goods if this Contract is awarded;
- Unit price including all applicable taxes/ customs duties/levies such as taxes, Entry tax, GST, Excise duty, Works Contract Tax, Octroi, Cess, transportation, packaging, transit insurance, service tax, sales and any other taxes and duties that are applicable for such contracts in the State of Andhra Pradesh as on the date of Opening of bid shall be considered and even already paid or payable on the components and raw material used in the manufacture or assembly of goods quoted.
- The prices quoted shall be lump sum and on for destination basis inclusive of all taxes and duties. For the purpose of clarity, applicable taxes as on the date of submission of bid shall be quoted.
- The bidder should quote his firm prices valid for the duration and completion of the contract of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati" No enhancement of prices for what so ever reason will be allowed once the offer is accepted.
- The bidder is supposed to quote the rate for remediation of garbage through Bio-Mining process on DOB System per tonne
- The rate quoted shall inclusive of the conveyance from the dumping site to the location shown by the TSCCL authorities which is around 10 Kms.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

- The land will be allotted by TMC for the Remediation process on lease basis after discussion with successful bidder (Reference:- G.O Ms. No:-56, dt:-05-02-2011).

General

1. The Schedules do not generally give a full description of the equipment to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Technical Specifications and other sections of the bidding documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to include for the full scope as aforesaid, including overheads and profit.

2. If bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with the Instructions to Bidders in the bidding documents prior to submitting their bid.

Pricing

3. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialled by the Bidder.

   As specified in the Conditions of Contract, prices shall be fixed and firm for the duration of the Contract.

4. Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the bidding documents.

   For each item, bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

   Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in the Technical Specifications, Drawings or elsewhere in the bidding documents.
5. Where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the former shall prevail and the latter will be corrected accordingly.
   Where there are discrepancies between amounts stated in figures and amounts stated in words, the amounts stated in words shall prevail.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

6. Payments will be made to the Contractor in the currency or currencies indicated under each respective item.

7. Items left blank will be deemed to have been included in other items. The TOTAL for each Schedule and the TOTAL of the Grand Summary shall be deemed to be the total price for executing the Facilities and sections thereof in complete accordance with the Contract, whether or not each individual item has been priced.

8. When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	**TECHNICAL OFFICER**	**MUNICIPAL ENGINEER-2**	**MUNICIPAL ENGINEER-1**	**SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

Financial Bid

Dated: DD/MM/YYYY

To

The Managing Director,
Tirupati Smart City Corporation Limited,
C/o Tirupati Municipal Corporation,
Tilak Road, Tirupati – 517501,
Chittoor District, Andhra Pradesh, India

Sub: Financial Bid for **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** – Reg.,

Ref: Your RFP Notification No. _____ dated _____

Dear Sir,

Having gone through this RFP document and having fully understood the Scope of the Project and the Scope of Work for the Project as set out by AUTHORITY in the RFP. I / we are pleased to inform that I / we would deploy the following resources for undertaking the entire activities involved in this RFP No._____. We also quote the amount that we would be charging from the Authority. The quote is inclusive of all applicable taxes and charges.

Fees	Unit	In Figures	In words
Amount quoted for Bio-Mining process	Rs. Per Ton		

- The Bidder has to provide details of calculations made in arriving at this financial offer. The committee may examine the details provided and ask for additional information, if required.
- The rate shall be quoted for 1 Tonne.

I / we have reviewed all the terms and conditions of the RFP and would undertake to abide by all the terms and conditions contained therein. I / we hereby declare that there are and shall be no deviations from the stated terms in the RFP Document.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

We the undersigned, examined the conditions of contract, specification, special conditions of contract, basic parameters of the proposed scheme and subsequent Addendums for the above mentioned works. We have examined understood and checked these documents and have ascertained that there is no ambiguity in the employer's requirement. We accordingly offer to complete the work in conformity with such documents for the lumpsum price as given here under.

We agree to takeup the work of as per the Employers requirements at a lumpsum price of …….. (in figures) …….. …….. (in words).

If this offer is accepted we will provide the specified performance security, commence the work within 15 days from the date of issue of letter of acceptance and complete the work within accordance with the above named documents within the period stipulated for completion. We guarantee that the works will then confirm with the performance security included in the RFP.

We understand that you are bound to accept the lowest or any RFP you may receive.

Yours faithfully,
For and on behalf of (*Name of Bidder*)

……..
Duly signed by the Authorised Signatory of the Bidder
(Name, Designation, Address and official stamp)

Date : DD/MM/YYYY

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

9. Annexure 5 (a) – Performance Bank Guarantee

Ref:_____ Date_____

Bank Guarantee No. _____

<Name>
<Designation>
<Address><Phone Nos.><Fax Nos.><Email id>

Whereas, <<name of the firm and address>> (hereinafter called "Implementing Agency") has undertaken, in pursuance of contract no. <Insert Contract No.> dated. <Date> to provide Implementation services for <<name of the assignment>> to Tirupati Smart City Corporation Limited (hereinafter called "the Authority")

And whereas it has been stipulated by in the said contract that the bidder shall furnish you with a bank guarantee by a recognized bank for the sum specified therein as security for compliance with its obligations in accordance with the contract;

And whereas we, <Name of Bank> a banking company incorporated and having its head/registered office at <Address of Registered Office> and having one of its office at <Address of Local Office> have agreed to give the supplier such a bank guarantee.

Now, therefore, we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of Indian Rupees<Insert Value> (Rupees <Insert Value in Words> only) and we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of Indian Rupees<Insert Value> (Rupees <Insert Value in Words> only) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the bidder before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract to be performed there under or of any of the contract documents which may be made between you and the Implementing Agency shall in any way release us from any liability under this guarantee and we hereby waive notice of any such change, addition or modification.

This Guarantee shall be valid until <<Insert

Date>>) Not withstanding anything

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

contained herein:

I. Our liability under this bank guarantee shall not exceed Indian Rupees<Insert Value> (Rupees <Insert Value in Words> only).

II. This bank guarantee shall be valid up to <Insert Expiry Date>)

III. It is condition of our liability for payment of the guaranteed amount or any part thereof arising under this bank guarantee that we receive a valid written claim or demand for payment under this bank guarantee on or before <Insert Expiry Date>) failing which our liability under the guarantee will automatically cease.

Date _____

Place _____ Signature _____

Witness _____ Printed name _____

(Bank's common seal)

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	**TECHNICAL OFFICER**	**MUNICIPAL ENGINEER-2**	**MUNICIPAL ENGINEER-1**	**SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

10. Annexure 5 (b) – Bank Guarantee for Bid Security / Earnest Money Deposit

To,

<Name>

<Designation>

<Address>

<Phone Nos.>

<Fax Nos.>

<Email id>

Whereas <<Name of the bidder>> (hereinafter called 'Implementing Agency') has submitted the bid for Submission of RFP <<RFP Number>> dated <<Date>> for <<Name of the assignment>> (hereinafter called "the Bid") to <<Authority>>.

Know all Men by these presents that we <<… >> having our office at <<Address>> (hereinafter called "the Bank") are bound unto the <<Authority>> (hereinafter called "the Authority") in the sum of Indian Rupees<<Amount in figures>> (Rupees <<Amount in words>> only) for which payment well and truly to be made to the said Authority, the Bank binds itself, its successors and assigns by these presents. Sealed with the Common Seal of the said Bank this <<Date>>.

The conditions of this obligation are:

1. If the Bidder having its bid withdrawn during the period of bid validity specified by the Bidder on the Bid Form; or
2. If the Bidder, having been notified of the acceptance of its bid by the Authority during the period of validity of bid

(a) Withdraws his participation from the bid during the period of validity of bid document; or
(b) Fails or refuses to participate in the subsequent Bid process after having been short listed;

We undertake to pay to the Authority up to the above amount upon receipt of its first written demand, without the Authority having to substantiate its demand, provided that in its demand the Authority will note that the amount claimed by it is due to it owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

This guarantee will remain in force up to <<insert date>> and including <<extra time over and above mandated in the RFP>> from the last date of submission and any demand in respect thereof should reach the Bank not later than the above date.

NOTHWITHSTANDING ANYTHING CONTAINED HEREIN:

I. Our liability under this Bank Guarantee shall not exceed Indian Rupees<<Amount in figures>> (Rupees <<Amount in words>> only)
II. This Bank Guarantee shall be valid up to *<<insert date>>*)
III. It is condition of our liability for payment of the guaranteed amount or any part thereof arising under this Bank Guarantee that we receive a valid written claim or demand for payment under this Bank Guarantee on or before <<insert date>>) failing which our liability under the guarantee will automatically cease.

(Authorized Signatory of the Bank)

Seal:

Date:

CHECK LIST FOR BANK GUARANTEES

Serial Number	Details of Checks	Yes / No
A	Is the BG on Non-Judicial Stamp paper of appropriate value, as per applicable Stamp Act of the place of execution	
B	Whether date, purpose of purchase of stamp paper and name of the purchaser are indicated on the back of Stamp Paper under the Signature of Stamp Vendor? [The date of purchase of Stamp Paper should be not later than the date of execution of BG and the Stamp Paper should be purchased either in the name of the executing Bank or the party on whose behalf the BG has been issued. Also the Stamp Paper should not be older than six months from the date of execution of BG	
C	Has the executing officer of BG indicated his name, designation and Power of Attorney No. / Signing Power No. on the BG?	
D	Is each page of BG duly signed / initialled by executant and whether stamp of bank is affixed thereon? Whether the last page is signed with full particulars including two witnesses under seal of Bank as required in the prescribed Performa?	
E	Does the Bank Guarantees compare verbatim with the Performa prescribed in the Bid Documents?	
F	Are the factual details such as Bid Document No. / Specification No. / LoA No. (if applicable) / Amount of BG and Validity of BG correctly mentioned in the BG	
G	Whether overwriting / cutting if any on the BG have been properly authenticated under signature & seal of executant?	

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR | **TECHNICAL OFFICER** | **MUNICIPAL ENGINEER-2** | **MUNICIPAL ENGINEER-1** | **SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

11. Annexure 6 – Non-Disclosure Agreement

WHEREAS, we the undersigned Bidder,_____, having our principal place of business or registered office at___, are desirous of bidding for RFP No. <<>> dated <<DD-MM-2018>> **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** (hereinafter called the said 'RFP')to the "Tirupati Smart City Corporation Limited", hereinafter referred to as 'Authority'

And,

WHEREAS, the Bidder is aware and confirms that the Authority's business or operations, information, application or software, hardware, business data, architecture schematics, designs, storage media and other information or documents made available by the Authority in the RFP documents during the bidding process and thereafter, or otherwise (confidential information for short) is privileged and strictly confidential and or proprietary to the Authority,

NOW THEREFORE, in consideration of disclosure of confidential information, and in order to ensure the Authority's grant to the Bidder of specific access to Authority's confidential information, property, information systems, network, databases and other data, the Bidder agrees to all of the following conditions.

It is hereby agreed as under:

1. The confidential information to be disclosed by the Authority under this Agreement ("Confidential Information") shall include without limitation, any and all information in written, representational, electronic, verbal or other form relating directly or indirectly to processes, methodologies, algorithms, risk matrices, thresholds, parameters, reports, deliverables, work products, specifications, architecture, project information, security or zoning strategies & policies, related computer programs, systems, trend analysis, risk plans, strategies and information communicated or obtained through meetings, documents, correspondence or inspection of tangible items, facilities or inspection at any site to which access is permitted by the Authority.

2. Confidential Information does not include information which:

To be continued

a. the Bidder knew or had in its possession, prior to disclosure, without limitation on its confidentiality;
b. information in the public domain as a matter of law;
c. is obtained by the Bidder from a third party without any obligation of confidentiality;
d. the Bidder is required to disclose by order of a competent court or regulatory authority;
e. Is released from confidentiality with the written consent of the Authority.

The Bidder shall have the burden of proving hereinabove are applicable to the information in the possession of the Bidder.

3. The Bidder agrees to hold in trust any Confidential Information received by the Bidder, as part of the Bid process or otherwise, and the Bidder shall maintain strict confidentiality in respect of such Confidential Information, and in no event a degree of confidentiality less than the Bidder uses to protect its own confidential and proprietary information. The Bidder also agrees:

   a. to maintain and use the Confidential Information only for the purposes of bidding for this RFP and thereafter only as expressly permitted herein;
   b. to only make copies as specifically authorized by the prior written consent of the Authority and with the same confidential or proprietary notices as may be printed or displayed on the original;
   c. to restrict access and disclosure of Confidential Information to their employees, agents, consortium members and representatives strictly on a "need to know" basis, to maintain confidentiality of the Confidential Information disclosed to them in accordance with this clause; and
   d. To treat Confidential Information as confidential unless and until Authority expressly notifies the Bidder of release of its obligations in relation to the said Confidential Information.

4. Notwithstanding the foregoing, the Bidder acknowledges that the nature of activities to be performed as part of the Bid process or thereafter may require the Bidder's personnel to be present on premises of the Authority or may require the Bidder's personnel to have access to software, hardware, computer networks, databases, documents and storage media of the Authority while on or off premises of the Authority. It is understood that it would be impractical for the Authority to monitor all information made available to the Bidder's personnel under such circumstances and to provide notice to the Bidder of the confidentiality of all such information.

To be continued

Therefore, the Bidder shall disclose or allow access to the Confidential Information only to those personnel of the Bidder who need to know it for the proper performance of their duties in relation to this project, and then only to the extent reasonably necessary. The Bidder will take appropriate steps to ensure that all personnel to whom access to the Confidential Information is given are aware of the Bidder's confidentiality obligation. Further, the Bidder shall procure that all personnel of the Bidder are bound by confidentiality obligation in relation to all proprietary and Confidential Information received by them which is no less onerous than the confidentiality obligation under this agreement.

5. The Bidder shall establish and maintain appropriate security measures to provide for the safe custody of the Confidential Information and to prevent unauthorized access to it.

6. The Bidder agrees that upon termination or expiry of this Agreement or at any time during its currency, at the request of the Authority, the Bidder shall promptly deliver to the Authority the Confidential Information and copies thereof in its possession or under its direct or indirect control, and shall destroy all memoranda, notes and other writings prepared by the Bidder or its Affiliates or directors, officers, employees or advisors based on the Confidential Information and promptly certify such destruction.

7. Confidential Information shall at all times remain the sole and exclusive property of the Authority. Upon completion of the Bid process and or termination of the contract or at any time during its currency, at the request of the Authority, the Bidder shall promptly deliver to the Authority the Confidential Information and copies thereof in its possession or under its direct or indirect control, and shall destroy all memoranda, notes and other writings prepared by the

   Bidder or its Affiliates or directors, officers, employees or advisors based on the Confidential Information within a period of sixty days from the date of receipt of notice, or destroyed, if incapable of return. The destruction shall be witnessed and so recorded, in writing, by an authorized representative of the Authority. Without prejudice to the above the Bidder shall promptly certify to the Authority, due and complete destruction and return. Nothing contained herein shall in any manner impair rights of the Authority in respect of the Confidential Information.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

8. In the event that the Bidder hereto becomes legally compelled to disclose any Confidential Information, the Bidder shall give sufficient notice and render best effort assistance to the Authority to enable the Authority to prevent or minimize to the extent possible, such disclosure. Bidder shall not disclose to a third party any Confidential Information or the contents of this RFP without the prior written consent of the Authority. The obligations of this Clause shall be satisfied by handling Confidential Information with the same degree of care, which the Bidder applies to its own similar Confidential Information but in no event less than reasonable care.

For and on behalf of:

(BIDDER)

Authorized Signatory	Office Seal:
Name:	Place:
Designation:	Date :

12. Annexure 7 – Consortium Agreement

DRAFT MEMORANDUM OF UNDERSTANDING EXECUTED BY MEMBERS OF THE CONSORTIUM

[On Non-judicial stamp paper of Indian Rupees 100 duly attested by notary public]

This Memorandum of Understanding (MoU) entered into this day of [*Date*] [*Month*] 2018 at [*Place*] among____(hereinafter referred to as "__") and having office at [*Address*], India, as Party of the First Part and_____(hereinafter referred as "__") and having office at [*Address*], as Party of the Second Part and _____ (hereinafter referred as "_") and having office at [*Address*], as Party of the Third Part.

The parties are individually referred to as Party and collectively as Parties.

WHEREAS Tirupati Smart City Corporation Limited has issued a Request for Proposal dated [*Date*] (RFP) from the Applicants interested in **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** for Authority:

AND WHEREAS the Parties have had discussions for formation of a Consortium for bidding for the said Project and have reached an understanding on the following points with respect to the Parties' rights and obligations towards each other and their working relationship.

AS MUTUAL UNDERSTANDING OF THE PARTIES, IT IS HEREBY AGREED AND DECLARED AS FOLLOWS:

i. The purpose of this Agreement is to define the principles of collaboration among the Parties to: Submit a response jointly to Bid for the **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"** as a Consortium.

a. Sign Contract in case of award.
b. Provide and perform the supplies and services which would be ordered by the Authority pursuant to the Contract.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

This Agreement shall not be construed as establishing or giving effect to any legal entity such as, but not limited to, a company, a partnership, etc. It shall relate solely towards the Authority for **Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"**

ii. for and related execution works to be performed pursuant to the Contract and shall not extend to any other activities

iii. The Parties shall be jointly and severally responsible and bound towards the Authority for the performance of the works in accordance with the terms and conditions of the BID document, and Contract.

iv. ---------- (Name of Party) shall act as Lead Partner of the Consortium. As such, it shall act as the coordinator of the Party's combined activities and shall carry out the following functions:
   a. To ensure the technical, financial and administrative co-ordination of the work package
   b. To lead the contract negotiations of the work package with the Authority.
   c. The Lead partner is authorized to receive instructions and incur liabilities for and on behalf of all Parties.
   d. In case of an award, act as channel of communication between the Authority and the Parties to execute the Contract

v. That the Parties shall carry out all responsibilities as Developer in terms of the Project Agreement.

vi. That the broad roles and the responsibilities of each Party at each stage of the Bidding shall be as below:

Party A: _____ Party B: ____ Party C: _____

vii. That the Parties affirm that they shall implement the Project in good faith and shall take all necessary steps to see the Project through expeditiously.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

viii. That this MoU shall be governed in accordance with the laws of India and courts in Andhra Pradesh shall have exclusive jurisdiction to adjudicate disputes arising from the terms herein.

In witness whereof the Parties affirm that the information provided is accurate and true and have caused this MoU duly executed on the date and year above mentioned.

(Party of the first part) (Party of the second part) (Party of the third part)

Witness:

i. _____
ii. _____

To be continued

13 Annexure 8 - Format for Power of Attorney to Authorize Signatory

POWER OF ATTORNEY

[To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant Stamp Act. The stamp paper to be in the name of the company who is issuing the power of attorney.]

We, M/s. (name of the firm or company with address of the registered office) hereby constitute, appoint and authorize Mr. or Ms. (Name and residential address) who is presently employed with us and holding the position of____, as our Attorney to do in our name and our behalf all such acts, deeds or things necessary in incidental to submission of our Bid of the Project (name of the Project), including signing and submission of the Bid and all other documents related to the bid, including but not limited to undertakings, letters, certificates, acceptances, clarifications, guarantees or any other documents, participating in the meetings, responding to queries, submission of information / responses which the Tirupati Smart City Corporation Limited may require us to submit and the aforesaid Attorney is further authorized for making representations to the Tirupati Smart City Corporation Limited, Tirupati or any other Government Agency or any person, in connection with the works until culmination of the process of bidding till the Project Agreement is entered into with Tirupati Smart City Corporation Limited and thereafter till the expiry of the Project Agreement.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid Attorney shall be binding on us and shall always be deemed to have been done by us.

All the terms used herein but not defined shall have the meaning ascribed to such terms under this RFP.

Signed by the within named……
(Insert the name of the executant company) through the hand of Mr. ……
duly authorized by the Board to issue such Power of Attorney

Dated this …… day of ……

Accepted

……..
Signature of Attorney
(Name, designation and address of the Attorney)

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

Attested

……..
Signature of Executant
(Name in Block Letters, designation and address of the Executant)

……..
Signature and Stamp of Notary of the place of execution

Common Seal of ……. has been affixed in my / our presence pursuant to Board of Director's Resolution dated……

WITNESS

Witness 1: …….. Witness 2: ……

Name …… Name ……..

Designation …….. Designation …….

Notes:

a. *To be executed by all the members individually.*
b. *The Mode of execution of the power of attorney should be in accordance with the procedure, if any laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal of the executant affixed in accordance with the required procedure Further, the person whose signatures are to be prescribed on the Power of Attorney shall be duly authorized by the executant(s) in the regard.*
c. *The person authorized under this Power of Attorney, in the case of the bidding Company / Lead Member being a public company or a private company which is a subsidiary of a public company, in terms of the Companies Act 1956, with a paid up share capital of more than Rupees of Five Crores, should be the Managing Director / whole time director / manager appointed under section 269 of the Companies Act,*

To be continued

1956. In all cases the person authorized should be a director duly authorized by a board of resolution duly passed by the company.

d. *Also, wherever required, the executant(s) should submit for verification the extract of the chartered documents and documents such as a Board Resolution / Power of Attorney, in favour of the person executing the power of Attorney for delegation of power hereunder on behalf of the executant(s).*

e. *For a Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued.*

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

14 Annexure 9 – Format for Power of Attorney for Lead bidder of Consortium

[To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant Stamp Act. The stamp paper to be in the name of the company who is issuing the power of attorney]

Whereas_____has invited RFP response for_____(Name of the Project)

Whereas, the Members of the Consortium comprising of M/s.___, M/s.___, M/s.__ and M/s._____(the respective names and addresses of the registered offices to be given) are interested in bidding for the Project and implementing the same in accordance with the terms and conditions contained in the RFP Documents.

Whereas, it is necessary for the members of the Consortium to designate one of them as the lead member with all necessary power and authority to do, for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's RFP response for the Project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT

We, M/s._____and M/s_____and M/s_____hereby designate M/s. ___
being one of the members of the Consortium, as the lead member of the Consortium, to do on behalf of the Consortium, all or any of the acts, deeds or things necessary or incidental to the Consortium's RFP response for the Project, including submission of the RFP response, participating in meetings, responding to queries, submission of information or documents and generally to represent the Consortium in all its dealings with Client or any other Government Agency or any person, in connection with the Project until culmination of the process of bidding till the Project Agreement is entered into with Client and thereafter till the expiry of the Project Agreement.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this power of attorney and that all acts, deeds and things done by our aforesaid Attorney shall and shall always be deemed to have been done by us or Consortium.

Dated this the_____day of_____2018

_____
(Signature)

_____
(Name in Block Letter of Executant) *[Seal of Company]*

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

Witness 1 Witness 2

Notes:

To be executed by all the members individually, in case of a Consortium.

The Mode of execution of the power of attorney should be in accordance with the procedure, if any laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure. All the terms used herein but not defined shall have the meaning ascribed to such terms under this RFP.

Signed by the within named……
(Insert the name of the executant company) through the hand of Mr. ……
duly authorized by the Board to issue such Power of Attorney

Dated this …… day of ……

Accepted

……
Signature of Attorney
(Name, designation and address of the Attorney)

Attested

……
Signature of Executant
(Name in Block Letters, designation and address of the Executant)

……
Signature and Stamp of Notary of the place of execution

Common Seal of …… has been affixed in my / our presence pursuant to Board of Director's Resolution dated……

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

WITNESS

Witness 1: ……..	Witness 2: ……
Name ……	Name ……..
Designation ……..	Designation ……

Notes:

a. *To be executed by all the members individually.*
b. *The Mode of execution of the power of attorney should be in accordance with the procedure, if any laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal of the executant affixed in accordance with the required procedure Further, the person whose signatures are to be prescribed on the Power of Attorney shall be duly authorized by the executant(s) in the regard.*
c. *The person authorized under this Power of Attorney, in the case of the bidding Company / Lead Member being a public company or a private company which is a subsidiary of a public company, in terms of the Companies Act 1956, with a paid up share capital of more than Rupees of Five Crores, should be the Managing Director / whole time director / manager appointed under section 269 of the Companies Act, 1956. In all cases the person authorized should be a director duly authorized by a board of resolution duly passed by the company.*
d. *Also, wherever required, the executant(s) should submit for verification the extract of the chartered documents and documents such as a Board Resolution / Power of Attorney, in favour of the person executing the power of Attorney for delegation of power hereunder on behalf of the executant(s).*
e. *For a Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued.*

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	**TECHNICAL OFFICER**	**MUNICIPAL ENGINEER-2**	**MUNICIPAL ENGINEER-1**	**SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

15 Annexure 10 – Manufactures / Producers Authorization Form

Dated: DD/MM/YYYY

To
The Managing Director,
Tirupati Smart City Corporation Limited,
C/o Tirupati Municipal Corporation,
Tilak Road, Tirupati – 517501, Chittoor District,
Andhra Pradesh, India

Subject : Manufacturer's Authorization Form

Ref.: RFP No.<<---------->>, Dated: <<--/--/-->>

Dear Sir,

We (Insert complete name of manufacturer) who are established and reputable manufacturers of _____[List of Goods] having factories or product development centers at the locations_____or as per list attached, do hereby authorize. _____[Name and Address of the Bidder] to submit a bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by us (insert name of goods) and to negotiate and conclude the contract with you against RFP No._____, dated: _____ for the above goods manufactured or developed by us.

We hereby extend our full guarantee and warranty for the goods supplied by the bidder and or maintenance or support services for the products against this invitation for bid by _____[Name of the Bidder] as per requirements and for the duration of contract as specified in this RFP.

We have repair and service facilities in India and we shall either develop our own facility or authorize a service center at Tirupati for day to day maintenance of equipments.

Products or technology quoted are neither end-of-sale nor end-of-life as on the date of installation and commissioning and are not end-of-support till the successful completion of O&M period of the project.

We have not have been blacklisted by any state / Central Government Department or Central/State PSU's.

We have not filed for bankruptcy and should be profitable for at least last 2 consecutive financial years.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

Thanking you,
Yours faithfully,

……
Name (complete name of person signing the security)
In the capacity of (legal capacity of the person signing the security)
Signed (signature)

……
Duly authorized to sign the Authorization for and on behalf of
(complete name of manufacturer)
Date (Insert date of signing)

For and on behalf of:_____ [Name of the OEM]

……
Authorised Signatory
Name:
Designation:

Place:
Date:

Note:

(a) This letter of authorization should be on the letterhead of the manufacturer and should be signed by a person with the proper authority to sign the document that is binding on the manufacturer.
(b) Please attach resolution of Board of Directors/Power of Attorney for the authorized signatory

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

SCHEDULE OF PLACES OF TEST AND INSPECTION

The BIDDER shall indicate the item of equipment of Supply, name of the MANUFACTURER or SUB-CONTRACTOR and place of test and inspection as shown below:

Item of Equipment	MANUFACTURER OR SUB-CONTRACTOR	Place of Test and Inspection

SIGNATURE :
DESIGNATION :
COMPANY :
COMPANY SEAL :
DATE :

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

16 PROFORMA OF GUARANTEE FOR EQUIPMENT PERFORMANCE

The Bidder hereby guarantees the requirements of this specification. If any of the requirements of the guarantees given are not fulfilled, the Authority has the right to reject the equipment, and if capacity, performance and efficiency obtained during acceptance tests falls short of that guaranteed by the bidder, the bidder hereby affirms that such deficiency will be made good by rectifying / replacing the defective parts. All the replaced parts shall be removed from the site. While the facility for making good the deficiency will be normally given once, the purchaser is entitled to reject the equipment in case of repeated failure to meet the guarantee as per the specification.

Seal of the Company :

Name of the Firm :
Signature of the Bidder :

Designation :

Date :

Seal of the Bidder Signature, Designation and address of the Bidder.

To be continued

17 SCHEDULE OF DEVIATIONS FROM THE SPECIFICATION

Bidder shall carefully state below all points which are not in accordance with the enclosed specification

Sl. No	Chapter Deviation	Section

The Bidder hereby certifies that the above mentioned are the only deviations from the specification No.

Seal of the Bidder Signature, Designation and address of the Bidder.

To be continued

18 List of proposed Sub-Contractors (if applicable)

Sl. No.	System / Sub-System/ Item Activity	Proposed Sub-Contract [Full Name & Address]
1.		
2.		
3.		
4.		
5.		

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR | **TECHNICAL OFFICER** | **MUNICIPAL ENGINEER-2** | **MUNICIPAL ENGINEER-1** | **SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED**

To be continued

19 Annexure 11 – Undertaking from Sub-Contractor

[on the letterhead of the subcontractor firm]

Letter No.: _____ *Date:*

To

Managing Director,
Tirupati Smart City Corporation Limited (TSCCL),
Tirupati Municipal Corporation, 13-29-M9-1-00, Tilak Road, East Tirupati,
Chittoor District, Andhra Pradesh. Pin Code : 517501

Request for Proposal [RFP] for selection of "Solid Waste Management Project – Remediation of Existing MSW Dumpsite at Ramapuram through Bio-Mining Process under Implementation of the Smart City Mission in Tirupati"

Sub : Consent of association with _____ as sub-contractor for the referred RFP.

Dear Sir,

1. I, the undersigned, confirm my agreement to associate with M/s. …….. (hereinafter referred to as "lead bidder") as the "Sub-Contractor" to submit the proposal and work for the above-captioned project.

2. I authorize the lead bidder to include my company's experience and expertise in the above referenced project proposal and/or forward my profile to the Authority for the proposal and represent me on all contractual aspects of this proposal.

3. I confirm my interest and availability to work on the projects awarded, should the lead bidder be successful in the RFP.

4. I confirm that to the best of my belief and knowledge, I have not been blacklisted by any government / Semi-government body or donor agency.

Yours sincerely,

……
Authorised Signatory of the subcontractor.

THE SUPPLIER / IMPLEMENTING AGENCY / CONTRACTOR	TECHNICAL OFFICER	MUNICIPAL ENGINEER-2	MUNICIPAL ENGINEER-1	SUPERINTENDING ENGINEER [FAC] TIRUPATI SMART CITY CORPORATION LIMITED

To be continued

e-Procurement details & Bidder uploaded Documents

To be continued

Annexure II

DUMPSITE REMEDIATION EPC AND O&M VENDORS				
Sl. no.	**Name of the Company**	**Contact person Name and Address**	**Contact Number and Email Address**	**Dumpsite Remediated in:**
1	Detox Corporation	Hiral Desai & Ankit Jani Business Development Detox House, Opp. Gujarat Samachar Press, Udhana Darwaja, Ring Road, Surat-395002	Call +91-261-2351248, 2346181; +91-9924440695; info@detoxcorp.com; info@sepplindia.com	Surat
2	Zigma Global Environ Solutions Pvt. Ltd.	Nagesh Prabhu C, Director & Ajay Arora (Vice President)	Call +91-8220005157; +91-9811169618; nagesh@zigma.in	Tamil Nadu, Noida
3	Chennai MSW Private Limited	Mr. RM Rao (National Head)	Call +91-9515114539; 7331175459 Email: cmswpl@gmail.com	Tamil Nadu
4	Ecogreen Energy Private Limited	Sanjay Sharma Dy. CEO 2nd Floor ILD Towers Sohna road Gurugram	+91-9899404979 sanjay.sharma@ecogreenenergy.co.in;	Gurugram
5	IL&FS Env. Infra & Service Ltd.	Mr. Manish Mishra Core 4B, 4th Floor, India Habitat Centre, Lodhi Road, New Delhi – 110 003	Call +91-8826895220 manish.mishra@ilfsindia.com	
6	Abellon Clean Energy Ltd.	Aatrey Pandya	Call +91-9099964346; aatrey.pandya@abelloncleanenergy.com	Ahmedabad
7	De-Syecan Waste Mgmt Pvt. Ltd	Mehul Mistry 507, AURUM, Makrand Desai Road, Bh. Vasna Petrol Pump, Vadodara-390007	Call +91-9067002496; mehul.mistry@desyecan.com	
8	Mailhem Engineers Private Limited	14, Vishranbaug Society, 2nd Floor, Senapati Bapat Road, Opp. International Convention Centre, Pune, Maharastra-411016	020-25532228 info@mailhem-ikos.com	Nagpur
9	DayaCharan & Company	Nagendra Kumar, D-2/96, JanakPuri,	+91 7016871947 +91 9712955978	Tamil Nadu

		New Delhi-110058	info@dozer.in	
10	Ramky Enviro Engineers Ltd.	AAyodhya Ram Reddy, Ramky Grandiose – 12th & 13th Floors, Ramky Towers Complex, Gachibowli, Hyderabad-500 032. Telangana, India.	Phone No. 040-2301 5000 (60 - Lines) 9515104390 E-mail: waste@ramky.com Web: www.ramkyenviroengineers.com arr@ramky.com;	Hyderabad
11	Rollz India Waste Management Pvt Ltd	R-10/107, Raj Nagar, Ghaziabad, UP	info@rollzindia.com 0120 4565999	Udaipur

Annexure III

Equipment for Bio-mining

A. Screening Equipment

- Trommels (different size sieves- separate the soil material, Combustible and inert)
- Air Density Separators/Classifier (separate the stones, papers plastics and such light fractions)
- Ballistic Separators (Stones and soil & humus)

B. Handling Equipment

- Loaders (Front Load) & Excavators
- Dumpers
- Fork Lifts, Water tankers etc
- Belt conveyors
- Shredders (optional)
- Bailing Machines (optional)

Ballistic Separator

Trommel

Conveyers

MSW HANDLING TOOLS AND EQUIPMENT INCLUDING MECHANIZED TRANSFER STATION				
S.no.	**Name of the Company**	**Contact person Name and Address**	**Contact Number and Email Address**	**Presence on GeM**
1	Hyva India Pvt. Ltd.	Mr. HaridasGopalkrishnan EL 215, MIDC Mahape, Navi Mumbai Maharashtra-400710	Call +91-9677159207 Email: haridasg@hyvaindia.com; susheel@hyvaindia.com Phone.:+91 22 67618888 Customer Care: 1800 2121 528 Fax.:+91 22 27672182 www.hyva.com sales@hyvaindia.com	Available
2	Zonta Infratech Pvt. Ltd.	Mr. Dennis Pulimittathu, 1st Floor, Reliable Phoenix Towers, #16 & 16/1, Museum Road, Bengaluru - 560001	Call+91-8067292100, 8086779855, 8965050732, dennis.puli@zontainfratech.com	Available
3	Kam Avida Enviro Engineers Pvt. Ltd.	Mr. Krishna MD, Plot No. 2, Survey No. 255/1, Hinjewadi, Tal.: Mulshi, Dist.: Pune - 411057	Call 09822025166; 022-66756300; Tel.: +91 - 020 - 6675 6500 (BOARD) Fax: +91 - 020 - 6675 6400 E-Mail: query@kam-avida.com Email: mkrishna12@sify.com; salesnorth1@csd.kam-avida.in; mk@kam-avida.com	Available
4	TPS Infrastructure Ltd.	Jaspreet Singh 84, M-Block, Commercial Complex, Greater Kailash Part-II, New Delhi 110 048, (INDIA).	Email : tps@tpsmfg.com, tps@tpsmfg.net; nehra.jaspreet@tpsmfg.com	To be listed by GeM
5	Waste Management Corporation	Mr. Ajay Arora GG-1/1798, Vikaspuri, New Delhi-110018	Email: info@wastemanagementcorp.com; ajayarora@wastemanagementcorp.com +91-11-28543080 +91-9811169618	To be listed by GeM
6	Precision Conveyor Systems	MR. Santosh Jha (Director) B-26, Ist Floor, Hill Apptt., Plot No: 17, Sec-13, Rohini, Delhi-110085, INDIA	Call +91-9810014957, +91-9013445492, 91-11-27564654 91-11-27564654 info@precisionconveyors.com, precesion@gmail.com	To be listed by GeM

7	Advance Equipment & Projects	E-18-B, Sector-8, Noida, Uttar Pradesh-201301	+91 9873384443 advance_equipment@yahoo.com	To be listed by GeM
8	AVK Technologies Private Limited	Plot No. 440, Udyog Vihar-3, Udyog Vihar, Gurugram, Haryana-122016	0124-4002426 bbchaudhry@rediffmail.com	To be listed by GeM
9	Genesis Waste Handling Private Limited	I12-16, GajraullaIndl. Area, (UPSIDC), Gajraulla II, J.P Nagar, Uttar Pradesh-244235	+919818190759 gwh.equip@gmail.com	Available
10	Green Tech Life	Level II, Prestige Omega, 104 EPIP Zone, Whitefield, Bangalore-560066	+91 9820086532 support@greentechlife.in	To be listed by GeM
11	GSE Lining	223, Gemsstar Commercial Complex, Ramachandran Lane, Extn. Kanchpada, Malad West, Mumbai-400064	022-28440841/42 sudhirr@gseworld.com	To be listed by GeM
12	JCB (JC Bamford Excavators Ltd.)	23/7, Mathura Road, Ballabgarh, Faridabad, Haryana-121004	0129-4299000 delhi.marketing@jcb.com	Available
13	Marvel Globes Industries	Plot No. 954, Gali No. 2, LuxmanVihar, Phase 1, railway Road, Gurgaon, Haryana-122001	+91 9810688683 marvelgloves@gmail.com	To be listed by GeM
14	Navdeep Engineering Private Limited	732, Near Bus Stand Babyal, Ambala cant, Haryana	+91 8071802590 meenakshibajaj33@rediffmail.com	To be listed by GeM
15	SRG International Private Limited	Plot No 13 A, Sector 4, Industrial Area, Faridabad, Haryana-121004	+91 8071803487 srgprefab@gmail.com	To be listed by GeM
16	Usha Engineering	S-70/71, Lodhi Road Industrial Area Mohan nagar, Ghaziabad-201005	0120-2658299 rakesh.sales@ushaengineerings.com	Available

17	Kwality Conveying Sytems (P) Ltd.	Tarsem Singh 14/25, Nangli Poona, Delhi-110036	+91 9810012402 kwality.tarsem@gmail.com	To be listed by GeM
18	Geron Engineering Pvt Ltd	Ankit Aggarwal, P- 4 ,Bulandsher Road , Bsr Industrial Area, near by R.T.O office, Bsr Industrial Area, Ghaziabad-201002, Uttar Pradesh	+91-9911181517 +91 9818709594 info@geronengineering.com	Available

Public Private Partnership

in

Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste

under

Hybrid Annuity Model

MODEL CONCESSION AGREEMENT

**** [Month], 20****

[Name of the State] Department of [Urban Development]

[Municipal Corporation of */Cluster of ***/Name of the Authority]**

Government of [Name of the State]

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CONCESSION AGREEMENT

This **CONCESSION AGREEMENT (Agreement)** is entered into on this {the ……. day of ……., 20……}[$]

BETWEEN

1. The **State Department of [Urban Development]** of [Name of the State] represented by [the Secretary], and having its offices at [•] (hereinafter referred to as the "**State Government**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns);

AND

2. The **[Municipal Corporation/Cluster[£]]** of [•] represented by [•], and having its offices at [•] (hereinafter referred to as the "**Authority**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns);

AND

3. {****** Limited}, a company incorporated under the provisions of the Companies Act, 2013 and having its registered office(s) at [•], (hereinafter referred to as the "**Concessionaire**" which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns and substitutes).

Collectively referred to as "Parties", and individually as "Party".

WHEREAS:

(A) Government of [Name of the State], through the [Name of the Municipal Act of the State], has entrusted the municipalities with such powers and functions as institutions of self-governance and to assign to them tasks relating to solid waste management.

(B) The Authority is engaged in the development of integrated solid waste management projects and bio-remediation of legacy waste.

(C) [The cluster comprises of Local Self Government Institutions (the "**LSGIs**") of [Municipal Corporation of ***], *** Municipality(ies), and *** Gram Panchayat, (collectively referred to as "**Participating Local Bodies or PLBs**") collectively decided for development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste;[1]

(D) [The Municipal Corporation and the PLBs have entered into an Inter-LSGI Agreement dated [•] for implementation of the Project whereby the Authority shall discharge the obligations

[$]The provisions in curly parenthesis and blank spaces shall be retained in the draft Agreement and shall be suitably modified/ filled after completion of the bid process to reflect the particulars relating to the selected bidder and other post-bid particulars. Provisions in square parenthesis may be modified in the concession agreement as per the requirement of the State Government and Authority at the time of bidding.

[£] In case the Project is to be developed for a cluster of municipalities, one representative Municipality to be the Authority.Names and addresses of all PLBs to be included as Party 1, Party 2, and so on.

[1]The Municipal Corporation may also enter into inter-LSGI agreements and represent other PLBs as the Authority in a cluster-based approach.

set out herein on behalf of the PLBs;]

(E) The Authority is desirous of implementing such development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste (the "**Project**") by seeking private sector participation on Public Private Partnership ("**PPP**") mode by inviting Proposals for the Project within the [jurisdiction of the Authority/collective jurisdictions of PLBs] (the **"Project Area"**); which will *inter alia* include setting up and operation of the Project in accordance with the terms and conditions to be set forth in the Agreement.

(F) The Authority had accordingly invited proposals under its {Request for Proposals/ Request for Qualifications} No. _____][2] dated [•] (the "**Request for Proposals/Request for Qualification**" or "**RFP/RFQ**") for short-listing of bidders for undertaking the development, operation and maintenance of the Project on Design, Build, Finance, Operate and Transfer (the **"DBFOT"**) basis and had shortlisted certain bidders including *inter alia*, the {the selected bidder/consortium comprising ……. and …….. (collectively, the "**Consortium**") with …… as its lead member (the "**Lead Member**").

(G) After evaluation of the bids received, the Authority had accepted the bid of the {selected bidder/ Consortium} (the "**Selected Bidder**") and issued its Letter of Award (hereinafter called the "**LOA**") No. …….. dated ……. to the Selected Bidder requiring, *inter alia*, the execution of this Agreement within 30 (thirty) days of the date of issue thereof.

(H) {The Selected Bidder has since promoted and incorporated the Concessionaire ("**Special Purpose Vehicle**" or "**SPV**") as a company under the Companies Act, 2013, and has requested the Authority to accept the Concessionaire as the entity which shall undertake and perform the obligations under the Concession Agreement for implementing the Project.}

(I) The Authority has {agreed to the said request of the Selected Bidder} and the Parties have accordingly agreed to enter into this Agreement with the Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of land through Bio-Remediation of Legacy Waste at Municipal Dumpsite(s)on Hybrid Annuity Model (the "**HAM**") basis, subject to and on the terms and conditions set forth hereinafter.

NOW THEREFORE in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the sufficiency and adequacy of which is hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

[2]To be inserted upon issuance of the RFP/ RFQ.

ARTICLE 1
DEFINITIONS AND INTERPRETATION

1.1 Definitions

1.1.1 The words and expressions beginning with capital letters and defined in this Agreement (including those in Article 32) shall, unless the context otherwise requires, have the meaning ascribed thereto herein, and the words and expressions defined in the Schedules and used therein shall have the meaning ascribed thereto in the Schedules. The words and expressions used but not defined in this Agreement and defined in the Environment Protection Act, 1986 (the **"EPA"**), Solid Waste Management Rules, 2016 (the **"SWM Rules"**),the Construction and Demolition Waste Management Rules, 2016 (the **"C&D Rules"**), the Plastic Waste Management Rules, 2016 (the **"PWM Rules"**),the Bio-Medical Waste Management Rules, 2016 (the **"BWM Rules"**), the E-Waste Management Rules, 2016 (the **"EWM Rules"**), the Hazardous Waste Management Rules, 2016 (the **"HWM Rules"**),and Guidelines for Disposal of Legacy Waste, 2019 (the **"Legacy Waste Guidelines"**), shall have the respective meanings as are assigned to them, respectively, in the EPA, the SWM Rules, the C&D Rules, the PWM Rules, the BWM Rules, the EWM Rules, the HWM Rules, and the Legacy Waste Guidelines.

1.2 Interpretation

1.2.1 In this Agreement, unless the context otherwise requires,

(a) the words, phrases and expressions defined hereinabove in this Article 1 or Article 32 or defined elsewhere by description in this Agreement, together with their respective grammatical variations and cognate expressions shall carry the respective meanings assigned to them in the said Article or in this Agreement and shall be interpreted accordingly. Expressions which have not been defined in this Agreement shall carry the respective meanings assigned to them in their ordinary applicability read in context with the manner of their usage in this Agreement or in their respective technical sense, as the case maybe;

(b) references to any legislation or any provision thereof shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;

(c) references to laws of the State, laws of India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of India and as from time to time may be amended, modified, supplemented, extended or re-enacted;

(d) references to a "**person**" and words denoting a natural person shall be construed as a reference to any individual, firm, company, corporation, society, trust, government, state or agency of a state or any association or partnership (whether or not having separate legal personality) of two or more of the above and shall include successors and assigns;

(e) the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;

(f) the words "**include**" and "**including**" are to be construed without limitation and shall be deemed to be followed by "**without limitation**" or "**but not limited to**" whether or not they are followed by such phrases;

(g) references to "**construction**" or "**building**" include, unless the context otherwise requires, investigation, design, developing, engineering, procurement, delivery, transportation, installation, processing, fabrication, testing, commissioning and other activities incidental to the construction, and "**construct**" or "**build**" shall be construed accordingly;

(h) references to **"development"** include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, upgradation and other activities incidental thereto, and "develop" shall be construed accordingly;

(i) any reference to any period of time shall mean a reference to that according to Indian Standard Time;

(j) any reference to "**hour**" shall mean a period of 60 (sixty) minutes commencing either on the hour or on the half hour of the clock, which by way of illustration means 5.00 (five), 6.00 (six), 7.00 (seven) and so on being hours on the hour of the clock and 5.30 (five thirty), 6.30 (six thirty), 7.30 (seven thirty) and so on being hours on the half hour of the clock;

(k) any reference to day shall mean a reference to a calendar day;

(l) reference to a "**business day**" shall be construed as reference to a day (other than a Sunday and public holiday) on which banks in [Name of the State] are generally open for business;

(m) any reference to month shall mean a reference to a calendar month as per the Gregorian calendar;

(n) any reference to "**quarter**" shall mean a reference to the period of 3 (three) months commencing from April 1, July 1, October 1, and January 1, as the case may be;

(o) references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;

(p) any reference to any period commencing "**from**" a specified day or date and "**till**" or "**until**" a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;

(q) the words importing singular shall include plural and vice versa;

(r) references to any gender shall include the other and the neutral gender;

(s) "**lakh**" means a hundred thousand (100,000) and "**crore**" means ten million (10,000,000);

(t) "**indebtedness**" shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;

(u) references to the "**winding-up**", "**dissolution**", "**insolvency**", or "**reorganisation**" of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganisation, dissolution, arrangement, protection or relief of debtors;

(v) save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, licence or document of any description shall be construed as reference to that agreement, deed, instrument, licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Sub-clause (u) shall not operate so as to increase liabilities or obligations of the Authority hereunder or pursuant hereto in any manner whatsoever;

(w) any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party in this behalf and not otherwise;

(x) the Schedules and Recitals to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement;

(y) references to Recitals, Articles, Clauses, Sub-clauses, Provisos or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Clauses, Sub-clauses, Provisos and Schedules of or to this Agreement; reference to an Annex shall, subject to anything to the contrary specified therein, be construed as a reference to an Annex to the Schedule in which such reference occurs; and reference to a Paragraph shall, subject to anything to the contrary specified therein, be construed as a reference to a Paragraph of the Schedule or Annex, as the case may be, in which such reference appears;

(z) the damages payable by either Party to the other of them, as set forth in this Agreement, whether on *per diem* basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the "**Damages**"); and

(aa) time shall be of the essence in the performance of the Parties' respective obligations. If any time period specified herein is extended, such extended time shall also be of the essence.

1.2.2 Unless expressly provided otherwise in this Agreement, any Documentation required to be provided or furnished by the Concessionaire to the Authority shall be provided free of cost and in three copies, and if the Authority is required to return any such Documentation with their comments and/or approval, they shall be entitled to retain two copies thereof.

1.2.3 The rule of construction, if any, that a contract should be interpreted against the parties responsible for the drafting and preparation thereof, shall not apply.

1.2.4 Any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Clauses Act, 1897 shall not apply.

1.2.5 The Parties acknowledge that damages for specific defaults prescribed under this Agreement (including the Delay Liquidated Damages, the Performance Liquidated Damages, the Availability Liquidated Damages, and the Power Consumption Liquidated Damages) are a genuine pre-estimate of and reasonable compensation for the loss and damage that shall be suffered by the non-defaulting Party due to failure of the defaulting Party to perform its obligations in accordance with this Agreement, and are not in the nature of a penalty.

1.2.6 Subject to the provisions of this Agreement, the Concessionaire shall be responsible to and indemnify, the State Government and the Authority for the acts and omissions of the Concessionaire Related Parties as if they were the acts and omissions of the Concessionaire and the State Government and the Authority shall be responsible to and indemnify the Concessionaire for the acts and omissions of State Government Related Parties and the Authority Related Parties, respectively, as if they were the acts and omissions of the State Government and the Authority, as the case may be.

1.2.7 Neither the giving of any approval or consent, the review, knowledge or acknowledgement of the terms of any document by or on behalf of the State Government and the Authority, nor the failure to do so, shall, unless expressly stated in this Agreement, relieve the Concessionaire of any of its obligations under this Agreement or of any duty which it may have under this Agreement to ensure the correctness, accuracy or suitability of the matter or thing which is the subject of the approval, consent, review, knowledge or acknowledgement.

1.3 Measurements and arithmetic conventions

All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down; provided that the drawings, engineering dimensions and tolerances may exceed 2 (two) decimal places as required.

1.4 Priority of agreements, clauses and schedules

1.4.1 This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:

(a) this Agreement; and

(b) all other agreements and documents forming part hereof or referred to herein, i.e. the Agreement at (a) above shall prevail over the agreements and documents at (b) .

1.4.2 Subject to the provisions of Clause 1.4.1, in case of ambiguities or discrepancies within this Agreement, the following shall apply:

(a) between two or more Clauses of this Agreement, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;

(b) between the Clauses of this Agreement and the Schedules, the Clauses shall prevail and between Schedules and Annexes, the Schedules shall prevail;

(c) between any two Schedules, the Schedule relevant to the issue shall prevail;

(d) between the written description on the Drawings and the Specifications and Standards, the latter shall prevail;

(e) between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and

(f) between any value written in numerals and that in words, the latter shall prevail.

ARTICLE 2
SCOPE OF WORK

2.1. Scope of Work

The scope of work of the Agreement (the "**Scope of Work**") shall mean and include, during the Concession Period:

2.1.1. Reclamation of land through Bio-Remediation of Legacy Waste at the [Name of the Municipal Dumpsite(s)] on Design, Build, Operate and Maintain (DBOM) basis;

2.1.2. Design, Build, Operate and Maintain (DBOM) infrastructure and facilities of design capacity of *** lakh metric tonnes for the co-processing/recycling/selling of the Bio-Remediated Legacy Waste at [Name of the Municipal Dumpsite(s)];

2.1.3. Design, Build, Operate and Maintain (DBOM) Processing facility(ies), Material Recovery Facility(ies) and other facilities of similar nature, as per requirement, of design capacity of *** tonnes per day at the site of Sanitary Land Filling (the **"SLF"**), identified and provided by the Authority for daily processing/recycling/disposal of the fresh municipal solid waste;[3]

2.1.4. Deploy [•] number of decentralized units for Processing of Organic Waste;

2.1.5. Primary and Secondary Collection, Transportation, Processing and Disposal of Solid Waste from Waste Generators in the Project Area to the SLF and decentralized units for Processing and Disposal in accordance with this Agreement;

2.1.6. Dispose/sell processed waste, by-products, recycled products, etc.; and

2.1.7. Discharge the Scope of Services more specifically set out in **Schedule 1**.[4]

[3] Depending on the availability of land, or lack thereof, the Authority may allocate a portion of the municipal dumpsite as the site for SLF.

[4] Based on the local requirement, during the construction period, the bio-remediation of legacy and subsequent reclamation of land may operate simultaneously as the construction of processing facility for fresh waste at the municipal dumpsite or both activities may occur one after the other at the municipal dumpsite or both activities may be undertaken simultaneously at different locations within the Project Area

ARTICLE 3
THE CONCESSION

3.1. Grant of Concession

3.1.1. Subject to and in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits, the Authority, awards to the Concessionaire the concession set forth herein including exclusive right, license and authority to construct, develop, operate and maintain the Project (the "**Concession**"), during the period of [24 (twenty four) months]for Bio-Remediation of Legacy Waste at the [Name of the Municipal Dumpsite(s)] as well as Construction of Project Facilities,[5] and Operation and Maintenance Period of [20 (twenty) years] commencing from Commercial Operation Date (the **"COD"**) of the Processing facilities, and the Concessionaire hereby accepts the Concession and agrees to implement the Project subject to and in accordance with the terms and conditions set forth in this Agreement.

[Provided that the Concessionaire may, at any time no earlier than [5 (five) years], but no later than [2 (two) years] prior to the completion of the Concession Period upon issuing a notice to this effect to the Authority, request for an additional Concession Period on the terms and conditions set out herein and in accordance with the provisions of Article 3.4.]

3.2. Rights Associated with the Grant of Concession

Without prejudice to the generality of foregoing, the Concession hereby granted to the Concessionaire shall oblige or entitle (as the case may be) the Concessionaire to:

3.2.1. the Right of Way, access and license rights to use the Site for the purpose of and to the extent conferred by the provisions of this Agreement;

3.2.2. access to the Site from the Compliance Date, for the sole purpose of implementing the Project, provided, however, to the extent of applicability of Article 14.1.1, the Concessionaire shall be entitled to access the Site prior to the Compliance Date;

3.2.3. To design, engineer, part-finance, procure, construct, install, commission, operate and maintain the Project either itself or through such Person/Sub-Contractor as may be selected by it;

3.2.4. Upon achieving COD of the Project, forming part of the Project, to manage, operate and maintain the same till the Termination Date of the Project;

3.2.5. To obtain financing for the Project in the form of equity or debt, from domestic and from recognized foreign sources, through public issues, private placements or direct borrowings

[5]Depending on the local factors, the parties may mutually decide as to: (a) first, the bio-remediation of legacy waste is carried out, land is reclaimed, and then on that land project facilities such as processing plant/MRF, etc. may be developed; or (b) a portion of land of the municipal dumpsite is assigned to the Concessionaire for construction of project facilities and bio-remediation of legacy waste carries on simultaneously; or (c) while the bio-remediation of legacy waste goes on, project facilities may be developed at a different location and once the land of dumpsite is reclaimed then the project facilities may be shifted to the reclaimed land.

or investment from the capital markets, banks, lending institutions, mutual funds, insurance companies, pension funds, provident funds and any other source as it may deem necessary for implementing the Project; and

Provided that the Authority shall be informed by the Concessionaire as to the creation of any security interest in favour of the Lenders within a period of [14 (fourteen)] days from the date such security interest comes into existence and provide to the Authority within such time, notarized true copies of any and all documents/ agreements relating thereto.

Provided further, nothing contained herein shall (i) absolve the Concessionaire from its responsibilities to perform/discharge any of its obligations under and in accordance with the provisions of this Agreement; (ii) authorise or be deemed to authorise the Lenders to implement and execute Project themselves; and (iii) under any circumstances amount to any guarantee from or recourse to the Authority;

3.2.6. To develop SLF facility of design capacity of *** lakh metric tonnes on the Site provided by the Authority for this purpose in accordance with the Legacy Waste Guidelines and other Applicable Laws;

3.2.7. To collect, segregate and Process entire Solid Waste from the Project Area and Dispose the residual inert matter and rejected waste/ processing rejects [and air pollution control residue]in SLF facility;

3.2.8. To store, use, appropriate, market and sell or dispose-off all the constituents / products / by-products from the Solid Waste, including but not limited to recyclables, electricity, methane (biogas), refuse derived fuel (the **"RDF"**), residual inert waste and to further retain and appropriate any revenues generated from the sale of such products/ by-products in accordance with this Agreement;

3.2.9. To retain the fiscal incentives and benefits accruing in respect of or on account of the Project including Certified Emission Reductions (CERs) or Verified Emission Reductions (VERs) under Kyoto Protocol / Climate Change initiative;

3.2.10. To obtain the utilities required for enabling the construction of the Project, by fulfilling eligibility conditions (if any) and paying the applicable charges for the utilities;

3.2.11. To hold, possess, control the Sites, in accordance with the terms of the Concession Agreement, for the purposes of the due implementation of the Project;

3.2.12. To appropriate, possess, control and to further, at its sole discretion, utilize, renovate, modify, replace or demolish, free of any cost or charges or any liability for payment of compensation in respect thereof, all the buildings and structures and infrastructure that may be existing on Secondary Collection Points and Sites with reference to Solid Waste management in Project Area;

3.2.13. To develop the Project using such technology to establish [Waste to Energy plant(s) having a processing capacity of [•] TPD and a production capability of [•] MW] and to retain and appropriate any revenues generated from the sale of [energy/residual inert waste]; such

technology should be suitable and commercially viable for the purposes of implementing the Project, in accordance with terms of this Agreement, SWM Rules and Good Industry Practice;

3.2.14. To modify, adapt, upgrade or change the technology, from time to time, based on actual operations of the Processing Project Facility, Good Industry Practices and the requirements of the Project except in respect of the building by-laws, subject to no disruption in services and obligations;

3.2.15. The Concessionaire may, as per requirement and in agreement with the Authority, subject to fulfilling the eligibility conditions and procuring all required approvals from related regulatory/ statutory authorities, develop, operate and maintain additional recycling or Processing facilities on the Site(s), provided that the same does not cause any adverse effect on its Project related obligations or increases in any manner the financial liability (including in relation to land requirement) of the Authority under the Agreement. In the event and so long as the Concessionaire meets the foregoing conditions, the Authority shall render such reasonable assistance that Concessionaire requests in this connection.

3.3. Concession Period

3.3.1. Subject to early Termination of this Agreement in accordance with its terms, the term of this Agreement is [22 (twenty two)] years from the Compliance Date (the **"Concession Period"**) during which the Concessionaire is authorised to implement the Project on Hybrid Annuity Model including management of all facilities and resources required for integrated management of Solid Waste in accordance with the provisions hereof:

Provided that in the event of Termination, the Concession Period shall mean and be limited to the period commencing from the Compliance Date and ending with the Termination Date.

3.3.2. [The Authority shall, at any time prior to the date of expiry of the Concession Period, have the right to grant concession with respect to the Project for a period which it may determine in its sole discretion, after the expiry of the Concession Period, through international competitive bidding amongst developers other than the Authority and any undertaking owned by it. The Authority further agrees that the Concessionaire shall have the right to participate in such competitive bidding and make its offer in accordance with the terms thereof. In the event that the Concessionaire is not the highest bidder, it shall have the first right of refusal to accept the concession, if its bid is in the range of plus-minus (+/-) [10% (ten per cent)] of the highest bid. Provided that the aggregate amounts paid by the Concessionaire to the Authority during the Concession Period in the nature of liquidated damages in accordance with the terms of this Agreement, are not more than [15% (fifteen per cent)] of the amount of the Performance Security or not more than [5 (five)] incidents of Concessionaire Default shall have occurred for [6 (six)] consecutive months during the entire Concession Period. For the purposes of this Article 3.3.3, the aggregate amounts of liquidated damages paid by the Concessionaire to the Authority during the Concession Period shall be calculated at the present value, which shall be taken as on the Execution Date.]

3.4. [Extension of Concession Period

The Authority / State Government may in its sole discretion, in the event the Concessionaire does not commit any Event of Default during the last [5 (five) years] of the Concession Period, agree to extend the Concession after the expiry of the Concession Period on same [or modified] terms and conditions for a term as mutually decided by the Parties by issuing a notice to the Concessionaire by no later than [6 (six)] months prior to the date of expiry of the Concession Period.

Provided that any such extension shall also lead to an extension of license agreement(s) for an equal period so as to make the license agreement co-terminus with extended Concession Period.]

ARTICLE 4
CONDITIONS PRECEDENT

4.1. Conditions Precedent

4.1.1. Save and except as expressly provided in Articles 4, 7, 8, 9, 10, 11, 12, 19, 20, 22, 31, and 32 and any related Schedules or unless the context otherwise requires, the respective rights and obligations of the Parties under this Agreement shall be subject to the satisfaction in full of the conditions precedent specified in this Article 4.1 (the "**Conditions Precedent**"). Provided, however, that a Party may grant waiver from satisfaction of any Condition Precedent by the other Party in accordance with the provisions of Articles 4.1.2, 4.1.3 or 4.1.4, as the case may be, and to the extent of such waiver, that Condition Precedent shall be deemed to be fulfilled for the purposes of this Article 4.1.1.

4.1.2. **Conditions Precedent for Authority**

The Concessionaire may, upon providing the Performance Securities to the Authority in accordance with Article 9 and at any time after [15 (fifteen)] days from the Execution Date or on an earlier day acceptable to the Authority, by notice require the Authority to satisfy any or all of the Conditions Precedent set forth in this Article 4.1.2 within a period of [180 (one hundred and eighty)] days of receipt of the notice, or such longer period not exceeding [210 (two hundred and ten)] days as may be specified therein, and the Conditions Precedent required to be satisfied by the Authority shall be deemed to have been fulfilled when the Authority shall have:

(a) Procured for the Concessionaire the Right of Way to the Site(s) in accordance with Article 10;

(b) Provided a portion of land at the Dumpsite as demanded by the Concessionaire for setting up of Project Facilities for Bio-Remediation of Legacy Waste, vacant and free from Encumbrances; provided, however, the Authority may add the task of clearance of a portion of land for setting up of Project Facilities for Bio-Remediation of Legacy Waste at the Dumpsite in the Scope of Work of this Agreement;[6]

(c) Executed and procured execution of Substitution Agreement;

(d) Facilitated and ensured that the Site(s) and vacant and unencumbered possession of all Site(s) handed over to the Concessionaire.

(e) Facilitated the Concessionaire in terms of obtaining all Applicable Permits from the Departments concerned/ Competent Authority, if requested by the Concessionaire, including permits in relation to environmental protection and conservation including but not limited to those specified in **Schedule 2**;

[6]If the Scope of Work is expanded to include the task of clearance of a portion of land for setting up of Project Facilities for Bio-Remediation of Legacy Waste at the Dumpsite, the duration of Construction Period may be increased if required.

(f) Finalized and allocated location for setting up decentralized waste processing units, in consultation with the Concessionaire;

(g) Finalized and allocated Secondary Collection Points, if any, in the Project Area in consultation with the Concessionaire;

(h) Finalized and allocated to the Concessionaire the locations proposed for keeping the Designated Bins;

(i) Provided land for SLF within 3 (three) months from the date of LoA;

(j) Ensure no fresh Waste is dumped at the Dumpsite assigned for Bio-Remediation of Legacy Waste;

(k) [Provided assistance and facilitated in execution of Power Purchase Agreement between the Concessionaire and [Name of the State] Electricity Board;]

(l) [Executed the Inter-LSGI Agreement between the Authority]; and

(m) Provided Access Roads to the Site as per Good Industry Practices.

Provided, that upon request in writing by the Authority, the Concessionaire may, in its discretion, waive the Conditions Precedent set forth in this Article 4.1.2.

4.1.3. **Conditions Precedent for the Concessionaire**

The Conditions Precedent required to be satisfied by the Concessionaire within a period of [90 (ninety)] days from the Execution Date shall be deemed to have been fulfilled when the Concessionaire shall have:

(a) Provided to the State Government and the Authority the copies (certified as true copies by an authorised officer of the Concessionaire) of the constitutional documents of the Concessionaire;

(b) Provided the Performance Securities to the State Government and the Authority pursuant to Article 9;

(c) Prepared and submitted a detailed project report, covering technology proposed, demand assessment, technical feasibility, detailed cost estimates, capital investment plan, project financing details, revenue projections, environment & social impact assessment and detailed financial analysis, to the Authority, consistent with the technical plan submitted during the bidding stage within 3 (three) months from Compliance Date;

(d) Executed the Financing Agreements and delivered to the Authority [3 (three)] true copies thereof, duly attested by a director of the Concessionaire;

(e) Delivered to the Authority [3 (three)] true copies of the Financial Package and the Financial Model, duly attested by a director of the Concessionaire, along with copies of the Financial Model in an editable version either in MS Excel version or any substitute

thereof, which is acceptable to the Senior Lenders;

(f) Achieved financial closure i.e. procured and raised all the funds (debt, equity, etc.) necessary to finance the Project as evidenced by the funding documents becoming effective and the Concessionaire having immediate access to the funds there under;

(g) Finalized and taken over Secondary Collection Points in the Project Area in consultation with the Authority;

(h) Provided notarised true copies of its board resolution authorizing the execution, delivery and performance of this Agreement by the Concessionaire;

(i) Executed and procured execution of the Escrow Agreement with the State Government, the Authority, and the Escrow Bank in accordance with Article 19 and Schedule 17;

(j) Procured all Applicable Permits unconditionally or if subject to conditions, then all such conditions required to be fulfilled under such Applicable Permits, have been fulfilled as on date the Concessionaire claims satisfaction of all the Conditions Precedent under this Agreement;

(k) Delivered to the Authority {from the Consortium Members, their respective} confirmation, in original, of the correctness of their representations and warranties set forth in Article 7;

(l) Delivered to the Authority a legal opinion from the legal counsel of the Concessionaire with respect to the authority of the Concessionaire to enter into this Agreement and the enforceability of the provisions thereof;

(m) Provided proof of its shareholding pattern, evidenced by certificates from the authorised signatory of the Concessionaire.

(n) Executed and procured execution of Substitution Agreement with the State Government, the Authority and the Lenders in the agreed form set out in Schedule 9;

(o) Taken over vacant and unencumbered possession of all the Site(s) from the Authority;

(p) [Made an application to [Name of the State] Electricity Regulatory Commission (the "**Power Regulator**") for fixing power tariff for the waste processing plant to be paid by the [Name of the State] Electricity Board , as provided Power Purchase Agreement (PPA) signed between Concessionaire and [Name of the State] Electricity Board separately];

(q) Procured at its own cost, water connection, power connection and other service connections to the Site;

Provided that upon request in writing by the Concessionaire, the Authority may in its sole

discretion, waive fully or partially any or all the Conditions Precedent set forth in this Article 4.1.

4.1.4. **Conditions Precedent to be satisfied by the State Government**

The State Government shall satisfy the following Conditions Precedent (if not already fulfilled on the Execution Date):

(a) work with the Authority to appoint the Project Engineer in accordance with Article 13;

(b) execute the Substitution Agreement with the Concessionaire, Authority and the Lenders in the agreed form set out at Schedule 9; and

(c) execute the Escrow Agreement with the Concessionaire, Authority, and the Escrow Bank in the agreed form set out at Schedule 17 and open the Escrow Account with the Escrow Bank;

4.2. Satisfaction of Conditions Precedent

4.2.1. Each Party shall make all reasonable endeavours at its respective cost and expense to procure the satisfaction in full of the Conditions Precedent relating to it within a period of [180 (One Hundred & Eighty)] days from the Execution Date (the **"Compliance Period"**) unless specified otherwise;

4.2.2. The later of the date within such time when the Authority or the Concessionaire fulfills its Conditions Precedent (unless the Authority waives the same for the Concessionaire) shall be the date from which the relevant and respective obligations of the Parties hereunder shall commence (the **"Compliance Date"**), respectively.

4.2.3. Each Party shall make all reasonable endeavors to satisfy the Conditions Precedent within the time stipulated and shall provide the other Party with such reasonable cooperation as may be required to assist that Party in satisfying the Conditions Precedent for which that Party is responsible.

4.2.4. The Parties shall notify each other in writing at least [once a month] on the progress made in satisfying the Conditions Precedent. Each Party shall promptly inform the other Party when any Condition Precedent for which it is responsible has been satisfied.

4.2.5. The Concessionaire shall, upon satisfaction or waiver, as the case may be, of all the Conditions Precedent, subject to confirmation by the Authority, notify the Authority of the occurrence of the Compliance Date.

4.3. Damages for delay by the State Government or Authority

In the event that: (i) the Authority and the State Government does not procure fulfillment or waiver of the Condition Precedent set forth in Articles 4.1.2 and 4.1.4, respectively, within the period specified in respect thereof; and (ii) the delay has not occurred as a result of breach of this Agreement by the Concessionaire or due to Force Majeure Event, the State Government or the Authority shall pay Damages to the Concessionaire of an amount calculated at the rate

of [0.1% (zero point one per cent)] of the Performance Security for each day's delay until the fulfillment of such Conditions Precedent, subject to a maximum amount equal to the bid security.

4.4. Damages for delay by the Concessionaire

In the event that: (i) the Concessionaire does not procure fulfillment or waiver of any or all of the Conditions Precedent set forth in Article 4.1.4 within the period specified in that Article; and (ii) the delay has not occurred as a result of breach of this Agreement by the Authority or the State Government or due to Force Majeure Event, the Concessionaire shall pay Damages to the Authority of an amount calculated at the rate of [0.2% (zero point two per cent)] of the Performance Security for each day's delay until the fulfillment of the Conditions Precedent, up to the maximum amount equal to the bid security and upon reaching such maximum amount, the Authority may, in its sole discretion and subject to the provisions of Article 23, terminate the Agreement. Provided that in the event of delay by the Authority in procuring fulfillment of the Conditions Precedent specified in Article 4.1.2, no Damages shall be due and payable by the Concessionaire under this Article 4.4 until the date on which the Authority shall have procured fulfillment of the Conditions Precedent specified in Article 4.1.2.

4.5. Commencement of the Concession Period

The date on which Financial Close is achieved and all the Conditions Precedent specified in Article 4.1, are satisfied or waived, as the case may be, shall be the Compliance Date which shall be the date of the commencement of the Concession Period. For avoidance of doubt, the Parties agree that the Concessionaire may, upon occurrence of the Compliance Date hereunder, by notice convey the particulars thereof to the Authority, and shall thereupon be entitled to commence development of the Project in accordance with the terms of this Agreement.

4.6. Non-Compliance with Conditions Precedent

4.6.1. In the event the Conditions Precedent for Concessionaire have not been satisfied within the stipulated time and the Authority or the State Government has not waived, fully or partially, such conditions relating to the Concessionaire, this Agreement shall cease to have any effect as of that date and shall be deemed to have been terminated by the mutual agreement of the Parties and no Party shall subsequently have any rights or obligations under this Agreement and the Authority or the State Government shall not be liable in any manner whatsoever to the Concessionaire or Persons claiming through or under it;

4.6.2. In the event this Agreement fails to come into effect on account of non-fulfillment of the Concessionaire's Conditions Precedent, the State Government or the Authority shall be entitled to forfeit and encash the Performance Security;

4.6.3. In the event the Conditions Precedent for the Authority or the State Government have not been satisfied within the stipulated time, then the Concessionaire shall have the option to either: (i) mutually extend the time period for satisfaction of the Conditions Precedent for the Authority or the State Government (as the case may be) or (ii) terminate this Agreement. In the event of termination, the Authority or the State Government shall pay to the

Concessionaire, reasonable development costs, as determined through the mechanism enumerated below. In case of extension of time period for fulfillment of Conditions Precedent for the Authority or the State Government beyond a period of 180 (one hundred and eighty) days from the Compliance Date, the Concession Period shall be proportionately extended for the same period. Parties hereby agree that for determination of the said development cost, the Authority may appoint a financial consultant for determining such development cost, whose determination shall be final, conclusive and binding. The Parties shall share the cost of such financial consultant. For the purpose of this clause the term "**Development Cost**" shall mean the reasonable cost (if any) incurred by the Concessionaire and as determined in terms above in relation to and limited to any physical development of the Site;

4.6.4. In the event this Agreement fails to come into effect on account of the non-fulfillment of the Authority Conditions Precedent, or the State Government Conditions Precedent, the Authority shall in addition to payment of Development Cost in terms of Article 4.6.3 above, shall return the Performance Securities to the Concessionaire; provided there are no outstanding claims of the Authority on the Concessionaire.

4.7. Termination upon delay

4.7.1. Without prejudice to the Damages for delay prescribed in Articles 4.3 and 4.4 above, the Parties expressly agree that in the event the Compliance Date does not occur, for any reason whatsoever, within a period of [180 (one hundred and eighty)] days from the Execution Date or the extended period provided in accordance with this Agreement, then all rights, privileges, claims and entitlements of the Concessionaire under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Concessionaire and the Agreement may be terminated by the non-defaulting Party. Provided, however, that in the event the delay in occurrence of the Compliance Date is for reasons attributable to the Concessionaire, the Performance Security or the bid security, as the case may be, of the Concessionaire shall be encashed and appropriated by the Authority as Damages thereof.

4.7.2. Instead of terminating this Agreement as provided in Article 4.7.1 above, the Parties may by mutual agreement extend the time for fulfilling the Conditions Precedent. In the event of such extension in time for fulfilling Conditions Precedent, the Concession Period shall also be extended proportionately.

ARTICLE 5
OBLIGATIONS OF THE CONCESSIONAIRE

5.1 General Obligations of the Concessionaire

5.1.1 Subject to and on the terms and conditions of this Agreement, the Concessionaire shall, at its own cost and expense, implement the Project, procure finance for and undertake the development, engineering, procurement, equipping, operation and maintenance of the Project and observe, fulfill, comply with and perform all its obligations set out in this Agreement or arising hereunder.

5.1.2 Perform and fulfill all of the Concessionaire's obligations with respect to the Project set out in Schedule 1 and under this Agreement;

5.1.3 The Concessionaire shall arrange for and procure, at its own cost and risk, all infrastructure facilities and utilities for the construction, development, operation and maintenance of the Project, including procuring connection for and supply of electricity, water, gas and other utilities as may be necessary or required for the operation of the Project. The Concessionaire shall obtain all Applicable Permits and comply with the conditions there under for the procurement and use of such infrastructure facilities and utilities.

5.1.4 During the Concession Period, the Concessionaire shall obtain from the relevant Government Instrumentalities, the Applicable Permits (other than the Applicable Permits required to be obtained by the Authority under Article 4.1.2) and keep in force and comply with the conditions of all Applicable Permits for the development, Operation and Maintenance of the Project.

5.1.5 The Concessionaire shall comply with all Applicable Laws (including without limitation all public and labour related laws and health, safety, and sanitation laws, as then in force) and conditions of all Applicable Permits (including keeping them valid and in force as required) while performing its obligations under this Agreement. Further, the Concessionaire shall ensure and procure that its Contractors, if any, comply with all Applicable Permits and Applicable Laws during their performance of any of the Concessionaire's obligations under this Agreement.

5.1.6 The Concessionaire shall procure that its Sub-Contractors, if any, shall discharge its obligations in accordance with Good Industry Practice and as a reasonable and prudent person. For the purpose of this Agreement, the discharge of obligations by the Sub-Contractors shall be the obligation of the Concessionaire.

5.1.7 The Concessionaire shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement:

(a) procure, as required, the appropriate proprietary rights, licences, agreements and permissions for materials, methods, processes and systems used or incorporated into the Project;

(b) perform and fulfill its obligations under the Financing Agreements;

(c) carry out Bio-Remediation of Legacy Waste by employing environment-friendly technologies which are not potentially detrimental or pose harm or risk to the quality of the reclaimed land;

(d) maintain harmony and good industrial relations among the personnel employed by it or its Contractors in connection with the performance of its obligations under this Agreement and shall be solely responsible for compliance with all labour laws and be solely liable for all possible claims and employment related liabilities of its staff employed in relation with the Project and hereby agrees to keep the Authority/ State Government indemnified against any claims, damages, expenses or losses in this regard and in no case and for no purpose shall the Project Engineer/ Authority/ State Government be treated as the employers of the Concessionaire, in this regard;

(e) not do or omit to do any act, deed or thing which may in any manner violates any provision of this Agreement;

(f) always act in a manner consistent with the provisions of this Agreement and not cause or fail to do any act, deed or thing, whether intentionally or otherwise, which may in any manner violate any of the provisions of this Agreement or Applicable Laws and Applicable Permits;

(g) procure that all equipment and facilities comprising the Project are developed, operated and maintained in accordance with the Specifications and Standards, Maintenance Requirements, Safety Requirements as specified in **Schedules 3,4 and 5** and Good Industry Practice;

(h) support, cooperate with and facilitate the Authority/ State Government in the implementation and operation of the Project in accordance with the provisions of this Agreement;

(i) to comply with the time lines for setting up the Project Facilities;

(j) endeavour to improve the ancillary conditions and infrastructure related to the Project including assistance to informal recycling workers, procure and maintain in full force and effect, as necessary, appropriate proprietary rights, licenses, agreements and permissions for materials, methods, processes and systems used in or incorporated into the Project;

(k) right to enter into sub-contracts for the purposes of and subject to the terms of this Agreement;

(l) for Bio-Remediation of Legacy Waste and reclamation of land develop, construct and operate the Sanitary Landfill Site at the allocated site in conformity with the terms of this Agreement for disposal of residual inert matter and rejected waste;

(m) be responsible for all the health, security, environment and safety aspects of the Project at all times during the Concession Period;

(n) ensure that the Project remains free from all encroachments and take all steps necessary to remove encroachments, if any;

(o) upon receipt of a request thereof, afford access to the Project to the authorised representatives of the Project Engineer/ Authority/ State Government for the purpose of ascertaining compliance with the terms, covenants and conditions of this Agreement;

(p) bear all expenses towards uniforms, safety gear and waste handling equipment to all the waste lifters and drivers;

(q) ensure that the project is operational on all calendar days of the year;

(r) be responsible for the conduct of its staff employed for this project while on duty;

(s) shall obtain approval from transport department as applicable and obtain fitness certificate for the vehicles each year before the due date and shall bear any cost or expense associated with this;

(t) to operate, maintain, repair and renovate the project assets and project facilities, in accordance with, inter alia, the Applicable Laws, Applicable Permits and the requirements;

(u) submit the Operational Plan to the Authority (with a copy to the State Government)at least 1 (one) month before proposed Commencement Date and get the same approved;

(v) [commence Secondary Collection and Transportation of the Solid Waste from the Designated Bins and Collection Points within the Project Area at least [60 (sixty)]days prior to COD, during the Trial Operations period];

(w) [intimate to the Project Engineer, the Authority, and the State Government, the date of commencement of the Secondary Collection and Transportation (the "**Commencement Date**") at least 2 (two) weeks in advance, and place the Designated Bins at the locations at least 2 (two) days before actual date of commencement of Secondary Collection and Transportation services];

(x) procure, acquire and put into place at its own cost and expenses all the Project Assets and Project Facilities required by the Concessionaire to implement the Project during the Pre-COD Period so as to achieve COD within the time stipulated in this Agreement;

(y) promptly rectify and remedy any defects or deficiencies, at its own cost, if any pointed out by the Project Engineer in the Inspection Report and furnish a report within the stipulated time period in respect thereof to the Project Engineer;

(z) comply with all the performance parameters as specified in KPIs, set forth in Article 18;

(aa) to carry out all necessary test(s) and get the approvals as per Applicable Law and in conformity with Good Industry Practices, prior to achieving COD;

(bb) pay all taxes, duties and outgoings, including utility charges relating to the project;

(cc) handover/transfer the Sites and immovable Project Facilities to the Authority upon Termination of this Agreement, in accordance with the provisions thereof;

(dd) provide live GPS feed of movement of transportation vehicles, camera feeds at weighbridge of Site to the Project Engineer, as and when sought by the Project Engineer;

(ee) be responsible and indemnify the Authority/ / State Government for any accident due to negligence or otherwise in the performance of the project; and

(ff) submit compliance as required to environmental agency and shall provide all information related to project as would be required by the Project Engineer/ Authority/ State Government pursuant to any RTI query or any issue raised in State Assembly/ Parliament; and

5.2 Obligations relating to Project Agreements

5.2.1. It is expressly agreed that the Concessionaire shall, at all times, be responsible and liable for all its obligations under this Agreement. Notwithstanding anything contained in the Project Agreements or any other agreement, and no default under any Project Agreement or any other agreement shall excuse the Concessionaire from its obligations or liability hereunder.

5.2.2. Before finalisation, the Concessionaire shall submit to the Authority and the State Government the drafts of all Project Agreements and the operation and maintenance contract (if any) or any amendments or replacements thereto for its review and comments, and the Authority and the State Government shall have the right but not the obligation to undertake such review and provide its comments and observations, if any, to the Concessionaire. Concessionaire shall appropriately make amendments as per review/comments/observations and re-submit the same to the Authority and the State Government for its review. Within [7 (seven)] days of execution of any Project Agreement or amendment thereto, the Concessionaire shall submit to the Authority and the State Government a true copy thereof, duly attested by a Director of the Concessionaire, for its record. For avoidance of doubt, it is agreed that the review and comments/ observations by the Authority / State Government on any Project Agreement or failure or omission of the Authority / State Government to review and/ or comment hereunder shall not be construed or deemed as acceptance of any such agreement or document by the Authority/ State Government. No observation and/or review of the Authority/ State Government and/or its failure to review and/or convey its observations on any document shall relieve the Concessionaire of its obligations and/or liabilities under this Agreement in any manner whatsoever nor shall the Authority/ State Government be liable for the same in any manner whatsoever.

5.2.3. The Concessionaire shall not make any addition, replacement or amendments to any of the Financing Agreements without the prior written consent of the Authority/ State Government if such addition, replacement or amendment has, or may have, the effect of imposing or

increasing any financial liability or obligation on the Authority/ State Government, and in the event that any replacement or amendment is made without such consent, the Concessionaire shall not enforce such replacement or amendment nor permit enforcement thereof against the Authority/ State Government. For avoidance of doubt, the Authority / State Government acknowledges and agrees that it shall not unreasonably withhold its consent for restructuring or rescheduling of the debt of the Concessionaire.

5.2.4. Notwithstanding anything to the contrary contained in this Agreement, the Concessionaire shall not sub-lease, sub-license, assign or in any manner create an Encumbrance on any of the Project Assets as the case may be, without prior written approval of the Authority/ State Government, which approval the Authority may, in its discretion, deny if such sub-lease, sub-license, assignment or Encumbrance has or may have a Material Adverse Effect on the rights and obligations of the Authority/ State Government under this Agreement or Applicable Laws.

5.2.5. The Concessionaire shall procure that each of the Project Agreements contains provisions that entitle the Authority/ State Government to step into such agreement, in its sole discretion, in substitution of the Concessionaire in the event of Termination or Suspension (the "**Covenant**"). For the avoidance of doubt, it is expressly agreed that in the event the Authority/ State Government does not exercise such rights of substitution within a period not exceeding [90 (ninety)] days from the Termination Date, the Project Agreements shall be deemed to cease to be in force and effect on the Termination Date without any liability whatsoever on the Authority/ State Government and the Covenant shall expressly provide for such eventuality. The Concessionaire expressly agrees to include the Covenant in all its Project Agreements and undertakes that it shall, in respect of each of the Project Agreements, procure and deliver to the Authority/ State Government an acknowledgment and undertaking, in a form acceptable to the Authority/ State Government, from the counter party(ies) of each of the Project Agreements, where such counter party(ies) shall acknowledge and accept the Covenant and undertake to be bound by the same and not to seek any relief or remedy whatsoever from the Authority/ State Government in the event of Termination or Suspension.

5.3 No Breach of Obligations

The Concessionaire shall not be considered to be in breach of its obligations under this Agreement nor shall it incur or suffer any liability if and to the extent performance of any of its obligations under this Agreement is affected by or on account of any of the following:

(i) Force Majeure Event, subject to Article20;

(ii) Authority Event of Default;

(iii) State Government Event of Default;

(iv) Compliance with the instructions of the Project Engineer/ Authority/ State Government or the directions of any Government Agency other than instructions issued as a consequence of a breach by the Concessionaire of any of its obligations hereunder;

5.4 Concessionaire's Representative

To fulfill the Concessionaire's obligations and for implementation of the Project in

accordance with this Agreement, the Concessionaire shall deploy representative(s) (the "**Concessionaire Representative**") on its behalf including a team leader (the **"Team Leader"**). The Team Leader shall have full authority to act on behalf of the Concessionaire for all matters relating to this Agreement and shall be an overall in charge to ensure implementation of the project in accordance with the provisions hereof. The Team Leader shall closely co-ordinate with the Project Engineer/Authority/ State Government and shall be responsible to ensure redressal on an immediate basis, any objections, observations, shortcomings, defects or defaults pointed out by the Project Engineer during routine inspections and project review meetings and submit action take report to the Project Engineer/Authority/ State Government within a period not later than 7 (seven) days from the date of conveying of such defect/shortcoming. The Team Leader or its nominee shall make themselves available for meetings as and when called upon by the Project Engineer, the State Government and the Authority.

5.5 Sole purpose of the Concessionaire

The Concessionaire having been set up for the sole purpose of exercising the rights and observing and performing its obligations and liabilities under this Agreement, the Concessionaire or any of its subsidiaries shall not, except with the previous written consent of the Project Engineer/Authority/ State Government, be or become directly or indirectly engaged, concerned or interested in any business other than as envisaged herein.

5.6 Engagement of trained personnel

The Concessionaire shall ensure that the personnel engaged by it in the performance of its obligations under this Agreement are at all times properly skilled and trained for their respective functions.

5.7 Equity Lock-in requirements

The Concessionaire acknowledges that:

5.7.1. The Selected Bidder shall hold [100% (one hundred per cent)] shareholding in the paid-up Equity capital of the Concessionaire until expiration of [1 (one)] year from COD, [51% (fifty one per cent)] shareholding in the paid-up Equity capital until expiration of [10 (ten)] years from COD and thereafter [26% (twenty six per cent)] shareholding in the paid up equity capital during the remaining Concession Period.

Provided that in case the Selected Bidder is a Consortium of entities, then the lead member (the "**Lead Member**") of such Consortium and the member whose credentials were considered for prequalification for bid, shall have the majority equity share holding of the paid-up Equity capital of the Concessionaire and that all the members of the Consortium together shall hold [100% (one hundred per cent)] Equity capital of the Concessionaire, until expiry of [1 (one)]year from COD, [51% (fifty one percent)]shareholding in the paid-up Equity capital until expiration of [10 (ten)]years from COD and thereafter [26% (twenty six per cent)]shareholding in the paid-up Equity capital during the remaining Concession period.

Provided further that a member of the Consortium meeting either the Technical Capacity or the Financial Capacity shall subscribe at least 10% (ten per cent) of the paid-up and subscribed Equity of the SPV until the 2nd (second) anniversary of the COD for member meeting the Technical Capacity and until the 1st (first) anniversary of the COD for the member meeting the Financial Capacity.

5.7.2. Any violation in the shareholding pattern in the equity lock-in requirements would be treated as Concessionaire Event of Default.

5.7.3. **Exit from Consortium**

(a) Any Consortium member other than the Lead Member shall be allowed to exit the Consortium anytime during the Concession Period post-COD and the Lead Member will be allowed to replace/absorb the shares and responsibilities of other Consortium members, subject to approval from Authority and the State Government which will not be unreasonably withheld.

(b) Notwithstanding the provisions of Article 5.7.3(a) above, the member of the Consortium responsible for carrying out Bio-Remediation of Legacy Waste may be allowed to exit the Consortium before COD, subject to receipt of Completion Certificate from the Authority upon satisfactory completion of works.

5.8 Obligations relating to management of the Concessionaire

5.8.1. The Concessionaire shall not, without the prior written approval of the Authority and the State Government, undertake or cause to be undertaken, any action for all or any of the following or any matter incidental or consequential thereto:

(a) to alter or add to the provisions of the memorandum of association;

(b) to alter or add to the articles of association;

(c) to change the name of the Concessionaire;

(d) to reduce the share capital;

(e) to commence any new lines of business;

(f) to enter into any contract or agreement with a related party with respect to such related party's appointed to any office or place of profit in the company, its subsidiary company or associate company;

(g) to make inter-corporate-loans and investments or guarantee or security (except where such security or payment is to be made to the Authority) to be given, if the aggregate amount thereof, exceeds the limit of [30% (thirty per cent)] of the Concessionaire's paid-up share capital;

(h) to apply for corporate insolvency proceedings under the Insolvency and Bankruptcy Code, 2016;

(i) for various other matters pertaining to the winding up of the Concessionaire; and

(j) any other matter which is required by the Companies Act to be passed by a special resolution of the shareholders of the Concessionaire.

For the purposes of this clause, a "related party" shall have the meaning ascribed to it under the Companies Act, 2013.

5.9 EHS Standards and L&FS Standards

5.9.1. The Concessionaire shall at all times and throughout the Concession Period (designing, development, construction, operation and maintenance) comply with Applicable Laws including the relevant Environmental, Health and Safety (the "**EHS**") Rules and Regulations and life and fire safety Standards (the "**L&FS Standards**").

5.9.2. The Concessionaire shall prepare and comply with the performance standards, including an environmental and sustainability plan stating how the Concessionaire intends to manage and mitigate risks in relation to EHS. Such performance standards shall take into consideration the principles set out in:

(a) [National EHS regulations;

(b) Real Estate (Regulation and Development) Act, 2016;

(c) National Building Code of India published by BIS and other statutory BIS standards applicable to projects of similar nature; and

(d) L&FS Standards.][7]

5.10 Obligations relating to Taxes

The Concessionaire shall pay, at all times during the subsistence of this Agreement, all Taxes, levies, duties, cesses and all other statutory charges payable in respect of the Project. Provided, however, that all payments made by the Concessionaire with respect to GST levied on or in respect of any services provided by the Concessionaire to the Authority / State Government for and in respect of the Project shall be paid by the Authority / State Government upon receipt of particulars thereof.

5.11 Obligations relating to information

5.11.1. Without prejudice to the provisions of Applicable Laws, Applicable Permits and this Agreement, upon receiving a notice from the Authority/ State Government for any

[7]This list may be added to depending upon the specific laws of the state in which the Project is to be set up.

information that it may reasonably require or that it considers may be necessary to enable it to perform any of its functions, the Concessionaire shall provide such information to the Authority forthwith and in the manner and form required by the Authority/ State Government.

5.11.2. After receiving a notice from the Authority/ State Government for reasoned comments on the accuracy and text of any information relating to the Concessionaire's activities under or pursuant to this Agreement which the Authority/ State Government proposes to publish, the Concessionaire shall provide such comments to the Authority in the manner and form required by the Authority/ State Government.

5.12 Obligations relating to other charges

The Concessionaire shall make timely payments for all utility services in respect of the Sites, including water, sewage, electricity, telecommunication, internet and cable charges, etc.

ARTICLE 6
OBLIGATIONS OF THE AUTHORITY

6.1. General Obligations of the Authority

6.1.1. The Authority shall, at its own cost and expense, undertake, comply with and perform all its obligations set out in this Agreement.

6.1.2. Subject to and in accordance with the provisions of this Agreement and Applicable Laws, the Authority agrees to provide support to the Concessionaire and undertakes to observe, comply with and perform the following:

(a) identify and earmark / allocate parcel(s) of land, by itself, within or outside the Project Area for the purpose of setting up of Project Facilities including SLF, Processing Project Facility and decentralized units, etc., for scientific management of Solid Waste;

(b) primary collection, Transportation, Processing and Disposal of Solid Waste until the COD;[8]

(c) conduct an ariel survey using latest technology such as LIDAR to determine the indicative quantum and type of waste in the Legacy Waste Dumpsite and make this information available in the {Request for Qualification/Request for Proposal};

(d) upon written request from the Concessionaire, and subject to the Concessionaire complying with Applicable Laws, provide reasonable support and assistance to the Concessionaire in procuring Applicable Permits required from any Government Instrumentality for implementation and operation of the Project, subject to the Concessionaire submitting its applications complete in all respect in a timely manner. The Authority agrees and undertakes that it shall not unreasonably delay or withhold provision of any such reasonable support or assistance to the Concessionaire;

(e) upon written request from the Concessionaire, provide reasonable assistance to the Concessionaire in obtaining access to all necessary infrastructure facilities and utilities, including water and electricity at rates and on terms no less favourable to the Concessionaire than those generally available to commercial customers receiving substantially equivalent services;

(f) provide the Sites on leave and license basis free from Encumbrance to the Concessionaire and ensure that no barriers are erected or placed on or about the Sites by any Government Instrumentality or persons claiming through or under any Government Instrumentality, except for reasons of Safety Requirements, Emergency, national security, or law and order;

(g) not do or omit to do any act, deed or thing which may in any manner violate the provisions of this Agreement;

[8]Subject to Sub-Clauses 5.1.8 (w) and (x), the Authority and Concessionaire may arrive at a mutual agreement that during Trial Operation Period, the primary waste collection and transportation may be carried out by the Authority but processed and disposed by the Concessionaire.

(h) support, cooperate with and facilitate the Concessionaire in the implementation and operation of the Project in accordance with the provisions of this Agreement;

(i) upon written request from the Concessionaire, execute the Substitution Agreement;

(j) engage an independent monitoring and appraisal entity (Project Engineer) who shall monitor, supervise, and review Concessionaire's progress details/activities. The Concessionaire shall submit monthly reports to the Project Engineer regarding progress of the Project. The Project Engineer shall validate the data provided by the Concessionaire in monthly progress reports;

(k) undertake on its own or through the Project Engineer, the development and management of ICT(Information Communication and Technology) and IoT (Internet of Things) based infrastructure (including sensors and video analytics) for monitoring the project, including but not limited to, GPS tracking of vehicles, Sensor based weight measurement in transportation vehicles, electronic weigh bridges at Site, surveillance cameras at Sites, etc., and a central command centre for all waste management projects in [Name of the State];

(l) make timely payments as prescribed in Article 17;

(m) observe and comply with all obligations set forth in this Agreement, and any other Agreement to be executed with the Concessionaire;

(n) handover to the Concessionaire within [24 (twenty four) months] of the Execution Date, the existing infrastructure of Secondary Collection Points on an 'as is where is' basis, if any;

(o) facilitate in a timely manner all such approvals, permissions and authorisations which Concessionaire may require or is obliged to seek from them under this Agreement, in connection with implementation of the Project and the performance of its obligations. Provided where authorization for availing permits for utilities such as power, water, sewerage, telecommunications or any other incidental services/utilities is required, the same shall be provided by the Authority within [30 (thirty)] days from receipt of such request from the Concessionaire, subject to the conditions of the applications / details submitted being complete and correct.

(p) approve the Operational Plan within [a week] of its submission by the Concessionaire;

(q) maintain the Minimum Escrow Balance;

(r) collect user fee as for door-to-door collection of solid waste.

6.2. Obligations relating to refinancing

Without prejudice to any rights or remedies of the Authority under this Agreement or otherwise, upon request made by the Concessionaire to this effect, the Authority shall, in

conformity with any regulations or guidelines that may be notified by the Government Instrumentality, permit and enable the Concessionaire to secure refinancing on such terms as may be agreed upon between the Concessionaire and the entity providing such refinancing; [provided, however, that the refinancing hereunder shall always be subject to the prior consent of the Authority, which consent shall not be unreasonably withheld. The Authority shall endeavor to convey its decision on such request of the Concessionaire within [30 (thirty)] days of receipt of the proposal by the Authority.][9] For the avoidance of doubt, the tenure of debt refinanced hereunder may be determined mutually between the Senior Lenders and the Concessionaire, but the repayment thereof shall be completed no later than 1 (one) year prior to expiry of the Concession Period.

[9] Alternately, a metric may be developed to serve the objective of refinancing based on net present value and/or internal rate of return, etc. E.g., a) If the interest rates offered may be reduced by say 2% points from the base case or b) Tenure is increased by say 2 years or c) If the new offer from a lender improves the base case financial model/ projections resulting in an NPV increase of say Rs. 20 Cr.

ARTICLE 7
REPRESENTATIONS, WARRANTIES AND UNDERTAKINGS

7.1. Representations and Warranties of the Parties

Each Party represents and warrants to the others that:

(a) It is duly organized, validly existing and in good standing under the laws of India;

(b) It has full power and authority to execute, deliver and perform its obligations underthisAgreementandtocarryoutthetransactionscontemplatedhereby;

(c) It has taken all necessary corporate and other action under Applicable Laws and its constitutional documents to authorize the execution, delivery and performance of this Agreement;

(d) It has the financial standing and capacity to undertake the Project;

(e) This Agreement constitutes its legal, valid and binding obligation fully enforceable against it in accordance with the terms hereof;

(f) It is subject to civil and commercial laws of India with respect to this Agreement and it hereby expressly and irrevocably waives any immunity in any jurisdiction in respect thereof; and

(g) It shall have an obligation to disclose to the other Party as and when any of its representations and warranties ceases to be true and valid.

7.2. Representations and Warranties of the Concessionaire

The Concessionaire represents and warrants to the Authority and the State Government that:

(a) it is duly organised and validly existing under the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;

(b) it has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby;

(c) it has taken all necessary corporate and other actions under Applicable Laws to authorise the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;

(d) it has the financial standing and capacity to undertake the Project in accordance with the terms of this Agreement;

(e) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement shall be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;

(f) all undertakings and obligations of the Concessionaire arising from the {RFP/RFQ} or otherwise shall be binding on the Concessionaire as if they form part of this Agreement;

(g) it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;

(h) the information furnished in the Bid and as updated on or before the Execution Date is true and accurate in all respects as on the Execution Date;

(i) the execution, delivery and performance of this Agreement shall not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its memorandum and articles of association or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;

(j) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial, Government Instrumentality or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;

(k) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Instrumentality which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;

(l) it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a Material Adverse Effect on its ability to perform its obligations under this Agreement;

(m) the SPV is duly organised and validly existing under the laws of the jurisdiction of its incorporation, and has requested the Authority to enter into this Agreement pursuant to the Letter of Award, and has agreed to and unconditionally accepted the terms and conditions set forth in this Agreement;

(n) all its rights and interests in the Project shall pass to and vest in the Authority on the Termination Date free and clear of all liens, claims and Encumbrances without any further act or deed on its part or that of the Authority, and that none of the Project Assets shall be acquired by it Subject to any agreement under which a security interest or other lien or Encumbrance is retained by any person, save and except as expressly provided in this Agreement;

(o) no representation or warranty given by it contained herein or in any other document furnished by it to the Authority or the State Government, including the Bid or to any Government Instrumentality in relation to Applicable Permits contains or shall contain any untrue or misleading statement of material fact or omits or shall omit to state a material fact necessary to make such representation or warranty not misleading;

(p) no sums, in cash or kind, have been paid or shall be paid, by it or on its behalf, to any person by way of fees, commission or otherwise for securing the Concession or entering into this Agreement or for influencing or attempting to influence any officer or employee of the Authority in connection therewith;

(q) all information provided by the Concessionaire in response to the {Request for Proposals/Qualification} or otherwise, is to the best of its knowledge and belief, true and accurate in all material respects;

(r) agree that the execution, delivery and performance by it of this Agreement and all other agreements, contracts, documents and writings relating to this Agreement constitute private and commercial acts and not public or government acts;

(s) consents generally in respect of the enforcement of any judgment against it in any proceedings in any jurisdiction to the giving of any relief or the issue of any process in connection with such proceedings; and

(t) the Concessionaire shall not venture into or continue any business which is in direct or indirect competition with the Project. In the event the Concessionaire engages in such activities, the same shall constitute a fundamental breach of this Agreement by the Concessionaire;

(u) all undertakings and obligations of the Concessionaire arising from the {Request for Proposals/Qualification} or otherwise shall be binding on the Concessionaire as if they form part of this Agreement

(v) further representations as may be added depending on the specific circumstances of the Concessionaire.

7.3. Representations and Warranties of the Authority

The Authority represents and warrants to the Concessionaire that:

(a) it has full power and authority to execute, deliver and perform its obligations under this Agreement and to carry out the transactions contemplated herein and that it has taken all actions necessary to execute this Agreement, exercise the rights and perform the obligations specified under this Agreement on behalf of the Authority.

(b) it has taken all necessary actions under the Applicable Laws to authorize the execution, delivery and performance of this Agreement.

(c) it has the financial standing and capacity to perform its obligations under this Agreement.

(d) this Agreement constitutes a legal, valid and binding obligation enforceable against it in accordance with the terms hereof.

(e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on the Authority's ability to perform its obligations under this Agreement;

7.4. Representations and Warranties of the State Government

The State Government represents and warrants to the Concessionaire and the Authority that:

(a) it has the financial standing and legal capacity to execute this Agreement and perform its obligations under this Agreement;

(b) it has taken all necessary approvals to execute this Agreement and perform its obligations under this Agreement;

(c) this Agreement constitutes legal, valid and binding obligations enforceable against it in accordance with the terms hereof; and

(d) it has complied with all Applicable Laws and Applicable Permits in all material respects.

7.5. Disclosure

(a) In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately notify the other Party of it. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any right, remedy or obligation of a Party under this Agreement.

(b) Neither the Authority nor any of its agents or employees shall be liable to the Concessionaire in contract, tort, including negligence or breach of statutory duty, statute or otherwise as a result of:

(i) any inaccuracy, omission, unfitness for any purpose of inadequacy of any kind whatsoever in the data disclosed by the Authority to the Concessionaire in relation to the Project; and/or

(ii) any failure to make available to the Concessionaire any materials, documents, drawings, plans or other information relating to the Project.

ARTICLE 8

DISCLAIMER

8.1. The Concessionaire acknowledges that prior to the execution of this Agreement, the Concessionaire has, after a complete and careful examination, made an independent evaluation of the Request for Proposals, Scope of the Project, Specifications and Standards, Site, existing structures, local conditions, physical qualities of ground, subsoil and geology, and all information provided by the Authority/ State Government or obtained procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. The Authority/ State Government makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability or completeness of any assessment, assumption, statement or information provided by it and the Concessionaire confirms that it shall have no claim whatsoever against the Authority/ State Government in this regard.

8.2. The Concessionaire acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Article 8.1 above and hereby acknowledges and agrees that the Authority/ State Government shall not be liable for the same in any manner whatsoever to the Concessionaire, Associates or any person claiming through or under any of them.

8.3. The Parties agree that any mistake or error in or relating to any of the matters set forth in Article 8.1 above shall not vitiate this Agreement or render it voidable.

8.4. In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Article 8.1 above, that Party shall immediately notify the other Party, specifying the mistake or error; provided, however, that a failure on part of the Authority/ State Government to give any notice pursuant to this Article 8.4 shall not prejudice the disclaimer of the Authority/ State Government contained in Article 8.1 and shall not in any manner shift to the Authority any risks assumed by the Concessionaire pursuant to this Agreement.

8.5. The Concessionaire accepts that it is solely responsible for the verification of any design, data, documents or information provided by the Authority/ State Government, any Government Authority or their consultants and advisors to the Concessionaire and that it shall accept and act thereon at its own cost and risk.

8.6. The Concessionaire shall be solely responsible for the contents, adequacy and correctness of the design, data, drawings and detailed engineering prepared or procured by the Concessionaire for implementing the Project.

ARTICLE 9
PERFORMANCE SECURITIES AND MOBILIZATION ADVANCE GUARANTEES

9.1. Performance Security

9.1.1. The Concessionaire shall for the due and punctual performance of its obligations hereunder relating to the Project simultaneously with the execution of this Agreement, furnish an unconditional and irrevocable bank guarantee, in favor of the State Government and the Authority, in the form as set out in **Schedule 6**[10], (the **"Performance Security"**) for a sum of Rs. [•] (Rupees [•]) or corresponding to [9% (nine per cent)] of the Bid Project Cost till receipt of Completion Certificate of reclaimed land post Bio-remediation of Legacy Waste. A fresh bank guarantee of will issued one month before construction of Processing facilities and valid until COD. Post-COD, the Performance Security shall be reduced to [25% (twenty five per cent)] to Rs. [•] (Rupees [•]) till the end of Concession Period or till the Termination Date, as the case may be.

9.1.2. The Performance Security or the amount retained by the State Government or the Authority as cash security shall be returned after the expiry of 30 (thirty) days from the COD, unless this Agreement is terminated earlier, in which case the Performance Security will be returned within 30 (thirty) days from the date of termination, subject to the State Government's or the Authority's right to receive any amounts from the Concessionaire under this Agreement.

9.1.3. The Performance Security shall secure the due performance of all the Concessionaire's obligations during the Construction Period.

9.2. ESHS Performance Security

9.2.1. The Concessionaire shall have submitted to the State Government and the Authority, prior to the Execution Date an unconditional and irrevocable bank guarantee for an amount equal to Rs. [•] (Rupees [•]), corresponding to [1% (one per cent)] of the Bid Project Cost (the **"ESHS Performance Security"**).

9.2.2. The ESHS Performance Security shall be valid until the Termination of the Agreement. The ESHS Performance Security shall have an initial validity period till COD, which must thereafter be renewed on a year-on-year basis, before the expiry of the 11th (eleventh) month of the relevant year, until the expiry of the O&M Period. If any of the ESHS Performance Security is not renewed by the expiry of the 11th (eleventh) month of the relevant year, then the State Government or the Authority shall be entitled to drawdown the total amount available under the ESHS Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the ESHS Performance Security.

9.2.3. The ESHS Performance Security shall secure the due performance of the Concessionaire's ESHS obligations during the Construction Period and the O&M Period, as set out in the approved ESHS Documents.

[10] Same format may be used for ESHS Performance Security and O&M Security and Technology Performance Security, if any.

9.3. O&M Security

9.3.1. As Condition Precedent to the COD, within 60 (sixty) days of the Construction Completion Date, or 30 (thirty) days before COD, whichever is earlier, the Concessionaire shall furnish an unconditional and irrevocable bank guarantee to the State Government and the Authority, for an amount equal to Rs. [•] (Rupees [•]), corresponding to [4% (four per cent)] of the Bid Project Cost (the **"O&M Security"**).

9.3.2. The Concessionaire shall furnish the O&M Security in the same format as provided for the Performance Security in the RFP, with necessary modifications. The Concessionaire shall maintain the O&M Security in full force and effect until the expiry of the O&M Period. The O&M Security shall have an initial validity period of 1 (one) year, which must be renewed on a year-on-year basis, before the expiry of the 11th (eleventh) month of the relevant year, until the Termination of the Concession Agreement.

9.3.3. The O&M Security shall secure the due performance of all the Concessionaire's obligations during the O&M Period.

9.4. Extension of Performance Securities

9.4.1. If the Performance Security is scheduled to expire before the COD, then the Concessionaire shall arrange for an extension of the Performance Security at least 30 (thirty) days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, the State Government and the Authority shall be entitled to drawdown the total amount available under the Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the Performance Security, that is scheduled to expire.

9.4.2. If the ESHS Performance Security is scheduled to expire before the expiry of the O&M Period, the Concessionaire shall replace or arrange for an extension of the ESHS Performance Security at least 30(thirty) days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, the State Government and the Authority shall be entitled to drawdown the total amount available under the ESHS Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the ESHS Performance Security.

9.4.3. If any O&M Security is not renewed by the expiry of the 11th (eleventh) month of the relevant year of the O&M Period, then the State Government and the Authority shall be entitled to drawdown the total amount available under the O&M Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the O&M Security.

9.5. Encashment of Performance Securities by the State Government and the Authority

9.5.1. The decision of the State Government or the Authority as to any breach/ delay having been committed, liability accrued or loss or damage caused or suffered shall be conclusive, absolute and binding on the Concessionaire and the Concessionaire specifically confirms and agrees that no proof of any amount of liability accrued or loss or damages caused or suffered

by the State Government or the Authority under this Concession Agreement is required to be provided in connection with any demand made by the State Government or the Authority to recover such compensation through appropriation of the relevant amounts from the Performance Security/O&M Security/ESHS Performance Security under this Agreement.

9.5.2. In the event of encashment of the Performance Security/O&M Security/ESHS Performance Security by the State Government or the Authority, in full or part, the Concessionaire shall within 15 (fifteen) days of receipt of the encashment notice from the State Government or the Authority provide a fresh Performance Security/O&M Security/ESHS Performance Security or replenish (in case of partial appropriation) the existing Performance Security, as the case may be. The provisions of this Article shall apply *mutatis mutandis* to such fresh Performance Security/O&M Security/ESHS Performance Security. The Concessionaire's failure to comply with this provision shall constitute a default or breach of the Concession Agreement by the Concessionaire, which shall entitle the State Government and the Authority to terminate this Concession Agreement in accordance with the provisions hereof.

Provided that if the Agreement is terminated due to any event other than a Concessionaire Event of Default, the Performance Security if subsisting as of the Termination Date shall subject to the State Government's and the Authority's right to receive amounts, if any, due from the Concessionaire under this Agreement, be duly discharged and released to the Concessionaire.

9.6. Utilization of retained amount

9.6.1. The State Government and the Authority shall be entitled to utilize the retained amount in the same manner as it would utilise the Performance Security, the ESHS Performance Security or the O&M Security, as the case may be.

(a) Upon receipt of a renewed or replacement Performance Security within 30 (thirty) days of the COD or expiry / termination of the Agreement, the State Government or the Authority shall return the unutilized cash security amount for the Performance Security to the Concessionaire.

(b) Upon receipt of a renewed or replacement ESHS Performance Security within 30 (thirty) days of the expiry / termination of the Term, the State Government or the Authority shall return the unutilized cash security amount for the ESHS Performance Security to the Concessionaire.

(c) Upon receipt of a renewed or replacement O&M Security within 30 (thirty) days of the expiry / termination of the O&M Period, the State Government or the Authority shall return the unutilized cash security amount for the O&M Security to the Concessionaire.

(d) The interest earned on any retained amounts on cash security shall be the property of the State Government and the Authority and the State Government or the Authority shall not be required to account to the Concessionaire for any such interest.

9.6.2. The State Government and the Authority shall have the right to draw on the Performance Securities and claim up to the amount guaranteed upon the Concessionaire's failure to satisfy

any Condition Precedent or honour any of its obligations, responsibilities or commitments during the Construction Period, or any amount due and payable by the Concessionaire to the State Government or the Authority (including any Delay Liquidated Damages), in accordance with this Agreement.

9.6.3. The State Government and the Authority shall have the right to draw on the O&M Securities and claim up to the amount guaranteed upon the Concessionaire's failure to honour any of its obligations, responsibilities or commitments during the O&M Period, or any amount due and payable by the Concessionaire to the State Government or the Authority (including any Availability Liquidated Damages), in accordance with this Agreement.

9.6.4. Without prejudice to its right to draw on the Performance Securities or, as the case may be, the O&M Securities, the State Government and the Authority shall have the right to draw on the ESHS Performance Securities and claim up to the amount guaranteed upon the Concessionaire's failure to honour any of its ESHS related obligations, responsibilities or commitments during the Construction Period or the O&M Period, as set out in the approved ESHS Documents, in accordance with this Agreement.

9.6.5. Bank Guarantees would not be released in case of breach by the Concessionaire of any of the terms of the Agreement.

9.7. Cost to be borne by Concessionaire

The cost of procuring the Performance Security, the ESHS Performance Security and the O&M Security shall be borne solely by the Concessionaire.

9.8. Demand under Performance Securities

9.8.1. The State Government or the Authority shall not be required to give any prior notice to the Concessionaire of its intention to make a demand under the Performance Securities, the ESHS Performance Securities or the O&M Securities, as the case may be. However, the State Government and the Authority shall provide the Concessionaire with a copy of any demand notice issued by them under the Performance Securities, the ESHS Performance Securities or the O&M Securities, simultaneously with the issuance of the demand notice to the Scheduled Bank that has issued the relevant Performance Security, ESHS Performance Security or the O&M Security.

9.8.2. If the State Government or the Authority makes a demand under any Performance Security and/or ESHS Performance Security and/or O&M Security, in part or in full, the Concessionaire shall immediately and in no event later than 15 (fifteen) days of such demand, restore the value of such Performance Security, ESHS Performance Security or O&M Security to the amount stated in Sub-Clauses 9.1.1, 9.2.1 and 9.3.1.

9.9. Release of Performance Security by the State Government and the Authority

9.9.1. Within 30 (thirty) days from the COD or the termination of this Agreement, whichever is earlier, the Performance Securities or, as the case may be, the amount retained by the State Government or the Authority as cash security, shall be released to the Concessionaire after the

expiry of 30 (thirty) days from the COD or termination of this Agreement, subject to the State Government's and the Authority's right to receive any amounts from the Concessionaire before or upon COD or Transfer Date.

9.9.2. Upon the expiry of the O&M Period or the termination of this Agreement, whichever is earlier, the O&M Securities, the ESHS Performance Securities or, as the case may be, the amount retained by the State Government or the Authority as cash security, shall be released to the Concessionaire after the expiry of 30 (thirty) days from the Termination of this Agreement, subject to the State Government's and the Authority's right to receive any amounts from the Concessionaire before or upon Transfer Date.

9.10. Mobilization Advance Guarantee

9.10.1. Within 30 (thirty) days of the Compliance Date, the Concessionaire shall submit to the State Government and the Authority: (i) an unconditional and irrevocable bank guarantee for an amount equal to 110% (one hundred and ten per cent) of the Mobilization Advance for the Project Facilities in the form set out at **Schedule 7** (the **"Mobilization Advance Guarantee"**); and the Mobilization Advance Guarantee shall secure the Mobilization Advance paid to the Concessionaire in accordance with Article 17. The cost of procuring the Mobilization Advance Guarantees shall be borne solely by the Concessionaire.

9.10.2. The Mobilization Advance Guarantee shall remain valid until the entire Mobilization Advance secured by such Mobilization Advance Guarantee has been adjusted against the Construction Payments. However, the Concessionaire may, at its discretion, progressively reduce the value of the relevant Mobilization Advance Guarantee by the amount of the Mobilization Advance adjusted against each of the 5 (five) installments of the Construction Payments, in accordance with Article 17. For this purpose, the Concessionaire shall be required to furnish a replacement Mobilization Advance Guarantee of the reduced amount within 15 (fifteen) days of receipt of a Payment Certificate from the Authority on successful completion of the relevant Payment Milestone. The State Government and/or the Authority shall return the relevant existing Mobilization Advance Guarantee upon receipt of a replacement Mobilization Advance Guarantee from the Concessionaire.

9.10.3. If any Mobilization Advance Guarantee is scheduled to expire before the entire Mobilization Advance has been adjusted, then the Concessionaire shall arrange for an extension of the relevant Mobilization Advance Guarantee at least 30 (thirty) days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, the State Government and the Authority shall be entitled to drawdown the total amount available under such Mobilization Advance Guarantee and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the Mobilization Advance Guarantee.

9.10.4. The State Government and the Authority shall be entitled to utilize such retained amount in the same manner as it would utilize the Mobilization Advance Guarantee. Upon receipt of an extension or replacement Mobilization Advance Guarantee or on adjustment of the entire Mobilization Advance, the State Government and/or the Authority shall return the unutilized cash security amount to the Concessionaire.

9.10.5. The interest earned on any retained amounts or cash security shall be the property of the State Government and the Authority and the State Government or the Authority shall not be required to account to the Concessionaire for any such interest.

9.10.6. The State Government and the Authority shall have the right to draw on the Mobilization Advance Guarantees in the event of the inadequate adjustment of the Mobilization Advance in accordance with Article 17, prior to the Construction Completion Date.

9.10.7. The State Government or the Authority shall not be required to give any prior notice to the Concessionaire of its intention to make a demand under any Mobilization Advance Guarantee. However, the State Government and the Authority shall provide the Concessionaire with a copy of any demand notice issued by the State Government or the Authority under a Mobilization Advance Guarantee, simultaneously with the issuance of the demand notice to the Scheduled Bank that has issued the Mobilization Advance Guarantee.

9.11. [Technology Performance Security

In accordance with Article 14.2.1 (e) (iv), the Concessionaire shall have submitted to the State Government and the Authority, prior to the Execution Date, an unconditional and irrevocable bank guarantee to the Authority, issued by the technology provider, for an amount equal to INR [_____] (Rupees [_____]), corresponding to 5% (five per cent) of the aggregate Bid Project Cost (the "**Technology Performance Security**")][11]

9.12. Additional Performance Security

In the event of the Selected Bidder having submitted Additional Performance Security in accordance with the RFP document, then such Additional Performance Security shall be in force till the end of Construction period if the Bid Project Cost is found to be unreasonable, and till the end of the Concession Period if O&M Charges are found to be unreasonable. Notwithstanding anything contained herein, the Additional Performance Security shall be liable to be forfeited either fully or partially by the State Government or the Authority as it deems fit for the reasons mentioned in Article 24 of the Concession Agreement. The Additional Performance Security for the unreasonable Bid Project cost shall be returned 30 (thirty) days after COD and the Additional Performance Security for O&M Charges shall be returned at the end of Concession Period.

[11]To be deleted if not applicable

ARTICLE 10
THE SITES

10.1. The Sites

10.1.1. The Sites of the Project Facilities shall comprise of the land as described in **Schedule 8**, and in respect of which the Rights of Way shall be provided and granted by the Authority to the Concessionaire on a leave and license basis under and in accordance with this Agreement (the "**Sites**").

10.1.2. The Sites would include (but not limited to) land for setting up of Project Facilities relating to Bio-Remediation of Legacy Waste (at the Municipal Landfill/Dumpsite), Processing and Material Recovery Project Facility (at the reclaimed Municipal Landfill/Dumpsite), decentralized units for Processing of Organic Waste, Secondary Collection Points, etc.

10.1.3. Without prejudice and subject to the Agreement, the ownership of the Project except Sites, including all improvements made therein by the Concessionaire, during the Concession Period, shall at all times remain with the Concessionaire.

10.2. Grant of License over the Site

10.2.1. Authority shall grant the Concessionaire a license over the Site along with all necessary Rights of Way, to enter upon, access and occupy the Sites, free of all Encumbrances in accordance with this Article 10, Applicable Laws, and Applicable Permits. The license granted to the Concessionaire shall include the exclusive right to:

(a) design, construct, commission, operate and maintain during the O&M Period, the Project Facilities necessary for implementation of the Project at various Sites, in accordance with the SWM Rules, Legacy Waste Guidelines and other Applicable Laws;

(b) install, operate, use, maintain, and remove such equipment, devices or other structures and improvements on, over, or under the Sites, as may be necessary or appropriate for the operations and activities required or permitted under this Agreement;

(c) use Access Roads, gates, fences and utilities at or about the Sites;

(d) construct, use, operate, maintain, replace and repair electric lines, telecommunication lines, water supply networks and other utilities required to undertake the Project at the Sites.

10.2.2. On and from the Compliance Date and subject to the provisions of this Agreement, Authority shall grant the Concessionaire: (i) license over the Sites including the exclusive right to occupy and use the Sites to construct the Project Facilities; and (ii) all necessary Rights of Way to the Sites. Any charges payable for obtaining the Right of Way will be paid directly by Authority.

10.2.3. Authority shall provide the Site to the Concessionaire free of Encumbrances and

encroachments as a Condition Precedent. If the Concessionaire discovers any hazardous substances at the time of handover of the Site by Authority, Authority will remove such hazardous substances at its own cost and expense. The Concessionaire's acceptance of the Sites at the time of Authority's handover/giving access to the Sites shall be deemed to be unconditional acceptance and that there were no hazardous substance or any possible form of obstruction to the project at the time of handover of Sites and concessionaire shall be barred from raising any such issues, whatsoever, after the handover or having access to the Sites.

10.2.4. The Concessionaire shall not without the prior written consent or approval of Authority use the Sites for any purpose other than to undertake the Project and purposes incidental thereto, as permitted under this Agreement or as may be otherwise approved by Authority.

10.2.5. The full ownership and title over the Sites shall vest with Authority for the entire Concession Period.

10.2.6. Authority warrants that the Concessionaire shall, subject to complying with the terms and conditions of this Agreement, occupy the Sites, from such time that access is granted to the Concessionaire and until the expiry of the Concession Period or early termination of this Agreement. If the Concessionaire is obstructed by any Person claiming any right, title or interest in or over the Sites or any part thereof or in the event of any enforcement action including any attachment, distraint, appointment of receiver or liquidator being initiated by any Person claiming to have a charge on the Site or any part thereof, Authority shall, if called upon by the Concessionaire, defend such claims and proceedings.

10.2.7. Subject to any substitution rights exercised by the Lenders, the license granted by Authority shall automatically terminate upon termination of this Agreement or expiry of the Concession Period.

10.2.8. The Concessionaire hereby irrevocably appoints the Authority (or its nominee) to be its true and lawful attorney, to execute and sign in the name of the Concessionaire a transfer or surrender of the rights granted hereunder at any time after the Concession Period has expired or has been Terminated in terms hereof, whichever is earlier, a sufficient proof of which shall be the declaration of any duly authorised officer of the Authority, and the Concessionaire consents to it being registered for this purpose.

10.2.9. Termination of the Agreement shall automatically terminate the license granted over the Sites.

10.3. Site Data and Verification

10.3.1. Authority has made available to the Concessionaire, the layout plans, ariel survey of the Legacy Waste Dumpsite, load flow studies and all other relevant data, studies and reports in Authority's possession in connection with the Sites.

10.3.2. The Concessionaire shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the implementation of the Project at the Sites.

10.3.3. The Concessionaire shall also be deemed to have inspected and examined the Site and its

surroundings, analysed and verified the accuracy and reliability of the studies, reports and data provided by Authority and any other information available with respect to the Sites and to have satisfied itself as to all the relevant matters including:

(a) the nature of the Site, including the subsurface, hydrological, climatic and general physical conditions of the Site;

(b) the suitability of the Site for undertaking the construction and operation of the Project;

(c) the condition of the utilities available till the battery limits of the Sites;

(d) the extent, nature and availability of labour, material, transport, accommodation, storage facilities and other facilities and resources necessary to undertake the Project;

(e) the nature of design, construction work and O&M services necessary for the performance of its obligations under this Agreement;

(f) Applicable Laws and Applicable Permits required to be obtained and maintained to undertake the Project;

(g) the risk of injury or damage to Adjoining Property and to the occupiers of such property or any other risk;

(h) the suitability and adequacy of any access roads to the Sites and other utilities and facilities to be provided by the relevant Government Authority; and

(i) all other matters that may affect the performance of its obligations under this Agreement.

Subject to Clause 10.3, the Concessionaire acknowledges and agrees that if any error or discrepancy is subsequently discovered in the data made available by Authority, then the Authority and the Concessionaire may mutually arrive at a decision regarding any extension of the Scheduled Payment Milestone Completion Date, the Scheduled Construction Completion Date and/or compensation for additional costs incurred caused due to such error or discrepancy. Provided that the Concessionaire shall not be entitled to any extension as mentioned above, nor shall it be open to the Concessionaire to justify any default or delay on the ground of the Concessionaire having not visited or acquainted itself with the Sites and Sites' conditions in any manner whatsoever. Further, any misinterpretation of the data, studies and reports provided by Authority shall not relieve the Concessionaire from the performance of its obligations under this Agreement on the ground that it could not reasonably be expected to have foreseen any of the matters listed in Clause 10.3.3 above, which affect or may affect the Project or the performance of any of its obligations under this Agreement.

10.4. [Unforeseen Site Conditions

Without prejudice to Clause 10.3 above, if during the execution of the Project, the Concessionaire encounters any adverse physical conditions, which could not have been

reasonably foreseen by acting in accordance with Good Industry Practices, the Concessionaire may seek a Variation in accordance with Article 28. Upon receipt of a request for a Variation due to unforeseen Site conditions, if, in the opinion and sole discretion of Authority, such conditions could not have been reasonably foreseen by a prudent developer acting in accordance with Good Industry Practices, then Authority shall issue a Variation Order in accordance with Article 28. Any decision of Authority regarding the existence of any unforeseen Site conditions shall be final and binding.]

10.5. Site Related Covenants

10.5.1. The Concessionaire agrees and undertakes that:

(a) the Concessionaire shall not transfer, alienate, assign, dispose of, sub-license or create any Security over any part of the Site or its rights and interest in the Site, other than as specifically permitted under this Agreement;

(b) the Concessionaire shall not allow any encroachment on, or unauthorized occupation of any part of the Site and in the event of any encroachment or unauthorized occupation, the Concessionaire shall immediately cause such encroachment or any unauthorized occupants to be removed from the Site. The Concessionaire shall not be entitled to any extension of time or costs incurred in removal of any encroachment or any unauthorized occupants from the Site;

(c) the grant of any rights to a Sub-Contractor or any other third party shall not interfere with or hinder the performance of the Concessionaire's obligations under this Agreement;

(d) the Concessionaire shall be wholly responsible for safety at and security of the Sites and the Project Facilities developed;

(e) the Concessionaire shall take all necessary measures to confine its operations, personnel and equipment to the Site and not encroach on any Adjoining Property;

(f) all minerals, fossils, articles of value or antiquity, structures and other remains or things of geological or archaeological interest and other objects with historic, antique or monetary value discovered at, on or under any of the Sites shall be dealt with in accordance with Applicable Laws and the Concessionaire shall take all necessary precautions to prevent its or its Sub-Contractor's personnel from removing or damaging any such article or thing. Further, immediately upon the discovery of any such article or thing of value, the Concessionaire shall inform Authority of such discovery and carry out the instructions of Authority in this regard;

(g) the Concessionaire shall make good any damage to any roads, footpaths, conduits, and other works on any Adjoining Property, which is caused by the Concessionaire or the Concessionaire Related Parties;

(h) the Concessionaire shall not to do or permit to be done anything which might:

(i) cause destruction, scarring or defacing of natural surroundings in the vicinity of the Site;
(ii) be or become a danger or nuisance or give rise to liability in tort to any owners or occupiers of the Adjoining Property or to members of the public; or
(iii) cause any contamination or damage to any Adjoining Property,

and the Concessionaire shall, at its own expense, take all reasonable measures and precautions to avoid any such danger, nuisance, tort, damage or interference and shall make good any damage so caused.

If the construction works and/or the O&M services cannot be carried out without interfering with the rights of the owner or occupier of any Adjoining Property, the Concessionaire shall promptly and at its own cost obtain all necessary third party consents and/or the approval of the concerned Government Authority(ies) to undertake such construction works and/or the O&M services. Authority shall provide all assistance to the Concessionaire for procuring such approvals.

(i) The Concessionaire shall not sub-license whole or any part of the Sites.

(j) The Concessionaire shall obtain and maintain the Applicable Permits in such sequence as is consistent with the requirements of the Project. The Concessionaire shall be responsible and shall be in compliance with the terms and conditions subject to which Applicable Permits have been issued.

(k) During the Concession Period, the Concessionaire shall protect the Sites from any and all occupations, encroachments or Encumbrances, and shall not place or create nor permit any Contractor or other person claiming through or under the Concessionaire to place or create any Encumbrance or security interest over all or any part of the Sites or the Project Facilities, or on any rights of the Concessionaire therein or under this Agreement, save and except as otherwise expressly set forth in this Agreement.

(l) The Concessionaire may landscape and develop the Sites and regulate the use thereof in accordance with the Good Industry Practice and in conformity with the provisions of this Agreement.

10.6. Access to State Government Related Parties and Authority Related Parties

10.6.1. The Concessionaire shall ensure that the State Government Related Parties, and the Authority Related Parties have access to the Sites and the license granted to the Concessionaire over the Site shall always be subject to:

(a) the rights of Authority, Authority's Representative, State Government's Representative, the Project Engineer, and other Authority Related Parties or State Government Related Parties to enter upon and access the Site to inspect and monitor the progress of the Project, and for the exercise of their rights and the performance of their obligations under this Agreement, provided that Authority and State Government shall ensure that the exercise of the inspection or monitoring rights do not impede or obstruct the construction and/or operation of the Project in any manner whatsoever; and

(b) the rights of the utility providers to enter upon and access the Sites for laying or installing telegraph lines, electric lines or for any other public purpose.

If any physical damage is caused to the Sites or the Project Facilities as a result of such access and use of the Sites by Authority, Authority's Representative, State Government Representative, the Project Engineer, and other Authority Related Parties or State Government Related Parties then the Authority or the State Government shall bear the costs of remedying such damage and restoring the Sites and the Project Facilities.

10.7. Sites to be free from Encumbrances

The Sites shall be made available by the Authority to the Concessionaire pursuant hereto free from all Encumbrances and occupations and without the Concessionaire being required to make any payment to the Authority on account of any costs, compensation, expenses and charges for the acquisition and use of such Sites for the duration of the Concession Period, except insofar as otherwise expressly provided in this Agreement. For avoidance of doubt, it is agreed that existing Rights of Way, easements, privileges, liberties and appurtenances to the Sites shall not be deemed to be Encumbrances. It is further agreed that the Concessionaire accepts and undertakes to bear any and all risks arising out of the inadequacy or physical condition of the Sites.

ARTICLE 11
UTILITIES AND ASSOCIATED ROADS

11.1. Existing utilities and roads

Notwithstanding anything to the contrary contained herein, the Concessionaire shall ensure that the Government Instrumentalities owning the existing roads, Right of Way or utilities, on, under or above the Site are enabled by it to keep such utilities in continuous satisfactory use, if necessary, by providing suitable temporary or permanent diversions with the authority of the relevant Government Instrumentality. Further, the Authority shall, upon written request from the Concessionaire, initiate and undertake at the Concessionaire's cost, legal proceedings for acquisition of any Right of Way necessary for such diversion.

11.2. Shifting of obstructing utilities

The Concessionaire shall, subject to Applicable Laws, provisions of Applicable Permits and with the assistance of the Authority, undertake shifting of any utility, including electric lines, water pipes and telephone cables, to an appropriate location or alignment within or outside the Site, if and only if such utility causes or shall cause a Material Adverse Effect on the construction, operation or maintenance of Project. The cost of such shifting shall be borne by the Concessionaire, and in the event of any delay in shifting thereof, the Concessionaire shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay on the part of the entity owning such electric lines, water pipes or telephone cables, as the case may be.

11.3. Felling of Trees

The Authority and the State Government shall assist the Concessionaire in procuring the Applicable Permits for felling of trees to be identified by the Concessionaire for this purpose if and only if such trees cause a Material Adverse Effect on the construction, operation or maintenance of the Project. In the event of any delay in felling thereof for reasons beyond the control of the Concessionaire, it shall in the sole discretion of the Authority/ State Government, be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay in the felling of trees. For avoidance of doubt, the costs and expense in respect of felling of trees shall be borne by the Concessionaire and any revenues thereof shall be paid to the Authority/ State Government.

ARTICLE 12
FINANCIAL CLOSURE AND SUBSTITUTION AGREEMENT

12.1. General Obligations

12.1.1 The Concessionaire expressly agrees and undertakes that it shall itself be responsible to arrange for financing and/ or meeting all financing requirements for the Project at its cost and shall enter into Financing Agreements with the Lenders for the same. To this end, the State Government and the Authority shall co-operate with the Concessionaire to achieve Financial Closure, including providing such consents and waivers as may be reasonably required by the Lenders.

12.1.2 The Concessionaire hereby agrees and undertakes that it shall achieve Financial Closure within [90 (ninety)] days from the date of this Agreement and in the event of delay, it shall be entitled to a further period not exceeding [90 (ninety)] days, subject to payment of Damages to the Authority in a sum calculated at the rate of 0.1% (zero point one per cent) of the Performance Security for each day of delay.

12.1.3 Damages specified herein shall be payable every week in advance and the period beyond the said [90 (ninety)] days shall be granted only to the extent of Damages so paid; provided further that no Damages shall be payable if such delay in Financial Closure has occurred solely as a result of any default or delay by the Authority in procuring satisfaction of the Conditions Precedent specified in Article 4or due to Force Majeure.

12.1.4 In case of a Concessionaire Event of Default, the State Government and the Authority acknowledge that the Lenders will have a right to substitute the Concessionaire in accordance with Article 25 and the Substitution Agreement. The Authority will suspend its right to step-in or terminate this Agreement until the expiry of the period available to the Lenders to exercise their substitution rights under Article 25.

12.1.5 The Concessionaire shall, upon occurrence of Financial Closure, notify the Project Engineer/ Authority forthwith, and shall have provided to the Project Engineer / Authority, at least 2 (two) days prior to Financial Closure, 3 (three) true copies of the Financial Package and the Financial Model, duly attested by a Director of the Concessionaire, along with 3 (three) soft copies of the Financial Model in Microsoft Excel version or any substitute thereof, which is acceptable to the Senior Lenders.

12.1.6 The Concessionaire shall maintain books of accounts recording all its receipts (including fees and other revenues derived/collected by it from or on account of any of the Project Facilities and/or its use), income, expenditure, payments (including payments from the Escrow Account), assets and liabilities, in accordance with this Agreement, Good Industry Practice, Applicable Laws and Applicable Permits.

12.1.7 The Concessionaire shall not make any addition, replacement or amendments to any of the Financing Agreements without the prior written consent of the Authority if such addition, replacement or amendment has, or may have, the effect of imposing or increasing any financial liability or obligation on the Authority, and in the event that any replacement or amendment is made without such consent, the Concessionaire shall not enforce such

replacement or amendment nor permit enforcement thereof against the Authority. For avoidance of doubt, the Authority acknowledges and agrees that it shall not unreasonably withhold its consent for restructuring or rescheduling of the debt of the Concessionaire.

12.2. Security Creation

12.2.1. The Concessionaire shall be entitled to create assignment by way of Security over all of its rights, title and interests in and to the Concession Agreement and the Escrow Agreement in favour of the Lenders for the purpose of obtaining Financial Assistance for the Project, provided that the creation of such Security will not result in any financial liability to the Authority or the State Government.

12.2.2. The Concessionaire shall be entitled to include the Lenders as co-insured and/or additional loss payees in any of the insurances taken by the Concessionaire in accordance with Article 27 and/or grant Security over the proceeds of such insurance.

12.2.3. Except for any Security created by operation of law and any Security created pursuant to this Article 12.2, the Concessionaire shall not be entitled to create any other Security over the Concession Agreement, the Escrow Agreement or insurance policies taken by it in favour of any third Persons, without the prior written consent of the Authority, which consent the Authority may deny in its sole discretion.

12.2.4. The Concessionaire shall not be entitled to create any Security over the Site or any part thereof, or any of the Project Facilities whether in favour of the Lenders or any third Persons.

12.3. Termination due to failure to achieve Financial Closure

Notwithstanding anything to the contrary contained in this Agreement, in the event that Financial Closure does not occur, for any reason whatsoever, within the period set forth in this Article or the extended period provided thereunder, all rights, privileges, claims and entitlements of the Concessionaire under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Concessionaire, and the Concession Agreement shall be deemed to have been terminated by mutual agreement of the Parties. In case of Termination due to such event, the State Government or the Authority shall have the right to forfeit the Performance Security or bid security. For the avoidance of doubt, it is agreed that in the event the Parties hereto have, by mutual consent, determined the Compliance Date to precede the Financial Closure, the provisions of this Article shall not apply.

12.4. Substitution Agreement

12.3.1 This Agreement shall not be assigned by the Concessionaire. Provided, however, subject to the provisions of this Agreement, Lenders may be given the right of substitution by execution of the Substitution Agreement in the form annexed hereto as **Schedule 9**.

12.3.2 The Lenders may exercise the rights of step in or substitution as provided in the Substitution Agreement provided that the Nominated Company substituting the Concessionaire shall enjoy

all rights and be responsible for performing/ fulfilling all obligations of the Concessionaire under this Agreement.

Provided that in the event the Lenders are unable to substitute the Concessionaire by Nominated Company as per the provisions of the Substitution Agreement, the Authority shall proceed to terminate the Agreement.

ARTICLE 13
PROJECT ENGINEER[12]

13.1. Project Engineer

The State Government and the Authority shall appoint a third-party engineering firm with requisite technical expertise, knowledge and experience in the [design, engineering, construction, development, and operation] of [bio-remediation of legacy waste, waste processing facilities, material recovery facilities, and other machinery and facilities forming part of the integrated solid waste management system] as the engineer for the Project (the "**Project Engineer**"). The Project Engineer shall assist the State Government and the Authority in supervising the development of all the amenities and facilities required as basic and support infrastructure for implementation of the Project including construction/renovation, operation and maintenance of facilities for Bio-Remediation of Legacy Waste and the integrated Solid Waste management system such as infrastructure, collection and transportation vehicles, ICT infrastructure, machinery and equipment procured, inherited, installed and operated and all other Project related physical assets (the "**Project Facilities**") and shall support Authority to monitor compliance with the KPIs during the O&M period. The detailed scope of work of the Project Engineer is set out in **Schedule 10**.

13.2. Remuneration

All fees, costs, charges and expenses payable to the Project Engineer shall be borne by the State Government and the Authority.

13.3. Replacement of Project Engineer

13.3.1. The Concessionaire may request the State Government or the Authority to replace the Project Engineer if the Concessionaire believes that the Project Engineer is not performing its duties in accordance with this Agreement or is otherwise impeding the performance of the Concessionaire's obligations under this Agreement.

13.3.2. the State Government or the Authority may replace the Project Engineer in any of the following circumstances:

(a) if it has reason to believe that the Project Engineer has not discharged its duties in accordance with this Article and/or Schedule 10; or
(b) has received a formal complaint from the Concessionaire. In such a case the State Government or the Authority will make necessary investigations and it is established that the Project Engineer has not discharged its duties in accordance with this Article and/or Schedule 10; or
(c) if the Project Engineer submits its resignation.

13.3.3. In appointing any replacement of the Project Engineer, the State Government and the Authority shall comply with this Article and Schedule 10.

[12]To be replaced with Project Management Unit should the Authority choose to opt for the PMU Model. The detailed provisions of PMU have been provided as an option.

13.4. Duties of Project Engineer

13.4.1. The Project Engineer shall be required to act independently, reasonably, fairly and expeditiously to ensure:

(a) the timely completion of construction of the Project Facilities on or before the Scheduled Construction Completion Date; and

(b) compliance with the KPIs during the O&M Period.

13.4.2. The Project Engineer shall at all times during the Concession Period have the right to enter upon and access the Site. The Concessionaire shall have the right to accompany the Project Engineer during its inspection of the Project Facilities.

13.4.3. During the Construction Period, the Project Engineer shall inspect the Project Facilities at least once a month and prepare an inspection report, setting out the progress of the construction of the Project Facilities, defects or deficiencies, if any, and status of compliance with the Construction Plan, Specifications and Standards, and Designs and Drawings. The Project Engineer shall send the report to Authority and the Concessionaire within 7 (seven) days of such inspection, pursuant to which, the Concessionaire shall be required to rectify the defects or deficiencies, if any, identified by the Project Engineer.

13.4.4. During the O&M Period, the Project Engineer shall inspect the Project Facilities at least once a month and prepare an inspection report, setting out the defects or deficiencies, if any, and status of compliance with the KPIs (including specifically, the Influent Standards and the Discharge Standards). The Project Engineer shall send the report to Authority and the Concessionaire within 7 (seven) days of such inspection, pursuant to which, the Concessionaire shall be required to rectify the defects or deficiencies, if any, identified by the Project Engineer. The Project Engineer shall also have the right to verify the results of the tests undertaken by the Concessionaire at any time during the O&M Period of the quality of the compost or any other by-products created during waste management processes which are intended to be sold in the market.

13.4.5. The Project Engineer shall, at all times, have the right to attend any meetings held by the Concessionaire to review the progress of the construction or O&M of the Project Facilities, and to provide its comments/suggestions regarding the progress as well as the manner in which the construction works, or O&M services is being undertaken. Neither any comments/suggestions provided by the Project Engineer nor any failure to provide comments/suggestions shall be deemed to be an acceptance of the construction works or the O&M services or a waiver of the Concessionaire's obligations to implement the Project, in accordance with this Agreement, the Technical Specifications, the Designs and Drawings, the ESHS Documents, and all Applicable Laws and Applicable Permits.

13.5. Except as specifically provided in this Agreement, the Project Engineer shall have no authority, whether express or implied, to amend, vary or curtail any of the rights or obligations of the Parties.

13.6. The Concessionaire agrees that notwithstanding any review by the Project Engineer of any or all of the construction works or O&M services, the Concessionaire shall bear all risk, responsibility and liability for the quality, adequacy and suitability of the Project Facilities.

[ARTICLE 13
PROJECT MANAGEMENT UNIT

13.1 Composition

The State Government and the Authority shall appoint project level Project Management Unit (the **"PMU"**) comprising of a project manager, representative(s) of the Authority, and experts from relevant fields (including a third-party engineering firm). There shall also be a representative of Concessionaire in the Project Management Unit.[13]

13.2 Role of the PMU

The PMU is expected to play a key role in discharging its functions as an extension to the State Government and the Authority, thereby facilitating the smooth implementation and operation of the Project. Broadly, the role of the PMU is to:

13.2.1. review, monitor and where required by the Agreement, to approve activities associated with the design, construction, operation and maintenance of the Project;

13.2.2. report to the Parties on the various physical, technical and financial aspects of the Project based on inspections, PMU site visits andTests;

13.2.3. assist the Parties in arriving at an amicable settlement of disputes should the need arise; and

13.2.4. review matters related to safety and environment management measures adopted by the Concessionaire for the Project.

13.3 Duties and functions

13.3.1. The PMU shall have the overall responsibility of monitoring and supervision of the Project.

13.3.2. The PMU shall coordinate with the State Government and the Authority and keep them updated on all activities and approvals accorded to the Concessionaire on a regular basis.

13.3.3. Further, any event of default by PMU as part of its obligations shall be treated as State Government Event of Default or the Authority Event of Default (as the case may be) and its consequence thereof.

13.4 Scope of Services

The services to be provided by the PMU are listed below. In addition, the scope of services would also include such other functions as are required to be undertaken pursuant to specific provisions of the Agreement.

13.4.1. Design and Planning

(a) Ensure that all activities of the Project fully comply with all Applicable Laws and, governing the requirements of Municipal Solid Waste disposal in India in particular,

[13] If the Project is partly-funded by a Financial Institution (FI) such as the World Bank, International Development Agency, etc., a representative from the respective FI may also be a part of the PMU.

SPCB and CPCB standards for air, water and land.

(b) Review of the implementation plan submitted by the Concessionaire.

13.4.2. Construction Inspection and General Services

(a) The PMU would monitor, in accordance with Good Industry Practice, the progress in implementation of the Project. For this purpose the PMU shall undertake, *inter-alia*, the following activities and where appropriate make suitable suggestions:

(i) Ensure compliance by the Concessionaire with the provisions of this Agreement and Applicable Laws;

(ii) Act on behalf of the Authority or State Government as the Authority's Representative or State Government Representative regarding all contact with the Concessionaire unless expressly indicated otherwise;

(iii) Review of all Tests;

(iv) Interpret the requirements of the contract and make decisions regarding performance of the Concessionaire. The PMU shall inform and advise the State Government and the Authority in a timely manner all matters relating to the execution, progress, and completeness of the Project;

(v) Reject work which fails to comply with the specifications and requirements of the Agreement. Whenever considered necessary or advisable to ensure correction of defective work, the PMU may require inspection or testing of such work, whether or not such work be then fabricated, installed, or completed;

13.4.3. The PMU shall attend regular meetings (the **"Project Review Meetings"** or **"PRMs")** with the State Government, the Authority and the Concessionaire, from time to time. The PMU shall take notes at the meetings and provide a copy of the PRM minutes to each person who attended the meeting.

13.4.4. The PMU shall approve fortnightly progress reports and bills and invoices raised by the Concessionaire.

13.5 Remuneration

The remuneration, cost and expenses of the PMU shall be borne by the State Government and the Authority only.

13.6 Replacement

The State Government or the Authority may, in its discretion, terminate the appointment of any member in the PMU, other than the Concessionaire's representative, at any time and appoint another member in his place.

13.7 Tenure

The tenure of the PMU shall commence from the date of its constitution during the Compliance Period and extend up to the Termination Date, unless the Agreement is terminated earlier in terms hereof.]

ARTICLE 14
CONSTRUCTION PERIOD

14.1 Commencement and Duration

14.1.1. The period for construction of the Project Facilities shall commence on and from the Compliance Date and shall continue until the Construction Completion Date (the "**Construction Period"**).

Notwithstanding anything to the contrary in this Agreement, the Concessionaire shall, prior to the Compliance Date, be entitled to commence:

(a) soil or geophysical investigation or testing at the Sites; and

(b) appointment of Sub-Contractors for the construction works for the Project Facilities, with the prior approval of Authority**.**

14.1.2. Bio-Remediation of Legacy Waste at Municipal Dumpsite(s) shall be carried out by the Concessionaire during and as a part of the Construction Period of [24 months] from the Compliance Date. [Due to the nature of work, the Bio-Remediation of Legacy Waste may be difficult to be carried out during the months of monsoon. Hence, number of days of monsoon showers in a year may be calculated mutually by the Parties and the Project Engineer and accordingly subtracted from the number of working days for Bio-Remediation of Legacy Waste. Accordingly, the KPIs relating to Bio-Remediation of Legacy Waste shall stand suspended for the number of days not counted as working days for Bio-Remediation of Legacy Waste, and its details shall reflect in the KPI Adherence Report of the Project Engineer.][14]

14.2 Designs and Drawings

14.2.1. Basic Engineering Designs

(a) The Concessionaire shall prepare the Basic Engineering Designs in accordance with the Technical Specifications, Applicable Laws and Applicable Permits. [If the Concessionaire proposes to set up the Waste to Energy Plant(s), the Concessionaire shall also submit the Basic Engineering Designs for the Waste to Energy Plant(s).] The Basic Engineering Designs shall be drawn to scale, with accurate dimensions, to minimize construction delays, disputes and cost overruns and to ensure smooth construction of the Project Facilities and submitted in accordance with **Schedule 11**. The Project Facilities should be designed in a manner such that the Concessionaire can obtain consent to operate from the [State Pollution Control Board] for the operation of the Project Facilities. The Basic Engineering Designs should also specify the Proposed Technology(ies) for the implementation of the Project.

(b) Within 30 (thirty) days from the Execution Date, the Concessionaire shall submit 4

[14] Depending on the local climate, the provision in the square brackets may be removed if the Project Area is not affected by monsoon showers.

(four) hard copies and 1 (one) soft copy on a compact disc of the draft Basic Engineering Designs to Authority for its review and approval.

(c) Authority shall forward the Basic Engineering Designs to the Project Engineer for their review and comments.

(d) Authority shall provide comments if any, on the draft Basic Engineering Designs (including any comments from the Project Engineer) to the Concessionaire or notify the Concessionaire of its approval of the draft Basic Engineering Designs within 20 (twenty) days from the date of receipt of the draft Basic Engineering Designs. Authority may require the Concessionaire to amend or modify the draft Basic Engineering Designs if Authority or the Project Engineer identifies any deficiencies, inaccuracies or shortcomings in the draft Basic Engineering Designs. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Basic Engineering Designs from Authority, then the Concessionaire shall modify the draft Basic Engineering Designs to correct any such shortcomings, inaccuracies or deficiencies and/or address, in writing, Authority's/ the Project Engineer's comments on the draft Basic Engineering Designs and submit the revised Basic Engineering Designs to Authority for its approval within 10 (ten) days of receipt of comments. The process set out in this Clause 14.2.1(a) shall continue until the Basic Engineering Designs are approved by Authority in accordance with this Clause 14.2.1(c) and Clause 14.2.1(d).For the avoidance of doubt, approval of Basic Engineering Designs by the Authority/ the Project Engineer shall not relieve the Concessionaire of its obligations to prepare the Basic Engineering Design in accordance with Technical Specifications, Applicable Laws and Applicable Permits.

(e) **Use of Proposed Technology**

(i) The Concessionaire shall design and develop the Project on the basis of the Proposed Technology, approved by Authority and the State Government as part of the Designs and Drawings.

(ii) If the Selected Bidder is the owner of the Proposed Technology, then the Concessionaire shall enter into a technology license agreement with the Selected Bidder, under which the Selected Bidder will grant to the Concessionaire an irrevocable, perpetual, assignable, non-exclusive and royalty-free license to use the Proposed Technology to develop and operate the Facilities.

(iii) If the Selected Bidder does not own the Proposed Technology, then the Concessionaire shall, at its own cost, enter into a technology license agreement with the technology provider, under which the technology provider will grant to the Concessionaire an irrevocable, perpetual, assignable and royalty-free license to use the Proposed Technology. At no point will the State Government and the Authority be obliged to make any payments to the Concessionaire towards the licensing and use of the Proposed Technology.

(iv) In the event of the Selected Bidder opting for a technology other than those

mentioned in the existing manuals, guidelines, and Applicable Laws, the technology provider shall have submitted to the Authority, prior to the Execution Date, the Technology Performance Security of 5% (five per cent) of the aggregate Bid Project Cost, which shall remain valid until [2 (two)] years from the COD. If the technology provider leaves the Project before the completion of [2 (two)] years, the Technology Performance Security shall be liable to be forfeited by the State Government or the Authority. Any modification required to make the Project operational in the absence of the technology provider, as suggested and approved by the State Government and the Authority, shall be undertaken by the Selected Bidder at his own risk. Any failure to meet the requirements as mentioned in this Clause shall be considered as a Concessionaire Event of Default.

(v) Upon the expiry or early termination of this Agreement, the Concessionaire shall assign the license and related rights to use the Proposed Technology for the sole purpose of operating and maintaining the Project at no additional cost to the Authority.

(vi) The Concessionaire shall indemnify the State Government and the Authority for any claims, losses, damages and costs suffered by the State Government and the Authority as a result of an infringement of any third party's Intellectual Property Rights caused by the operation and use of the Project Facilities.

14.2.2. Screening Report

(a) The Concessionaire shall prepare the Screening Report in accordance with the relevant safeguard policies/performance standards/Applicable Laws, and the Environment and Social Management Framework (the **"ESMF"**).

(b) Within 30 (thirty) days from the Execution Date, the Concessionaire shall submit 4 (four) hard copies and 1 (one) soft copy of the draft Screening Report on a compact disc to the Executing Agency for its review and approval.

(c) The Authority shall forward the draft Screening Report to the Authority for its review and comments.

(d) The Authority shall provide comments if any, on the draft Screening Report to the Concessionaire or notify the Concessionaire of its approval of the draft Screening Report within 20 (twenty) days from the date of receipt of the draft Screening Report. The Authority may require the Concessionaire to amend or modify the draft Screening Report if the Authority identifies any deficiencies, inaccuracies or shortcomings in the draft Screening Report. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Screening Report from the Authority, then the Concessionaire shall modify the draft Screening Report to correct any such shortcomings, inaccuracies or deficiencies and/or address, in writing, the Authority's comments on the draft Screening Report and submit the revised Screening Report to the Authority for its approval within 10 (ten) days of receipt of comments. The process set out in this Clause 14.2.2(d) shall continue until the Screening Report is approved by the Authority in accordance with this Clause 14.2.2(d).

14.2.3. The process set out in Clause 14.2.2 above shall apply to the submission and approval of the

Designs and Drawings for the work corresponding to each subsequent Payment Milestone for the Project Facilities.

14.2.4. The Concessionaire shall construct the Project Facilities strictly in accordance with the approved Designs and Drawings. If there are any errors or deficiencies in the Technical Specifications, the Designs and Drawings shall take into account, address or rectify such errors or deficiencies. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Designs and Drawings without the prior written approval of Authority. The Concessionaire shall not commence construction of any part of the Project Facilities prior to approval of the Designs and Drawings in accordance with the Clause 14.2. If the Concessionaire undertakes any construction work for the Project Facilities prior to the approval of the Designs and Drawings, it shall do so at its own risk and Authority shall have the right to reject any such construction work that does not comply with the approved Designs and Drawings.

14.2.5. Notwithstanding any approval of the Designs and Drawings by Authority, the Concessionaire shall bear all risk, responsibility and liability for the suitability, accuracy, adequacy and practicality of the Designs and Drawings. Subject to satisfaction of Conditions Precedent set out in Article 4, the Concessionaire shall not be entitled to any extension of time and/or costs incurred in the preparation of the Designs and Drawings and complying with the requirements of the Clause 14.2.

14.2.6. The process set out in this Clause 14.2 above shall separately apply to works of Bio-Remediation of Legacy Waste at the Municipal Dumpsite(s) corresponding to its Payment Milestones.

14.3 Construction Plan and land Reclamation Plan

14.3.1. Within [30 (thirty)] days from the Execution Date, the Concessionaire shall prepare and submit to Authority a detailed Construction Plan. The Construction Plan shall set out:

(a) The detailed plan for completing the construction (the **"Construction Completion Schedule"** as set out in **Schedule 12**) of the Project Facilities by the Scheduled Construction Completion Date; specific activities and extent of construction work to be performed by the Concessionaire to achieve each of the Project Facilities Payment Milestones; and

(b) the order in which the Concessionaire proposes to execute the construction of the Project Facilities.

14.3.2. Authority shall review and provide comments, if any, on the draft Construction Plan to the Concessionaire or notify the Concessionaire of its approval of the draft Construction Plan within 30 (thirty) days from the date of receipt of the draft Construction Plan from the Concessionaire. Authority may require the Concessionaire to amend or modify the draft Construction Plan if Authority identifies any deficiencies or shortcomings in the draft Construction Plan. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Construction Plan from Authority**,** then the Concessionaire shall incorporate the suggestions made by Authority and modify the draft Construction Plan to address any such comments, shortcomings or deficiencies identified by Authority. Thereafter, the Concessionaire shall submit the revised Construction Plan to Authority for its approval.

The process set out in this Clause 14.3.2 shall continue until the Construction Plan is approved by Authority in accordance with this Clause 14.3.2.

14.3.3. The Concessionaire shall develop and construct the Project Facilities strictly in accordance with the approved Construction Plan. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Construction Plan without the prior written approval of Authority**.** The Concessionaire shall not commence construction of any part of the Project Facilities prior to approval of the Construction Plan in accordance with this Clause 14.3.

14.3.4. Notwithstanding any approval of the Construction Plan by Authority, the Concessionaire shall, be solely liable for completing the construction of the Project Facilities by the Scheduled Construction Completion Date.

14.3.5. The Concessionaire shall submit a consolidated Construction Plan for the Project Facilities.

14.3.6. Within a maximum of [20 (twenty)] days from the Execution Date, the Concessionaire shall prepare and submit to Authority a detailed plan for reclamation of the Municipal Dumpsite through Bio-Remediation (the **"Reclamation Plan"**). The Reclamation Plan shall set out:

(c) The detailed plan for completing Bio-Remediation of Legacy Waste and clearing the land by the a date before or coincidental with COD (the **"Scheduled Reclamation Date"**); specific activities and extent of work to be performed by the Concessionaire to achieve each of the Project Facilities Payment Milestones; and

(d) the order in which the Concessionaire proposes to execute the work of Bio-Remediation of Legacy Waste.

14.3.7. Authority shall review and provide comments, if any, on the draft Reclamation Plan to the Concessionaire or notify the Concessionaire of its approval of the draft Reclamation Plan within 20 (twenty) days from the date of receipt of the draft Reclamation Plan from the Concessionaire. Authority may require the Concessionaire to amend or modify the draft Reclamation Plan if Authority identifies any deficiencies or shortcomings in the draft Reclamation Plan. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Reclamation Plan from Authority**,** then the Concessionaire shall incorporate the suggestions made by Authority and modify the draft Reclamation Plan to address any such comments, shortcomings or deficiencies identified by Authority. Thereafter, the Concessionaire shall submit the revised Reclamation Plan to Authority for its approval. The process set out in this Clause 14.3.6 shall continue until the Reclamation Plan is approved by Authority in accordance with this Clause 14.3.6.

14.3.8. The Concessionaire shall execute Bio-Remediation of Legacy Waste strictly in accordance with the approved Reclamation Plan. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Reclamation Plan without the prior written approval of Authority**.** The Concessionaire shall not commence execution works of Bio-Remediation of Legacy Waste prior to approval of the Reclamation Plan in accordance with this Clause 14.3.7.

14.3.9. Notwithstanding any approval of the Reclamation Plan by Authority, the Concessionaire

shall, be solely liable for Reclamation of land through Bio-Remediation of Legacy Waste by the Scheduled Reclamation Date.

14.3.10. The expenditure borne by the Concessionaire for Bio-Remediation of Legacy Waste at the Municipal Dumpsite(s) shall be covered under the Project Facilities Payment Milestones. Therefore, the Concessionaire shall bear in mind the timeline of work of Bio-Remediation of Legacy Waste while formulating the Construction Plan.

14.4 ESHS Documents

14.4.1. Within 45 (forty five) days from the Execution Date, the Concessionaire shall prepare and submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the ESHS Documents to Authority in the format prescribed in **Schedule 13**.

14.4.2. The ESHS Documents shall set out the Project Facilities specific health, safety and environment policies, guidelines and procedures to be followed by the Concessionaire in undertaking the Project, developed in accordance with the applicable safeguard policies/performance standards/Applicable Laws, the ESMF, this Agreement, Applicable Permits, and Good Industry Practices.

14.4.3. The ESHS Documents shall comprise the following:

(a) Safeguard Documents

As part of the Safeguard Documents, the Concessionaire shall be required to:

(i) submit an update of the environment and social impact assessment report (the **"ESIA"**), which has been prepared by Authority and shall be provided to the Concessionaire along with the RFP; and

(ii) prepare the environmental management plan (the **"EMP**").

or

(iii) in case of unavailability of such existing document, create ESIA and prepare the EMP

(b) Safety Documents

As part of the Safety Documents, the Concessionaire shall be required to prepare the following:

(i) environment, social, health and safety management plan (the **"ESHS MP"**);

(ii) environmental, social, health and safety management strategies and implementation plan (the **"ESHS-MSIP"**). The ESHS-MSIP[15] shall include the following, for the purposes of managing the key ESHS risks in relation to the Project:

[15] The ESHS-MSIP shall be prepared on the basis of the template of requirements as set out in Schedule 13.

(A) traffic management plan to ensure safety of local communities from construction traffic;
(B) water resource protection plan to prevent contamination of drinking water;
(C) boundary marking and protection strategy for mobilization and construction to prevent offsite adverse impacts; and
(D) strategy for obtaining Concessionaire Applicable Permits prior to the start of relevant works.

(c) Code of Conduct

The Code of Conduct shall be prepared on the basis of the requirements set out in Schedule 13. The Code of Conduct shall apply to the Concessionaire's employees and subcontractors and shall set out the ESHS obligations of the Concessionaire under the Agreement relating to risks associated with labor influx, spread of communicable diseases, sexual harassment, gender-based violence, illicit behaviour and crime, and maintaining a safe environment etc. The Code of Conduct shall also set out the manner in which the Code of Conduct will be implemented, including how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Concessionaire proposes to deal with any breaches.

(d) In the ESHS, the Concessionaire shall also be required to provide details of the core team of 3 (three) people for implementation of the Concessionaire's ESHS obligations, comprising: (i) health expert and safety specialist; (ii) an environmental specialist; and (iii) social specialist, who meet the minimum qualification requirements specified in Schedule 13.

(e) Within 30 (thirty) days from the Execution Date, the Concessionaire shall prepare and submit 4 (four) hard copies and 1 (one) soft copy of Labour Influx and Workers Camp Management Plan to Authority that addresses specific activities that will be undertaken to minimize the impact on the local community, including elements such as worker codes of conduct, training programs on HIV/AIDS, etc. A Workers' Camp Management Plan addresses specific aspects of the establishment and operation of workers' camps.

This Labor Influx and Workers' Camp Management Plan will include:

(i) mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
(ii) informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
(iii) introducing a Worker Code of Conduct as part of the employment contract, and including sanctions for non-compliance (e.g., termination), manual scavenging, engagement with local residents, child labor, nondiscrimination, harassment of coworkers including women and those belonging to Scheduled Castes and Schedules Tribes and other minority social groups,

(iv) contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.
(v) training programs on HIV/AIDS and other communicable diseases,
(vi) workers' Camp Management Plan addressing specific aspects of the establishment and operation of workers' camps provided the Authority is unable to cater to the demand for affordable housing for this additional workforce in terms of rentals, hostels, apartments, etc.; and
(vii) complaint handling mechanism at the Project level.

14.4.4. Authority shall forward a copy of the draft ESHS Documents to the Project Engineer and the State Government for its review and comments.

14.4.5. Authority shall provide comments, if any, on the draft ESHS Documents (including any comments from the Project Engineer and the State Government) to the Concessionaire or notify the Concessionaire of its approval of the draft ESHS Documents within 30 (thirty) days from the date of receipt of the draft ESHS Documents from the Concessionaire. Authority may require the Concessionaire to amend or modify the draft ESHS Documents if Authority or the Project Engineer or the State Government identifies any deficiencies or shortcomings in the draft ESHS Documents. If the Concessionaire receives any comments, suggestions or instructions to modify the draft ESHS Documents from Authority, then the Concessionaire shall modify the draft ESHS Documents to address any such comments, shortcomings or deficiencies identified by Authority. Thereafter, the Concessionaire shall submit the revised ESHS Documents to Authority for its approval. The process set out in this Clause 14.4.5 shall continue until the ESHS Documents are approved by Authority in accordance with this Clause 14.4.5.

14.4.6. The Concessionaire shall ensure that its Sub-contractors comply with and conform in all aspects of the ESHS Documents, approved in accordance with this Clause 14.4, in executing the Project. Any failure of the Concessionaire or the Sub-Contractors to comply with the ESHS Documents shall constitute a Concessionaire Event of Default. The Concessionaire shall indemnify Authority and the State Government against all costs, expenses, penalties and liabilities incurred/suffered by Authority the State Government due to the Concessionaire's or any Sub-Contractor's failure to comply with the ESHS Documents in the course of execution of the Project. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved ESHS Documents without the prior written approval of Authority.

14.4.7. Neither any approval of the ESHS Documents by Authority, nor any failure to review and provide comments on the ESHS Documents shall excuse any failure by the Concessionaire to adopt proper and recognized safety and environment friendly practices during the execution of the Project. The Concessionaire shall bear all risk, responsibility and liability for the accuracy and adequacy of the final ESHS Documents in ensuring compliance with the applicable safeguard policies/performance standards/Applicable Laws, the ESMF, this Agreement, Applicable Permits and Good Industry Practices in the execution of the Project. The Concessionaire shall not be entitled to any extension of time and/or costs incurred in preparation of the ESHS Documents and complying with the requirements of Clause 14.4.

14.5 Sub-contracting

14.5.1. The Concessionaire may enter into Sub-Contracts to perform any part of its Scope of Work during the Construction Period, with the prior intimation to the Authority.

14.5.2. The Concessionaire shall provide a copy of each proposed Sub-Contract, along with details of the relevant Sub-Contractor, for the record to the Authority, which should set out the precise Scope of Work to be Sub-contracted to such Sub-Contractor and should be consistent with the terms of this Agreement.

14.5.3. The Concessionaire shall be responsible for the supervision and monitoring of the performance of any work or services by the Sub-Contractor.

14.5.4. If the Concessionaire proposes to novate or replace a Sub-Contract after submission of details as required under Article 14.5.2 above, then such novation or replacement shall also be intimated to the Authority.

14.5.5. The Concessionaire shall be and remain liable under this Agreement for all work and services subcontracted under this Agreement and for all acts, omissions or defaults of any Sub-Contractor. No default under any Sub-Contract shall excuse the Concessionaire from its obligations or liabilities under this Agreement. All references in this Agreement to any act, default, omission, breach or negligence of the Concessionaire shall be construed to include any such act, default, omission, breach or negligence of the Sub-Contractors.

14.5.6. The Project Engineer and Authority have the right to access of information and audit the Sub-Contractor files with regards to the Concession Agreement.

14.6 Concessionaire's Construction Obligations

14.6.1. The Concessionaire shall design, finance, construct and complete the Project Facilities and achieve the COD in accordance with Applicable Laws, Applicable Permits, Good Industry Practice, the Technical Specifications, the ESHS Documents, the Designs and Drawings, the Construction Plan and other provisions of this Agreement.

For this purpose, during the Construction Period, the Concessionaire shall:

(a) complete the work corresponding to each Payment Milestone by the Scheduled Payment Milestone Completion Date and complete the development and construction of the relevant Project Facilities by the relevant Scheduled Construction Completion Date, in a manner that:

(i) is in compliance with the Technical Specifications, the Designs and Drawings, the Construction Plan, the ESHS Documents, Applicable Laws, Applicable Permits and Good Industry Practices. For the avoidance of doubt, if there arises any ambiguity or conflict between the Technical Specifications and any Applicable Laws, then the one setting out the more stringent requirements or specifications shall prevail;

(ii) the Project Facilities are fabricated, erected, installed and completed in accordance with the final Designs and Drawings;

(iii) the Project Facilities are free from all defects in design, materials, and workmanship;

(iv) the Project Facilities are safe, reliable and fit for purpose;

(v) the Project Facilities shall be capable of operating up to their respective design capacity; and

(b) maintain and comply with the conditions of all Applicable Permits in undertaking the construction of the Project Facilities;

(c) within 30 (thirty) days of the Compliance Date, and in any event, prior to the commencement of any construction of the Project Facilities, appoint a Person with sufficient skill and expertise to act as the Concessionaire's Representative. The Concessionaire's Representative shall monitor, coordinate and supervise the completion of the Project Facilities, and liaise with Authority's Representative and the State Government Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Concession Period, the Concessionaire may replace the Concessionaire's Representative with prior written notice to the Authority and the State Government;

(d) provide all necessary assistance to the Project Engineer, the State Government, and the Authority in undertaking inspection of the Project Facilities, and in performing its other obligations and duties under this Agreement;

(e) [provide all necessary assistance to the Financial Institutions to inspect the Site(s) and/or all accounts, records, and other documents relating to the submission of proposals and contract performance of the Concessionaire, as well as its Sub-Contractors, agents, personnel, consultants, service providers or suppliers relating to the Project and have them audited by auditors appointed by the Financial Institutions];[16]

(f) ensure that none of its employees, consultants, service providers, suppliers, or Sub-Contractors, who may be engaged in future, shall be engaged in corrupt, fraudulent, collusive, coercive or obstructive practice;

(g) reasonably consider and act upon the comments/suggestions made by the Project Engineer and Authority during any meetings with the Concessionaire;

(h) rectify any defects and/or deficiencies in the Project Facilities, including any defects and/or deficiencies identified by the Project Engineer or Authority;

(i) take all necessary measures to maintain the safety and security of personnel, material

[16] For the projects funded through Financial Institutions such as the World Bank, IBRD, International Development Agency (IDA), JICA, etc.

and property at the Site(s) and the Adjoining Properties, in accordance with the approved ESHS Documents and all Applicable Laws;

(j) ensure that all excavated materials, earthworks, waste materials and hazardous substances are stored and/or disposed in accordance with the ESHS Documents, Applicable Laws and Applicable Permits;

(k) submit monthly reports to the Project Engineer (with a copy to Authority), no later than 10 (ten) days after the end of each month, which should set out the following:

(i) extent of progress of construction activities performed by the Concessionaire for the Project Facilities;

(ii) comparison of actual progress against the planned progress of construction works, reasons for delay, if any and steps taken by the Concessionaire to mitigate the delay;

(iii) details of any accident or hazardous incident at the Site(s) and the steps taken by the Concessionaire to mitigate the consequences of such accident or hazardous incident; and

(iv) status of rectification of defects and/or deficiencies discovered by the Project Engineer or Authority;

(l) ensure that an adequate number of suitably skilled and experienced contractors, architects, workmen and other personnel are engaged to undertake the Project. The Concessionaire shall be solely responsible for the work performed by any staff and labour engaged by it to execute the Project and for payment of all applicable labour charges, fees, cess payable under Applicable Laws (including labour welfare legislations) in connection with the skilled and unskilled manpower employed for the Project, including specifically the 'Building and Other Construction Workers Welfare Cess Act, 1996'. The Concessionaire shall ensure that its Sub-Contractors provide all necessary amenities and welfare facilities for the staff and labour engaged by them at the Site(s) and comply with all applicable labour laws. The Concessionaire shall indemnify and hold harmless Authority and the State Government from and against all claims, liabilities, expenses, costs and losses suffered or incurred by Authority or the State Government due to the Concessionaire's or any Sub-Contractor's failure to comply with any Applicable Laws (including labour welfare legislations);

(m) arrange for all equipment, machinery, tools and other resources required to undertake the Project and be solely responsible for such equipment, machinery, tools and resources;

(n) take all reasonable measures to ensure that the transportation of any of the Concessionaire's or the Sub-Contractors' personnel or equipment, to or from the Site(s), does not interfere with local traffic in the vicinity of the Site(s);

(o) maintain accurate and systematic accounts and records of goods and material utilized

and other costs and expenses incurred in connection with the construction works for the Project Facilities, including all invoices, receipts, *challans*, vouchers, quotations and other records and documents with respect to the Project Facilities in accordance with Applicable Laws;

(p) obtain and maintain adequate insurances as per this Agreement; and

(q) prepare and keep up-to-date, "as-built" records of the execution of the construction work for the Project Facilities, showing the exact as-built locations, sizes and details of the works executed. The "as-built" records shall be kept on the Site(s) and be made available to the Project Engineer and Authority for review and verification. The Concessionaire shall provide 4 (four) hard copies and 1 (one) soft copy on a compact disc, of the complete set of "as-built" drawings for the Project Facilities to Authority as a condition precedent to the issuance of the Construction Completion Certificate.

(r) The Concessionaire shall not be ordinarily entitled to additional land beyond the quoted land in the Financial Proposal for the implementation of the Project. However, under unavoidable circumstances and in the interest of the Project, Authority based on availability, may consider to allocate additional land for the implementation of the Project upon the request of the Concessionaire and such allocation shall be subject to the payment of [150% (one hundred and fifty percent)] of the [circle rate] of the land, for each additional acres of land and part thereof. If the additional land requirement changes position of the Selected Bidder vis-à-vis the second preferred bidder, then the Concessionaire shall pay to Authority, a sum of equivalent to: (a) [150% (one hundred and fifty percent)] of the [circle rate] of the land for each additional acres of land and part thereof; or (b) the difference between Bid Project Cost of second preferred bidder and the revised Bid Project Cost of the Selected Bidder/Concessionaire; whichever is higher.

14.7 [Waste to Energy Plant(s)

14.7.1. The Concessionaire [may at its sole option and discretion] construct Waste to Energy Plant(s) at the Project Facilities Site(s) to produce, utilize and/or sell the clean energy generated from the treatment of the Solid Waste/Legacy Waste. The Concessionaire may, at its sole option and discretion, also construct a rooftop solar power plant(s) at the Project Facilities to produce clean energy.

14.7.2. If the Concessionaire chooses to construct a Waste to Energy Plant(s) at the Site(s), the Concessionaire shall undertake such construction of Waste to Energy Plant(s) at the Site(s) in accordance with all Applicable Laws and after obtaining all necessary approvals and consents to construct the Waste to Energy Plant(s) at the Site(s).

14.7.3. The Concessionaire shall not be entitled to any additional land, Construction Payments, or an extension of the Scheduled Construction Completion Date for construction of the Waste to Energy Plant(s).

14.7.4. The Concessionaire shall not be entitled to any additional O&M Payments for operating the Waste to Energy Plant(s).

14.7.5. It shall be the Concessionaire's obligation to obtain all required clearances and approval for purposes of setting up, operating and maintaining the Waste to Energy Plant(s).]

14.8 Rights and Obligations of the Authority and the State Government

14.8.1. During the Construction Period, Authority shall:

(a) comply with all its obligations under Applicable Laws (including, specifically the [Act applicable in the State] Act) and Applicable Permits;

(b) make reasonable endeavors to assist the Concessionaire in obtaining the Applicable Permits from the relevant Government Authorities, provided that the Concessionaire has complied with all the requirements as per Applicable Laws for applying for such Applicable Permits;

(c) within 30 (thirty) days of the Compliance Date, and in any event, prior to the commencement of any construction for the Project Facilities, appoint a Person with sufficient skill and expertise to act as Authority's Representative. Authority's Representative shall liaise with the Concessionaire's Representative and the State Government Representative, and the Project Engineer during the Construction Period and the O&M Period. At any time during the Concession Period, Authority may replace Authority's Representative with prior written notice to the Concessionaire and the State Government;

(d) cause the Project Engineer to carry out timely inspection of the Project Facilities, and perform its other obligations and duties under this Agreement;

(e) upon progressive completion of construction works for the Project Facilities in accordance with the Technical Specifications, Designs and Drawings, Construction Plan and other provisions of this Agreement, as certified by the Project Engineer, issue the Milestone Completion Certificates and the Construction Completion Certificate to the Concessionaire;

(f) ensure that the Concessionaire enjoys peaceful access to the Site(s) and shall not assign, transfer, or otherwise dispose its rights, title, and interest in the Site(s) or create any Encumbrance over any part of the Site(s), which may adversely impact the exercise of the Concessionaire's rights and duties under this Agreement; and

(g) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

14.8.2. During the Construction Period, the State Government shall:

(a) comply with all its obligations under the Applicable Laws;

(b) make the Construction Payments, on satisfactory completion of the relevant Payment Milestone; and

(c) within 30 (thirty) days of the Compliance Date, and in any event, prior to the commencement of any construction for the Project Facilities, appoint a Person with sufficient skill and expertise to act as the State Government Representative. The State Government Representative shall liaise with the Concessionaire's Representative, Authority's Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Concession Period, the State Government may replace the State Government Representative with prior written notice to the Authority and the Concessionaire; and

(d) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

14.9 Utilities

14.9.1. The Concessionaire shall obtain install and maintain at its cost, all utilities necessary for undertaking the construction of the Project Facilities, including all temporary power and water connections, lighting facilities, telephone connections, internet connections, etc., at the Site(s). The Concessionaire shall bear the cost of all power, water, and other utilities consumed by it during the Construction Period, and the Concessionaire shall not be entitled to claim any reimbursement from Authority or the State Government in this regard.

14.9.2. The Concessionaire shall not be entitled to any extension of time or costs to comply with its obligations in Clause 14.9.1 and Clause 14.9.2 above.

14.9.3. Authority shall provide any reasonable assistance required by the Concessionaire to obtain the utilities for the construction of the Project Facilities.

14.10 Construction Timelines

14.10.1. The Concessionaire shall comply with the Construction Plan, the Designs and Drawings and the Technical Specifications and complete the construction of the Project Facilities on or before the date scheduled for completion of construction works (the "**Scheduled Construction Completion Date**").

14.10.2. Subject to Clause 14.10.3 below, the Concessionaire shall be entitled to a day-for-day extension of the relevant Scheduled Payment Milestone Completion Date or as the case may be, the Scheduled Construction Completion Date, if the completion of construction of the Project Facilities is delayed due to any of the following reasons (each such event, a **"Delay Event"**):

(a) occurrence of a Force Majeure Event, provided that the requirements of Article 14 have been complied with;

(b) a Qualifying Change in Law;

(c) any delay attributable to unforeseen Site conditions; or

(d) any variation proposed by Authority in the Technical Specifications or the Designs and Drawings in accordance with Article 28.

(e) delay caused in complying with any instructions of Authority or the Project Engineer, which instructions are not attributable to any default of the Concessionaire.

The Concessionaire shall promptly provide Authority (with a copy to the State Government and the Project Engineer) with a notice upon becoming aware of any Delay Event listed at Article 14.10.2 above. The notice should specify the nature of the Delay Event, the extent of delay suffered or likely to be suffered by the Concessionaire and mitigation measures being taken by the Concessionaire.

The issuance of the notice under this Article 14.10.2, within 7 (seven) days from the date the Concessionaire became aware of the Delay Event, shall be a condition precedent to the Concessionaire's entitlement to an extension under Article 14.10.2.
For the avoidance of doubt, a Delay Event shall allow the Concessionaire only the extension of time and no additional costs.

14.10.3. Without prejudice to the Concessionaire's obligations to notify Authority regarding the occurrence of a Delay Event above, the Concessionaire shall: (i) keep and maintain records as reasonably necessary to substantiate and establish claims for extensions under Article 14.10.2; and (ii) give Authority and the Project Engineer access to such records and documents or provide Authority and the Project Engineer with copies, if so requested.

14.10.4. If the Concessionaire claims an extension of time in accordance with Article 14.10.2 and Authority is of the opinion that such delay was caused or materially contributed to by any concurrent or interacting cause or causes of delay not listed in Article 14.10.2 but solely attributable to the Concessionaire, then the Concessionaire shall not be entitled to any extension of time for the concurrent period of delay.

14.10.5. If two or more of the Delay Events listed in Clause 14.10.2 occur concurrently, then such concurrent period shall not be counted twice in determining an extension under Clause 14.10.2.

14.10.6. Except as provided in Clause 14.10.2, the Concessionaire shall not be entitled to any extension of time for any reason whatsoever, including due to:

(a) delay caused in complying with any instructions of Authority or the Project Engineer which are attributable to any act or omission of the Concessionaire;

(b) failure of any Sub-Contractor to commence or carry out any work within the prescribed timelines;

(c) unavailability or shortage of equipment, materials, or any other resources;

(d) any delay in approving the drafts of the Designs and Drawings, the Construction Plan, the ESHS Documents or any other document submitted by the Concessionaire due to any deficiencies or shortcomings in such drafts of the Designs and Drawings, the

Construction Plan, the ESHS Documents or other documents, as the case may be; or

(e) [the construction of Waste to Energy Plant(s) at the Site(s)]

14.10.7. Any Dispute between the Parties with respect to the occurrence, length of subsistence or consequence of any of the Delay Event shall be settled in a final and binding manner in accordance with Article 26.

14.11 Delay Liquidated Damages and Bonus

14.11.1. Subject to Clause 14.10.2, if the Concessionaire fails to complete the work corresponding to any Payment Milestone by the relevant Scheduled Payment Milestone Completion Date or fails to complete the construction of the Project Facilities by the Scheduled Construction Completion Date, then Authority shall be entitled to liquidated damages for each day of delay beyond the Scheduled Payment Milestone Completion Date, or, as the case may be, the Scheduled Construction Completion Date, at the rate of [[0.1% (zero point one per cent)] of the Performance Security (in case of a delay in achieving a Project Facilities Payment Milestone or completing the Project Facilities by the Scheduled Construction Completion Date)]for each day of delay up to [6 (six)] months from the Scheduled Payment Milestone Completion Date, or the Scheduled Construction Completion Date as the case may be (the **"Delay Liquidated Damages"**).

The Delay Liquidated Damages will be payable until the work for the relevant Payment Milestone is completed or, as the case may be, the construction of the Project Facilities is completed, as certified by Authority in accordance with Article 14.11.

If the Concessionaire completes the construction of the Project Facilities by the Scheduled Construction Completion Date, the aggregate Delay Liquidated Damages recovered by Authority under this Article 14.11.1 for a delay in achieving any Payment Milestone shall be refunded by Authority to the Concessionaire, without any interest.

14.11.2. Authority shall be entitled to deduct the Delay Liquidated Damages from the amount payable to the Concessionaire for any Payment Milestone, and if such amounts are insufficient, Authority shall have a right to invoke the Performance Security(ies) to the extent of the Delay Liquidated Damages.

14.11.3. The Parties acknowledge that the Delay Liquidated Damages are a genuine pre-estimation of and reasonable compensation for the loss that shall be suffered by Authority as a result of the delay in the completion of the Project Facilities, and not as penalty.

14.11.4. If, for any reason, the above paragraphs relating to the payment of Delay Liquidated Damages are void, invalid or otherwise inoperative so as to disentitle Authority from claiming any Delay Liquidated Damages, then Authority will be entitled to claim against the Concessionaire for general damages for delay in completing the works for the relevant Payment Milestone by the Scheduled Payment Milestone Completion Date, or for the delay in completing the construction of the Project Facilities by the Scheduled Construction Completion Date.

14.11.5. If the Concessionaire fails to complete the works for a Payment Milestone within 6 (six) months of the Scheduled Payment Milestone Completion Date or if the Concessionaire fails to complete the construction of the Project Facilities within 6 (six) months from the Scheduled Construction Completion Date, other than on account of any Delay Event (the **"Grace Period"**), then such failure shall be deemed to be a Concessionaire Event of Default in accordance with Clause 16.1.

14.11.6. The payment or deduction of Delay Liquidated Damages shall not relieve the Concessionaire from its obligations to complete the construction of the Project Facilities, or from any of its other duties, obligations or responsibilities under the Agreement. The Concessionaire shall use and continue to use its best endeavors to avoid or reduce further delay in completing the Project Facilities.

14.11.7. Bonus on early completion

If the Construction Completion Date for a Project Facilities occurs prior to the Scheduled Construction Completion Date, the Concessionaire shall be entitled to a bonus equal to [0.05% (zero point zero five per cent)] of the relevant Performance Security for each day by which the Construction Completion Date precedes the Scheduled Construction Completion Date.

14.12 Completion of Works

14.12.1. Completion of Payment Milestones

(a) Upon completion of the works corresponding to each Payment Milestone, as specified in the Construction Plan, the Concessionaire shall issue a notice to Authority, with a copy to the Project Engineer and the State Government, requiring Authority to inspect (or cause the Project Engineer to inspect) the completed works covered by the relevant Payment Milestone. The purpose of such inspection shall be to determine whether the works corresponding to the relevant Payment Milestone have been completed in accordance with the requirements of Article 14.6.

(b) If Authority is satisfied that the works for the relevant Payment Milestone have been completed in accordance with the requirements of Article 14.6, then, subject to Article 14.12.1(e) below, Authority shall issue a Milestone Completion Certificate to the Concessionaire for such completed Payment Milestone, with a copy to the State Government, within 7(seven) Business Days from the date of inspection of the works covered by such Payment Milestone.

(c) If Authority is of the view that the works for the relevant Payment Milestone do not satisfy the requirements of Article 14.6, then Authority shall have the right to provide any comments, suggestions and/or instruct the Concessionaire to carry out necessary modifications, to ensure that the works comply with the requirements of Article 14.6. Upon receipt of such comments, suggestions or instructions from Authority, the Concessionaire shall make necessary modifications to the works to remedy any defects

or deficiencies and re-issue a notice to Authority. The Concessionaire shall bear all costs of remedying the defects and deficiencies in the works and shall not be entitled to any extension of time for remedying such defects or deficiencies. This process shall be repeated until Authority is satisfied that the works for the relevant Payment Milestone have been completed in accordance with the requirements of Article 14.6 and issues a Milestone Completion Certificate in accordance with this Article 14.12.1.

(d) If Authority fails to:

(i) inspect the completed portion of the works covered by the relevant Payment Milestone, within 7 (seven) Business Days from the date of receipt of a notice from the Concessionaire under Clause 14.12.1(a) above;

(ii) provide any comments or suggestions or notify the Concessionaire of any defects or deficiencies in the completed portion of the works covered by the relevant Payment Milestone, within 7 (seven) Business Days from the date of inspection of such completed portion of the works; or

(iii) issue the Milestone Completion Certificate, within 7 (seven) Business Days from the date of inspection of the completed portion of the works covered by the relevant Payment Milestone,

then, such delay shall be treated as a Delay Event, which will entitle the Concessionaire to a day for day extension in the Scheduled Payment Milestone Completion Date or the Scheduled Construction Completion Date, as the case may be, beyond the 7 (seven) Business Days period.

(e) Authority may exercise its rights to review and certify the completion of works for any Payment Milestone either itself or through the Project Engineer. If Authority instructs the Project Engineer to undertake a review of the works, then the Concessionaire shall cooperate with the Project Engineer to facilitate such review and rectify any defects or deficiencies identified by the Project Engineer in the works. Provided that, in all instances, Authority shall finally approve the works and issue the Milestone Completion Certificates.

14.12.2.Testing and Commissioning of the Project Facilities

(a) Upon completion of construction of each Project Facilities, in accordance with the requirements set out in this Agreement, the Concessionaire shall issue a notice to Authority, with a copy to the State Government, requiring it to be present at the Site(s) on the date specified in such notice to undertake a final inspection of the completed Project Facilities and conduct any tests required to ensure that the Project Facilities complies with the Technical Specifications, the Designs and Drawings, Applicable Laws and Applicable Permits.

(b) Within 5 (five) days from the date of receipt of a notice under Article 14.12.2(a) above, Authority may request the Concessionaire to vary the date of the final inspection and tests and the Concessionaire shall accommodate such request, provided that, such date

shall be no later than 7 (seven) days from the date specified in the notice received from the Concessionaire under Article 14.12.2(a) above.

(c) The Concessionaire shall, on the date specified in the notice issued under Article 14.12.2(a) or on such other date as may be agreed with Authority, carry out the tests in accordance with the instructions and under the supervision of Authority and in accordance with **Schedule 14**, to demonstrate that the Project Facilities complies with the requirements of Clause 14.6.

(d) If Authority is not satisfied with the results of the tests or inspection, then the Concessionaire shall remedy any defects or deficiencies in the Project Facilities, identified by Authority or revealed through the tests and the Project Facilities shall be tested again upon rectification of such defects or deficiencies. This process shall be repeated until such time that Authority is satisfied that the Project Facilities has been completed in accordance with Clause 14.6 and is safe and fit for purpose. The Concessionaire shall bear all costs of remedying the defects and deficiencies and retesting the Project Facilities and shall not be entitled to any extension of time for remedying such defects or deficiencies or for retesting the Project Facilities.

(e) If Authority is satisfied with the results of the tests and inspection of the Project Facilities, Authority shall issue the Milestone Completion Certificate in respect of the last Payment Milestone to the Concessionaire, with a copy to the State Government, within 7 (seven) days from the date of inspection and testing of the completed Project Facilities. The issue of the Milestone Completion Certificate for the last Payment Milestone shall certify that the Project Facilities has been completed in accordance with this Agreement, the Technical Specifications, the Designs and Drawings, Applicable Laws and Applicable Permits and the Project Facilities is safe and fit for purpose.

(f) If Authority fails to:

(i) inspect or witness the testing of the Project Facilities within 14 (fourteen) Business Days from the date of receipt of notice from the Concessionaire issued under Article 14.12.2(a) or such other date as may be agreed with the Concessionaire;

(ii) notify the Concessionaire of any defects or deficiencies in the Project Facilities within 7 (seven) Business Days from the date of inspection and testing of the Project Facilities; or

(iii) issue the Milestone Completion Certificate for the last Payment Milestone within 7 (seven) Business Days from the date of inspection and testing of the Project Facilities,

Then, such delay shall be treated as a Delay Event, which will entitle the Concessionaire to a day-for-day extension in the Scheduled Payment Milestone Completion Date and the Scheduled Construction Completion Date.

14.12.3.Issue of Completion Certificate for Reclamation of Land through Bio-Remediation of Legacy

Waste at the Site(s)

(a) The Concessionaire may, upon completion of obligations and responsibilities of works relating to Reclamation of Land through Bio-Remediation of Legacy Waste at the Site(s) assigned by the Authority, in accordance with this Agreement, by notice inform the Authority with a copy to the State Government of such completion of works.

(b) Within [30 (thirty)] Business Days from the date of issuance of the notice as provided in Article 14.12.3(a), the Authority shall issue the Completion Certificate in the format prescribed in **Schedule 15** for the Reclamation of land through Bio-Remediation of Legacy Waste to the Concessionaire, subject to the following conditions having been fulfilled by the Concessionaire:

(i) the Concessionaire having cleared the Site(s) and removed all Legacy Waste, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site(s);
(ii) the quality of the reclaimed land has not deteriorated compared to the quality of dumpsite as it was prior to the commencement of Bio-Remediation of Legacy Waste at the Site(s); and
(iii) the Bio-Remediation of Legacy Waste at the Site(s) has been carried out satisfactorily as per the reports of the Project Engineer and/or Authority.

(c) If Authority fails to issue the Completion Certificate for Reclamation of Land through Bio-Remediation of Legacy Waste at the Site(s)to the Concessionaire within [30 (thirty)] Business Days from the date of satisfaction of the conditions set out in Clause 1.12(c)(ii) above and fails to notify the Concessionaire of any reasons for the failure to issue such Completion Certificate, then, the Completion Certificate for Reclamation of Land through Bio-Remediation of Legacy Waste at the Site(s)shall be deemed to have been issued to the Concessionaire upon the expiry of the [30 (thirty)] Business Days period.

(d) The date of the issuance or deemed issuance of the Completion Certificate shall be the completion date for the Bio-Remediation of Legacy Waste at the Site(s).

(e) Upon receipt of the Completion Certificate as set forth in Article 14.12.3, the member of the Consortium shall be allowed to exit the Consortium in accordance with the Article 5.7.3 of this Agreement.

14.12.4.Issue of Construction Completion Certificate of Project Facilities

(a) Within [7 (seven)] Business Days from the date of issuance of the Milestone Completion Certificate for the last Payment Milestone, Authority shall issue the Construction Completion Certificate for the Project Facilities to the Concessionaire with a copy to the State Government, subject to the following conditions having been fulfilled by the Concessionaire:

(i) the submission of 4 (four) hard copies and 1 (one) soft copy on a compact disc of complete sets of the ‘as-built’ drawings of the Project Facilities;

(ii) the Concessionaire having obtained all Applicable Permits necessary for commencement of the O&M services (including specifically, the consent to operate from the [State Pollution Control Board] for the operation of the Project Facilities);

(iii) the Concessionaire having obtained adequate insurance for the O&M Period in accordance with Clause 11.2;

(iv) the Concessionaire having engaged sufficient number of adequately skilled O&M personnel to perform the services during the O&M Period; and

(v) the O&M Manual having been approved by Authority; and

(vi) the Concessionaire having cleared the Site(s) and removed all debris, hazardous materials, surplus construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site(s).

(b) If Authority fails to issue the Construction Completion Certificate for the Project Facilities to the Concessionaire within [7 (seven)] Business Days from the date of satisfaction of the conditions set out in Clause 14.12.4(a) above and fails to notify the Concessionaire of any reasons for the failure to issue the Construction Completion Certificate for the Project Facilities, then, the Construction Completion Certificate for the Project Facilities shall be deemed to have been issued to the Concessionaire upon the expiry of the [7 (seven)] Business Days period.

(c) The date of the issuance or deemed issuance of the Construction Completion Certificate shall be the Construction Completion Date for the Project Facilities.

14.13 Trial Operations

14.13.1. Subject to Clause 14.13.3 below, within [1 (one)] day of the issuance or deemed issuance of the Construction Completion Certificate for the Project Facilities to the Concessionaire, the Concessionaire shall commence the Trial Operations of the Project Facilities in accordance with the trial operation procedures to determine whether the Project Facilities meets the KPIs on a continuous basis and is fit and ready to be placed into commercial operations in accordance with this Agreement.

14.13.2. Concessionaire shall ensure that adequate quantity of Solid Waste is delivered to the Project Facilities[17] during the Trial Operations to enable the Concessionaire to demonstrate that the Project Facilities meets the Technical Specifications and the KPIs.

[17] The same may be ensured if the Solid Waste from Secondary Collection Points may be collected by the Concessionaire during Trial Operation Period in accordance with Sub-Clauses 5.1.8 (w) and (x), or the Authority and Concessionaire may arrive at a mutual agreement that during Trial Operation Period, the primary waste collection and transportation may be carried out by the Authority but processed and disposed by the Concessionaire, or the Authority and Concessionaire may develop another mechanism for delivery of adequate quantity of Solid Waste to the Project Facilities during Trial Operation Period.

14.13.3. If the Concessionaire fails to commence or continue the Trial Operations, due to the inadequate quantity or inferior quality of the Solid Waste, then the Concessionaire shall promptly notify Authority. If in the opinion of Authority, the quantity or quality of Solid Waste is not adequate to undertake Trial Operations, then Authority shall extend the time period for the Trial Operations. In such case, the date scheduled for commencement of operations (the **"Scheduled COD"**) will also be extended on a day-for-day basis, provided that the Scheduled COD shall not be extended beyond the date which is [6 (six)] months from the Construction Completion Date.

14.13.4. During the Trial Operations, Authority shall or shall cause the Project Engineer to monitor the performance of the Project Facilities on a regular basis to ensure that the Project Facilities meets the Technical Specifications.

14.13.5. If Authority, or, as the case may be, the Project Engineer is of the view that: (i) the Trial Operations are not being conducted in accordance with the Trial Operations Procedure; or (ii) there are any defects or deficiencies in the Project Facilities, Authority shall instruct the Concessionaire to follow the trial operation procedures and/or rectify the defects and deficiencies to ensure compliance with the KPIs.

It is clarified that no Availability Liquidated Damages are payable by the Concessionaire during the Trial Operations period for a failure to achieve the KPIs. However, for the Trial Operations to be successfully concluded, the Concessionaire must demonstrate that the Project Facilities consistently and continuously meets the KPIs during the last [20 (twenty)] days of the [3 (three)] months Trial Operations period, as may be extended in accordance with Clause 14.14(c) above. If the Project Facilities fails to achieve the KPIs on a continuous basis during the last [20 (twenty)] days of the[3 (three)] months Trial Operations period (as extended in accordance with Clause 14.14(c), then the Trial Operations period shall be extended by another 20 days. Subject to Clause 14.14(e)(i), the Trial Operations shall continue until the Concessionaire can demonstrate that the Project Facilities consistently achieves the KPIs for 20 (twenty) consecutive days.

14.13.6. If the Concessionaire has been able to consistently achieve the KPIs for [20 (twenty)] consecutive days (as supported by daily reports), the Concessionaire shall issue a notice to Authority requiring Authority to undertake a final inspection of the Project Facilities. Authority shall have the right to undertake such final inspection within [5 (five)] Business Days of a notice being issued by the Concessionaire.

14.13.7. If, upon final inspection, Authority is satisfied that the Project Facilities meets the KPIs and the Technical Specifications, and are capable of safe and reliable operations, then, Authority shall issue the Trial Operations Completion Certificate for the Project Facilities to the Concessionaire within [7 (seven)] days of Authority undertaking a final inspection of the Project Facilities pursuant to Article 14.13.5 above.

14.13.8. If, upon final inspection, Authority believes that the Project Facilities does not comply with the KPIs and/or Technical Specifications, then Authority may reject the Project Facilities and terminate this Agreement. Upon termination of this Agreement, in accordance with this Article 14.13.8, the consequences set out in Article 23.4.1 and Article 23.4.7 shall follow.

14.13.9. If Authority: (i) does not undertake a final inspection of the Project Facilities within [5 (five)] Business Days of receipt of a notice from the Concessionaire under Clause 14.14(e); or (ii) fails to notify the Concessionaire of any defects in the Project Facilities within [7 (seven)] days of undertaking a final inspection; or (iii) fails to issue a Trial Operations Completion Certificate within [7 (seven)] Business Days from the date of the final inspection, then the Trial Operations shall be deemed to have been successfully completed for Project Facilities and the Trial Operations Completion Certificate will be deemed to have been issued to the Concessionaire upon the expiry of the [5 (five)] Business Days period (in case of (i)) and upon the expiry of the [7 (seven)] Business Days period (in case of (ii) and (iii)).

14.13.10. If the Trial Operations are not successfully completed and/or the Concessionaire fails to issue a notice to Authority under Article 14.13.5 above on or prior to the Scheduled COD, as may be extended in accordance with Article 14.13.3, for any Project Facilities, then such failure shall be treated as a Concessionaire Event of Default and the consequences set out at Article 16 shall follow.

14.13.11. Notwithstanding anything contained in Article 14.13.8, if the Concessionaire fails to successfully complete the Trial Operations for the Project Facilities on or prior to the Scheduled COD, as may be extended in accordance with Clause 14.13.3, then such failure will be treated as an Authority Event of Default, and the consequences set out at Article 23 shall follow.

14.13.12. The Concessionaire will not be entitled to any O&M Payments or any other payment for conducting the Trial Operations, which shall be carried out solely at the cost and risk of the Concessionaire.

14.14 Commercial Operations Date

14.14.1. Within [7 (seven)] Business Days from the date of issuance or deemed issuance of the Trial Operations Completion Certificates for the Project Facilities, Authority shall issue the COD Certificate with a copy to the State Government, subject to the following conditions having been fulfilled by the Concessionaire:

(a) the Concessionaire having received the Construction Completion Certificate;
(b) the Concessionaire having submitted to Authority the Scheduled Maintenance Programme for the first-year Post-COD; and
(c) the O&M Manual having been approved by Authority;
(d) the Concessionaire having submitted the Project Facilities O&M Security to Authority.

14.14.2. If Authority fails to issue the COD Certificate to the Concessionaire within 7 (seven) Business Days from the date of satisfaction of the conditions set out in Article 14.14.1 above and fails to notify the Concessionaire of any reasons for the failure to issue the COD Certificate, then, the COD Certificate shall be deemed to have been issued to the Concessionaire upon the expiry of the 7 (seven) Business Days period.

14.14.3. The date on which the COD Certificate is issued or deemed to have been issued to the Concessionaire shall be the Commercial Operations Date of the Project Facilities.

14.15 Safety certification prior to Project COD

The Concessionaire shall, not later than [15 (fifteen)] days prior to the likely Project COD, notify the Authority and the Project Engineer of the compliance or Safety Requirements and invite them to observe any or all the Tests that may be specified by the Project Engineer in accordance with Applicable Laws, Applicable Permits and Good Industry Practice to determine that the Project infrastructure is safe for entering into commercial service, and the costs of such Tests shall be shared equally between the Concessionaire and the Authority; provided that in case of failure in any Test requiring repetition thereof, the cost of such second or subsequent Test shall be borne entirely by the Concessionaire.

ARTICLE 15

OPERATIONS AND MAINTENANCE PERIOD

15.1 Commencement and Duration

The period for the operation and maintenance of the Project Facilities, other than the Project Facilities used for Bio-Remediation of Legacy Waste, shall commence on and from COD and shall continue until the Termination Date (the **"O&M Period"**).

15.2 O&M Manual

15.2.1. The Concessionaire shall prepare a detailed O&M Manual for the Project Facilities based on the Proposed Technology and in accordance with the Technical Specifications, the ESHS Documents, Applicable Laws and Applicable Permits. The O&M Manual shall specify the operation procedures (separately for each component of the Project Facilities) and maintenance procedures. In case of any errors or deficiencies in the Technical Specifications, the O&M Manual shall take in account, address or rectify such errors or deficiencies. The Language of the O&M Manual shall be English.

15.2.2. At least 30 (thirty) days prior to the Scheduled Construction Completion Date, the Concessionaire shall submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the draft O&M Manual to Authority for its review and approval.

15.2.3. Authority shall review and provide comments, if any, on the draft O&M Manual to the Concessionaire or notify the Concessionaire of its approval of the draft O&M Manual within 20 (twenty) days from the date of receipt of the draft O&M Manual from the Concessionaire. Authority may require the Concessionaire to amend or modify the draft O&M Manual if Authority identifies any deficiencies, inaccuracies or shortcomings in the draft O&M Manual. If the Concessionaire receives any comments, suggestions or instructions to modify the draft O&M Manual from Authority, then the Concessionaire shall modify the draft O&M Manual to correct any shortcomings, inaccuracies or deficiencies identified by Authority and/or address, in writing, Authority's comments on the draft O&M Manual and submit the revised O&M Manual to Authority within 10 days of having received Authority's response, for its approval. The process set out in this Article 15.2.3 shall continue until the O&M Manual is approved by Authority in accordance with this Article 15.2.3.

15.2.4. The Concessionaire shall revise the O&M Manual as and when the Concessionaire thinks it necessary to do so and in such case the provisions of Article 15.2.3 will apply as is to the approval of the revised manual.

15.2.5. The Concessionaire shall undertake the O&M of the Project Facilities strictly in accordance with the approved O&M Manual. The Concessionaire shall not deviate from or make any amendment to the approved O&M Manual without the prior written approval of Authority. The Concessionaire shall not commence operation of the Project Facilities prior to approval of the O&M Manual in accordance with Article 15.2.

15.2.6. Notwithstanding any approval of the O&M Manual by Authority**,** the Concessionaire shall

bear all risk, responsibility and liability for the suitability, accuracy, adequacy and practicality of the O&M Manual. The Concessionaire shall not be entitled to any extension of time and/or costs incurred in the preparation of or updating the O&M Manual and complying with the requirements of Article15.2.

15.2.7. The Concessionaire shall submit a consolidated O&M Manual for the Project Facilities.

15.3 Sub-Contracting

15.3.1. The Concessionaire may enter into Sub-Contracts to perform any part of its Scope of Work during the O&M Period, with the prior intimation to the Authority**.**

15.3.2. The Concessionaire shall provide a copy of each proposed Sub-Contract, along with details of the relevant Sub-Contractor, to Authority for its approval, which should set out the precise Scope of Work to be Sub-Contracted to such Sub-Contractor and should be consistent with the terms of this Agreement.

15.3.3. Within 7 (seven) days of the execution of an amendment to any approved Sub-Contract, the Concessionaire shall submit a copy of such amendment to Authority for its records.

15.3.4. If the Concessionaire proposes to novate an approved Sub-Contract and/or replace an approved Sub-Contractor, then such novation or replacement shall be with prior intimation to the Authority.

15.3.5. Notwithstanding the approval of any Sub-Contractor by Authority**,** the Concessionaire shall be and remain liable under this Agreement for all work and services subcontracted under this Agreement and for all acts, omissions or defaults of any Sub-Contractor. No default under any Sub-Contract shall excuse the Concessionaire from its obligations or liabilities under this Agreement. All references in this Agreement to any act, default, omission, breach or negligence of the Concessionaire shall be construed to include any such act, default, omission, breach or negligence of the Sub-Contractors.

15.4 Concessionaire's rights and obligations

15.4.1. The Concessionaire shall operate and maintain the Project Facilities in a manner that:

(a) is in compliance with the Technical Specifications, Applicable Laws, Applicable Permits and Good Industry Practice;
(b) results in the Project Facilities achieving the KPIs;
(c) ensures that each of the Project Facilities is capable of operating up to its design capacity on a daily basis;
(d) is safe and reliable, subject to normal wear and tear of the Project Facilities;
(e) is in compliance with the technology license agreement(s) executed by the Concessionaire for the technology, processes, know-how and systems used or incorporated into the Project Facilities;
(f) maintains the safety and security of personnel, material and property at the Site(s), in accordance with the approved ESHS Documents, Applicable Laws and Applicable Permits;
(g) ensures that all waste materials and hazardous substances are stored and/or disposed in

accordance with the ESHS Documents, Applicable Laws and Applicable Permits; and

(h) rectify, cure, remedy all defects, deficiencies, defaults, damage, etc., all of the Project Facilities at its own cost and risk.

15.4.2. The Concessionaire shall provide adequate power backup at the Site(s) (including through installation of DG Sets) to ensure continuous supply of power (even during any interruption(s) in the supply of power from the grid) for the uninterrupted operations of the Project Facilities during the O&M Period.

15.4.3. The Concessionaire shall provide all necessary assistance to the Project Engineer, the State Government, and Authority in undertaking inspection and monitoring of the operation and maintenance of the Project Facilities.

15.4.4. The Concessionaire shall reasonably consider and act upon the comments/suggestions made by the Project Engineer and Authority during any meetings of the Concessionaire with its Sub-Contractors.

15.4.5. The Concessionaire shall provide Authority and the Project Engineer with reasonable access to the Site(s) during office hours to monitor and inspect the Project Facilities.

15.4.6. The Concessionaire shall arrange for all equipment, machinery, tools and other resources required to undertake the O&M of the Project Facilities and shall take all reasonable measures to ensure that the transportation of any of the Concessionaire's or the Sub-Contractors' personnel or equipment, to or from the Site(s), does not interfere with local traffic in the vicinity of the Site(s).

15.4.7. The Concessionaire shall develop and implement a safety and surveillance programme for the Project Facilities and for handling and disposal of the residual inert matter and adopt appropriate measures and safeguards for security of the environment, life, and property at the Site(s).

15.4.8. The Concessionaire shall ensure that none of its employees, consultants, service providers, suppliers, or Sub-Contractors, including any O&M contractor appointed by the Concessionaire, shall engage in any corrupt, fraudulent, collusive, coercive or obstructive practice.

15.5 Rights and obligations of the Authority and the State Government

15.5.1. During the O&M Period, Authority shall:

(a) comply with all its obligations under Applicable Laws (including, specifically the [Act applicable in the State] Act) and Authority Applicable Permits;

(b) monitor and review the operations and performance of the Project Facilities. This includes the right to access the Project Facilities, and review the records and reports that the Concessionaire is required to maintain, during normal working hours;

(c) review the Scheduled Maintenance Programme and all other plans and documents

submitted by the Concessionaire in an expeditious manner, in accordance with this Agreement;

(d) ensure that the Escrow Account is funded with the Minimum Escrow Balance; and

(e) ensure that the Concessionaire continues to enjoy peaceful access to the Site(s) and shall not assign, transfer, or otherwise dispose of its rights, title, and interest in the Site(s) or create any Encumbrance over any part of the Site(s), which may adversely impact the exercise of the Concessionaire's rights and duties under this Agreement.

15.5.2. During the O&M Period, the State Government shall:

(a) comply with all its obligations under the Applicable Laws;

(b) make the O&M Payments in accordance with Article 17; and

(c) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

15.6 Utilities

15.6.1. The Concessionaire shall apply for and obtain the power connection (at the battery limit of the relevant Site(s)) for the operation of the Project Facilities, in its name, at least 30 (thirty) days prior to the Scheduled Construction Completion Date. The Concessionaire shall provide all necessary assistance to Authority in procuring the power connection, including by providing all documents and information necessary to complete the application process.

15.6.2. The Concessionaire shall install and maintain at its cost, all utilities (other than power) necessary for the O&M of the Project Facilities, including water, telephone connections, internet connections, etc. at the Site(s). Specifically, to procure water for the O&M of the Project Facilities, the Concessionaire may dig bore wells at the Site(s) after obtaining all Applicable Permits (including any no-objection certificates from the Central Ground Water Authority or the relevant state authority).

15.6.3. The Concessionaire shall not be entitled to any additional costs to comply with its obligations in Article 15.6.

15.6.4. Authority shall provide any reasonable assistance required by the Concessionaire to obtain the utilities for the O&M of the Project Facilities.

15.7 Monitoring and Reporting

15.7.1. Online Monitoring and Meters

(a) At the Project Facilities Sites, the Concessionaire shall install and maintain an online monitoring system, in accordance with the Technical Specifications and Applicable Laws (including specifically, the EPA) to monitor the volume, specifications and characteristics of the incoming Solid Waste and ensure that the Project Facilities are capable of operating up to its design capacity on a daily basis. The online monitoring

devices should be capable of measuring and analyzing the quantum and characteristics of the Solid Waste at the Processing facility and decentralized units and of the quantum and quality of disposables discharged from the Sites.

(b) Online monitoring system shall maintain a record for equipment's historical running information, status, faults, and any other parameters required to judge its conditions. Such monitoring shall be conducted in accordance with Applicable Laws and Good Industry Practices.

(c) The Concessionaire shall record and transmit all data collected from the online monitoring systems and the meter reading of the grade, volume and characteristics of the incoming Solid Waste and the processed disposables. The Concessionaire shall furnish a summary report for the Project Facilities to Authority (with a copy to the Project Engineer) on a daily basis, which shall indicate: (A) the quantum of the Solid Waste received at the relevant Project Facility(ies) and the quantum of the processed disposables including compost from the relevant Project Facility(ies) of the relevant day; and (B) the periods during which the quantum of Solid Waste received at the relevant Project Facility(ies)exceeded its design capacity.

(d) The Concessionaire shall also be required to upload the periodic reports from the online monitoring on the Central Pollution Control Board's website.

(e) The Concessionaire shall maintain the online monitoring systems and meters at its own cost and expense for the entire O&M Period.

(f) At Project Facility (ies), the Concessionaire shall also install meters and gauges at the DG Sets to measure the total number of energy units (in kWh) consumed from the DG Sets in each month of the O&M Period.

(g) [If the Concessionaire sets up a Waste to Energy Plant(s), then the Concessionaire shall install meters at the Waste to Energy Plant(s) to measure the total number of energy units (in kWh) generated from the Waste to Energy Plant(s) in each month of the O&M Period.]

(h) The meters shall be calibrated once every year during the O&M Period in accordance with Good Industry Practices and the meters shall be jointly tested by Authority and the Concessionaire to ensure the accuracy of the meters installed by the Concessionaire.

15.7.2. Records and Reporting Requirements

(a) The Concessionaire shall maintain:

(i) records of the quantum and characteristics of the Solid Waste received at, and the processed disposables discharged from the Project Facilities; and

(ii) books of accounts recording all payments received from Authority and/or the State Government and other revenues derived/collected by it from the Project Facilities or resulting from its use, separately for each of the Project Facility and Site.

(b) The Concessionaire shall provide to Authority, 2 (two) copies of its audited financial statements along with a report from its statutory auditors, within 90 (ninety) days of the close of each Financial Year.

(c) For Project Facilities, the Concessionaire shall deliver to Authority, with a copy to the Project Engineer, the following during the O&M Period within the specified timelines:

(i) reports relating to any activity, problem, incident or circumstance that threatens or may threaten public health, safety, the environment or the safety and security of the Project Facilities, and any action taken to mitigate the effect of such incident or problem, as soon as reasonably practicable but no later than 12 (twelve) hours after the occurrence of such event or circumstance;

(ii) reports on any critical breakdowns or failures in the Project Facilities, within 12 (twelve) hours of such occurrence;

(iii) reports on accidents or other incidents in relation to the O&M personnel or any third party, along with statements on actions taken to minimise recurrence, within 2 (two) days of such occurrence;

(iv) daily reports with the data collected from the monitoring and metering system, the online monitoring system and the tests conducted by the Concessionaire in accordance with Clause 15.9 on the characteristics and volume of Solid Waste treated at the Project Facilities, processed disposables discharged from the Project Facilities, at the end of each day (i.e., on or before [1500 hours] every day);

(v) monthly progress reports relating to the performance of O&M services (including on compliance with the KPIs, details of disposal or sale, as the case may be, of the processed disposables, and details of any Emergency during the relevant month), on or before the 7th (seventh) day of the following month. The monthly progress report must be certified by the Project Engineer before it is submitted to Authority;

(vi) copies of any reports, notices or responses submitted for compliance/non-compliance with Applicable Laws or Applicable Permits, within 2 (two) days of making such submissions to the relevant Government Authority; and

(vii) reports on any material litigation, including any winding-up proceedings or notice to commence winding-up proceedings or material disputes to which the Concessionaire is a party, appointment of a receiver or administrator in relation to the business or assets of the Concessionaire and any adverse orders or judgments passed by any Government Authorities that affects or is likely to affect the performance of the O&M services, as soon as reasonably possible after the occurrence of any such event.

(d) It is clarified that the reports set out in this Clause 15.7 will be separately prepared and furnished for each of the Project Facilities.

(e) [It is expressly agreed between the Parties that the [Name of the Financial Institution] shall be permitted to inspect the Site(s) and/or all accounts, records, and other documents relating to contract performance of the Concessionaire, as well as its Sub-Contractors, agents, personnel, consultants, service providers or suppliers, including O&M contractors for the Project and have them audited by auditors appointed by the [Name of the Financial Institution].[18]

15.8 Design Capacity Utilization

15.8.1. During each day of the O&M Period, the Concessionaire shall ensure that Project Facilities can accept and process Solid Waste up to its design capacity.

15.8.2. The Concessionaire shall notify Authority (with a copy to the Project Engineer) as soon as it becomes aware that the quantum of Solid Waste received at the relevant Project Facility is more than its design capacity.

15.8.3. In such circumstances, if the Concessionaire is unable to accept and process the excess Solid Waste (i.e., over and above the design capacity) at the relevant Project Facility, then such failure shall be treated as a Forced Unavailability for which the Concessionaire shall not be liable, subject to the Concessionaire having notified Authority in accordance with Article 15.8.2 above. Authority reserves the right to require the Project Engineer to verify the capacity utilization at any Project Facility, at any time during the O&M Period.

15.9 Maintenance and Repair of the Project Facilities

15.9.1. During the O&M Period, the Concessionaire shall, at its own cost, undertake the maintenance of the Project Facilities and repair any damage to the Project Facilities either by itself, or through an approved Sub-Contractor, such that the Project Facilities shall be:

(a) in good working condition (subject only to wear and tear and Force Majeure) and achieve their full useful economic life in accordance with the Designs and Drawings;

(b) maintained in compliance with the Technical Specifications, O&M Manual, Scheduled Maintenance Programme, Applicable Laws, Applicable Permits, Good Industry Practice and the recommendations of the technology providers;

(c) capable of meeting the KPIs.

15.9.2. For the first year of the O&M Period, the Concessionaire shall submit its scheduled maintenance programme for the Project Facilities, specifying the Scheduled Maintenance periods for the Project Facilities and the impact of such Scheduled Maintenance periods on the Availability of each of the Project Facility (the **"Scheduled Maintenance Programme"**) to the Authority at least 1 (one) month before the Scheduled COD and for every subsequent year of the O&M Period, the Concessionaire shall submit the Scheduled Maintenance Programme, at least 1 (one) month prior to the beginning of the relevant year. The Scheduled Maintenance Programme for the first year will cover the period from the COD until the end of

[18] Insert if the Project is partly funded by a Financial Institution such as the World Bank, IDA, etc.

the calendar year in which the COD occurs. It is clarified that the Concessionaire shall submit a consolidated Scheduled Maintenance Programme for the Project Facilities.

15.9.3. Within 15 (fifteen) days of receipt of the Scheduled Maintenance Programme, Authority shall notify the Concessionaire of its approval of such schedule.

If Authority does not accept any one or more of the requested Scheduled Maintenance periods or its impact on the Availability of a Project Facilities, Authority shall advise the Concessionaire within 15 (fifteen) days of the receipt of the Scheduled Maintenance Programme on when any Scheduled Maintenance can be rescheduled or how its impact on the Availability of a Project Facilities may be minimised. The rescheduled time shall be as close as reasonably practicable to the requested time and shall be of equal duration as the requested period. If Authority fails to object to any Scheduled Maintenance within the specified time period or fails to advise the Concessionaire of a substitute time, the Concessionaire may schedule the Scheduled Maintenance for such duration and at such time as initially requested.

(a) Notwithstanding the finalization of the Scheduled Maintenance Programme pursuant to this Article 15.9, Authority may require the Concessionaire to reschedule a Scheduled Maintenance in the Scheduled Maintenance Programme, provided that:

(i) Authority has given the Concessionaire at least 30 (thirty) days' prior written notice of such re-scheduling;

(ii) Authority shall not require such Scheduled Maintenance to be rescheduled for a period of shorter or longer duration;

(iii) Authority shall not require that a single Scheduled Maintenance period be split into two or more periods; and

(iv) Authority shall not require that a Scheduled Maintenance be brought forward any earlier than 15 (fifteen) days from the date of such notice without the consent of the Concessionaire.

(b) Notwithstanding the finalization of the Scheduled Maintenance Programme pursuant to this Clause 15.9, the Concessionaire may request a rescheduling of any Scheduled Maintenance upon 60 (sixty) days' prior written notice to Authority. Authority shall respond to such request within 10 (ten) days and shall not unreasonably withhold its permission for such re-scheduling.

(c) Within 5 (five) days of any re-scheduling of a Scheduled Maintenance, as may be approved by the Authority, the Concessionaire shall provide to Authority, the amended Scheduled Maintenance Programme, which shall then be the "**Scheduled Maintenance Programme**".

(d) During the O&M Period, the Concessionaire shall, at its own cost, replace any component or part of the Project Facilities that is damaged or worn out or in the Concessionaire's judgment becomes no longer practicable to repair as a result of normal wear and tear.

(e) If at any time during the O&M Period, a Project Facilities is damaged by a Minor Casualty, the Concessionaire shall, with reasonable diligence, proceed to process the claim with insurance providers and at its own cost, repair, replace, and restore the damaged portion of the Project Facilities to the same condition that it was in before the occurrence of such Minor Casualty. To the extent available, insurance proceeds shall be applied to such repair, replacement or restoration.

If at any time during the O&M Period, a Project Facilities is damaged by a Total Casualty, then this Agreement shall be terminable at the option of the Concessionaire. If the Concessionaire elects to terminate the Agreement, then the consequences set out in Article 23 will follow. If, however, the Concessionaire elects not to terminate the Agreement, then the Concessionaire shall repair, replace and restore the damaged Project Facilities to the same condition that it was in before the occurrence of such Total Casualty. To the extent available, insurance proceeds shall be applied to such repair, replacement or restoration.

15.10 Remedial Measures

If after the COD, the Concessionaire ceases to operate Project Facilities for a period of 48 (forty eight) consecutive hours other than due to a Forced Unavailability, Scheduled Maintenance, or a suspension pursuant to Article21, which is not attributable to the Concessionaire, or a Force Majeure Event, without the prior written consent of Authority, then Authority shall be entitled to step-in and undertake O&M of such Project Facilities until the Concessionaire demonstrates to the satisfaction of Authority that it can and will resume normal operation and maintenance of the Project Facilities. The exercise of Authority's rights under this Article 15.10 shall be at the cost, risk and expense of the Concessionaire. The Concessionaire shall not be entitled to receive any O&M Charges for the duration that Authority steps-in to operate and maintain the Project Facilities.

15.11 O&M Personnel

15.11.1. The Concessionaire shall engage (either directly or through an approved Sub-Contractor) adequate number of suitably skilled and qualified personnel to undertake the O&M of the Project Facilities in accordance with the requirements set out in this Article 15.

15.11.2. The Concessionaire shall be solely responsible for discharging all obligations in connection with the employment of the O&M personnel, including the payment of wages, salaries, Taxes, and retrenchment compensation and providing all amenities and benefits required under applicable laws.

15.11.3. Subject to compliance with the Applicable Laws, the Concessionaire shall have full freedom to determine its internal human resources (HR) policies, including, the wages, benefits and salary structure of its employees, the conditions of service, the shifts of work, its hire and fire policy (whether for misconduct or other cause), and payment of severance or retrenchment compensation.

15.11.4. Authority is not and shall not be treated as the "principal employer" of or be deemed to have any contractual or other relationship with the O&M personnel. The Concessionaire shall hold

harmless and indemnify Authority against all losses, claims, costs and damages that Authority may suffer due to the Concessionaire's or any of its Sub-Contractor's failure to comply with Applicable Laws.

ARTICLE 16
MONITORINGAND INSPECTION

16.1 During Pre-COD Period

16.1.1 Monthly Progress Reports

During the Pre-COD Period, the Concessionaire shall, not later than 7 (seven) days after the close of each month, furnish to the Project Engineer, a monthly report bringing out in detail the progress made by the Concessionaire and also organise monthly review meetings with respect to its Scope of Work, including *inter-alia* the Processing facility (including the power plant, if any), Project Facilities and any such information as may be considered essential by the Project Engineer.

16.1.2 Inspection

During the Pre-COD Period, the Project Engineer shall inspect or cause to be inspected the Project Facilities at least [once a month] or at such shorter intervals as may be considered essential by the Project Engineer and make report of such inspection (the **"Pre-COD Inspection Report"**) stating in reasonable detail the delay or deficiencies, if any, with particular reference to the Scope of Work, specifications, Good Industry Practices, and Applicable Laws.

It shall send a copy of such a Report to the Concessionaire within 2 (two) days of such inspection/ observation and upon receipt thereof, the Concessionaire shall rectify and remedy the observations, if any, stated in the Inspection Report. Provided however, such inspection or submission of Inspection Report by the Project Engineer shall not relieve or absolve the Concessionaire of its obligations and liabilities hereunder in any manner whatsoever.

16.1.3 Tests

For determining that the Project Facilities conform to the specifications and requirements of this Agreement, the Project Engineer shall require the Concessionaire to carry out or cause to be carried out tests, at such time and frequency and in such manner as may be specified by the Project Engineer/Authority from time to time, in accordance with Good Industry Practice for quality assurance. The Concessionaire shall, with due diligence, carry out or cause to be carried out all the tests in accordance with the instructions of the Project Engineer and furnish the results thereof to the Project Engineer. For the avoidance of doubt, the costs to be incurred on any such test undertaken shall be borne solely by the Concessionaire. In the event that results of any tests conducted under this Article 16.1.3 above establish any defects or deficiencies in the works, the Concessionaire shall carry out remedial measures and furnish a report to the Project Engineer in this behalf. For the avoidance of doubt, it is agreed that tests pursuant to this Article 16.1.3 shall be undertaken in addition to and independent of the

tests that shall be carried out by the Concessionaire for its own quality assurance in accordance with Good Industry Practice. It is also agreed that a copy of the results of such tests shall be sent by the Concessionaire to the Project Engineer forthwith.

16.2 Post-COD period

16.2.1 Monthly Status Reports

During Post-COD Period, the Concessionaire shall, not later than 7 (seven) days after the close of each month, furnish to the Project Engineer a monthly report stating in reasonable detail the condition of the Project including its compliance or otherwise with the Maintenance Requirements, the quantity of Solid Waste Collected, Processed and Disposed and shall promptly give such other relevant information as may be required by the Project Engineer. In particular, such report shall separately identify and state in reasonable detail the defects and deficiencies that require rectification.

16.2.2 Inspection

16.2.3 The Project Engineer shall inspect or cause to be inspected the execution of the Project at least [once a month]. It shall make a report of such inspection (the "Post-COD Inspection Report") stating in reasonable detail the defects or deficiencies, if any, with reference to the Maintenance Requirements, maintenance manual, KPIs or requirements as set forth in this Agreement including Schedules/ Schedules, and send a copy thereof to the Concessionaire within 7 (seven) days of such inspection and upon receipt thereof, the Concessionaire shall rectify and remedy the defects or deficiencies, if any, stated in the Post-COD Inspection Report. Such inspection or submission of Post-COD Inspection Report by the Project Engineer shall not relieve or absolve the Concessionaire of its obligations and liabilities hereunder in any manner whatsoever.

16.2.4 Remedial measures

(a) The Concessionaire shall repair or rectify the defects or deficiencies, which have impact on the operations/ efficiency of the Project, if any, set forth in the Post-COD Inspection Report and furnish a report in respect thereof to the Project Engineer within 15 (fifteen) days of receiving the Post-COD Inspection Report; provided that where the remedying of such defects or deficiencies is likely to take more than 15 (fifteen) days, the Concessionaire shall submit progress reports to the Project Engineer of the repair works [once every week] until such works are completed in conformity with this Agreement.

(b) In the event that remedial measures are not completed by the Concessionaire in conformity with the provisions of this Agreement, the Project Engineer/ Authority shall be entitled to recover Damages from the Concessionaire at the rate of [0.1% (zero point one percent)] of Performance Security for each day of delay beyond the period specified for rectification of such defect or deficiency by the Project Engineer/Authority.

16.2.5 Authority's right to take remedial measures

(a) In the event the Concessionaire does not maintain and/or repair the Project Facilities/ Project Assets or any part thereof in conformity with the Maintenance Requirements, maintenance manual or KPI or requirements as set forth in this Agreement including Schedules/ Schedules, and fails to commence remedial works within 15 (fifteen) days of receipt of Post-COD Inspection Report or notice in this behalf from the Authority, the Authority shall, without prejudice to its right under this Agreement including termination thereof, be entitled to undertake such remedial measures at the risk and cost of the Concessionaire, and to recover its cost from the Concessionaire. In addition to recovery of the aforesaid cost, an additional sum equal to [10% (ten percent)] of such cost shall be paid by the Concessionaire to the Authority as damages.

(b) The Authority shall have the right, and the Concessionaire hereby expressly grants to the Authority the right, to recover the costs and Damages specified in this Article directly from the Escrow Account, and for that purpose, the Concessionaire hereby agrees to give irrevocable instructions to the Escrow Bank to make payment from the Escrow Account in accordance with the instructions of the Authority under this Article. Any demand from the Authority stating that a specified amount is payable shall be final, binding and conclusive on the Concessionaire and Escrow Bank and Escrow Bank shall pay and Concessionaire shall cause the Escrow Bank to pay such amount without any demur, delay, cavil or protest on receiving a demand for such costs and Damages.

ARTICLE 17
PAYMENTS

17.1. Payment during Concession Period

In consideration of the works and services required to be performed by the Concessionaire for designing, financing, constructing, operating and maintaining the Project Facilities in accordance with this Agreement, the Concessionaire shall be entitled to receive the Construction Payments and the O&M Payments from the Authority and the State Government in accordance with this Article 17.

The Concessionaire shall be deemed to have satisfied itself regarding the adequacy, accuracy and sufficiency of the Construction Payments and the O&M Payments. Except for any adjustment in accordance with this Agreement, or any permitted Variation, the Construction Payments and the O&M Payments are the total consideration payable to the Concessionaire for undertaking the Project.

17.1.1. Bid Project Cost

The Parties expressly agree that the cost of construction of the Project, as on the Bid Date, which is due and payable by the Authority/ State Government to the Concessionaire, shall be deemed to be Rs. [•] (Rupees [•]) (the **"Bid Project Cost"**). The Parties further agree that the Bid Project Cost specified hereinabove for payment to the Concessionaire shall be inclusive of the cost of Bio-Remediation, cost of decentralized units, cost of construction, interest during construction, working capital, physical contingencies and all other soft costs, expenses and charges for and in respect of construction of the Project [save and except any additional costs arising on account of variation in Price Index, change of Scope of Work, Change in Law, Force Majeure or breach of this Agreement, which costs shall be due and payable to the Concessionaire in accordance with the provisions of the Agreement]. For the avoidance of doubt, the Bid Project Cost specified herein represents the amount due and payable by the Authority/ State Government to the Concessionaire and may be less than, equal to, or more than the Estimated Project Cost.

17.1.2. Adjusted Bid Project Cost

(a) The Bid Project Cost specified shall be revised from time to time in accordance with the provisions to reflect the variation in Price Index occurring after the Reference Index Date immediately preceding the Bid Date.

(b) The Bid Project Cost adjusted for variation between the Price Index occurring between the Reference Index Date preceding the Bid Date and the Reference Index Date immediately preceding the Execution Date shall be deemed to be the Bid Project Cost at commencement of construction.

(c) For every month occurring after the Execution Date, the Authority shall compute the variation in Price Index occurring between the Reference Index Date preceding the Bid Date and the Reference Index Date preceding the date of Invoice, and shall express the latter as a multiple of the former (the "**Price Index Multiple**").

(d) All Invoices to be submitted by the Concessionaire to the Authority for and in respect of the Construction Period shall be the product of the relevant proportion of the Bid Project Cost and the Price Index Multiple applicable on the date of Invoice. For the avoidance of doubt and by way of illustration, if the Price Index on the Reference Index Date preceding the Bid Date, say January 31, 2016, is 200 (two hundred); the Invoice is submitted on October 15, 2017; and the Price Index as on September 30, 2017 is 210 (two hundred and ten), then the Price Index Multiple for determination of the amount due in respect of such Invoice shall be 1.05 (one point zero five).

17.1.3. Payment of Bid Project Cost

(a) [45% (forty five per cent)] of the Bid Project Cost, adjusted for the Consumer Price Index multiple, shall be due and payable to the Concessionaire in 5 (five) equal installments of [9% (nine per cent)] each during Bio-Remediation of Legacy Waste and construction of other Project Facilities in accordance with the provisions of this Agreement.

(b) The remaining Bid Project Cost, adjusted for the Consumer Price Index Multiple, shall be due and payable in [120 (one hundred and twenty)] [monthly] installments commencing from the day of COD in accordance with the Article 17.1.6 (e).

17.1.4. Payment during Construction Period

(a) The State Government or the Authority shall deposit an amount equivalent to the first [2 (two)] Payment Milestones in the Escrow Account in accordance with the Escrow Agreement, prior to the Compliance Date. From the Compliance Date and during the Construction Period, the State Government and Authority shall ensure that the Escrow Account is funded with an amount equivalent to the next [2 (two)] Payment Milestones for the Project Facilities.

(b) 10% (ten per cent) of the Bid Project Cost for the Project Facility shall be given to the Concessionaire as a Mobilization Advance in accordance with Article 17.1.4(d), which will be adjusted against the Construction Payments to be paid by the State Government or the Authority to the Concessionaire in 5 (five) installments, in accordance with Article 17.1.4(e). The Construction Payments will be paid to the Concessionaire upon completion of the work corresponding to the Payment Milestones and certification of completion of such Payment Milestones by the Authority.

(c) Adjustment in Construction Payments

(i) The Construction Payments shall be adjusted during the Construction Period to reflect the variation in the Construction Price Index occurring after the Reference Index Date immediately preceding the Bid Due Date.

(ii) All Invoices to be submitted by the Concessionaire to the Authority for any installment of the Construction Payments shall be the product of the relevant percentage of the Bid Project Cost and the Price Index Multiple applicable on the

date of the Invoice.

(d) Mobilization Advance

(i) 10% (ten per cent) of the Bid Project Cost shall be payable to the Concessionaire as the Mobilization Advance, within 30 (thirty) days from the Compliance Date, subject to the Concessionaire having submitted a Mobilization Advance Guarantee in accordance with Article 9.

(ii) Subject to Article 17.1.4(d)(iv) below, Project Facilities Mobilization Advance shall be an interest free advance for mobilization and towards execution of the construction works for the Project Facilities.

(iii) The Mobilization Advance shall be deducted in equal installments from the 5 (five) installments of the Construction Payments to be made to the Concessionaire upon progressive completion of the Payment Milestones.

(iv) However, the Concessionaire is liable to pay a simple interest at the rate of 8% (eight per cent) on the Mobilization Advance, if the Payment Milestones are not achieved by the Concessionaire in accordance with the agreed Construction Plan and for the reasons attributed to the Concessionaire. The interest shall be payable for the period between the actual Payment Milestone and agreed Payment Milestone. The interest amount shall be deducted along with the Mobilization Advance from the Construction Payments.

(e) Milestone Construction Payments

(i) Subject to this Article17.1.4(e), and upon receiving a report from the Project Engineer certifying the physical progress for each Project Facility, the Construction Payments will be paid by the State Government or the Authority to the Concessionaire in the following 5 (five) equal installments (the **"Payment Milestones"**) (after adjusting the Mobilization Advance (and the interest payable if any as per Clause 17.1.4(d)(iii)):

(A) 1st(first) installment equal to [9% (nine per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 10% (ten per cent)physical progress, upon the issuance of the first Milestone Completion Certificate;

(B) 2nd(second) installment equal to [9% (nine per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 30% (thirty per cent)physical progress, upon the issuance of the second Milestone Completion Certificate;

(C) 3rd(third) installment equal to [9% (nine per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 50% (fifty per cent)physical progress, upon the issuance of the third Milestone Completion Certificate;

(D) 4th(fourth) installment equal to [9% (nine per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 75% (seventy five per cent)physical progress, upon the issuance of the fourth Milestone Completion Certificate; and

(E) 5th (fifth) installment equal to [9% (nine per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 100% (hundred per cent)physical progress, upon the issuance of the Construction Completion Certificate.

For the purpose of this Article 17.1.4, physical progress shall mean and include the Metric Tonnes of Legacy Waste cleared from the Dumpsite, and the stage of construction achieved for the Project Facility(ies) in accordance with the agreed Construction Plan submitted by the Concessionaire.[19]

Provided that in case of change of Scope of Work, the Physical Progress shall be re-calculated to account for the changed scope.

(ii) For the Project Facility(ies), within 7 (seven) days of issuance of the Milestone Completion Certificate for a Payment Milestone, the Concessionaire shall submit an Invoice to the Authority for the amount of the Construction Payment linked to such Payment Milestone along with the KPI Adherence Report. Any Invoice raised by the Concessionaire for the Construction Payments shall be accompanied by a copy of the relevant Milestone Completion Certificate issued by the Authority.

(iii) Within 10 (ten) days of receipt of an Invoice from the Concessionaire pursuant to Article 17.1.4(e)(ii) above, the Authority shall verify and certify the amounts due and payable to the Concessionaire, and either:

(A) approve the Invoice and issue a certificate to the Escrow Bank (the "**Payment Certificate"**) (with a copy to the State Government and the Concessionaire), conveying its approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with this Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws); or

(B) issue a notice to the Concessionaire disputing the Invoice and directing the Concessionaire to issue a revised Invoice, after rectifying the errors or discrepancies identified by the Authority.

The Concessionaire shall submit a revised Invoice to the Authority after

[19] If the Concessionaire is a Consortium or Joint-Venture, the internal mechanism of payment basis and payment frequency to the Consortium member carrying out Bio-Remediation of Legacy Waste related works is to be devised by the Consortium members.

rectifying the errors or discrepancies identified by the Authority and this process will be repeated until the Authority approves the Invoice and issues a Payment Certificate to the Escrow Bank with a copy to the State Government and the Concessionaire, conveying its approval for release of the amount specified in the Invoice.

(iv) Any dispute between the Parties in relation to a disputed Invoice will be settled in accordance with Article 26.

(v) If, within 10 (ten) days from the date of receipt of an Invoice, the Authority does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the Authority**,** and the Concessionaire may issue instructions to the Escrow Bank (with a copy to the Authority and the State Government) to release the amounts specified in the Invoice, upon the expiry of the 10 (ten) day period.

(vi) Immediately upon receipt of a Payment Certificate from the Authority or upon receipt of instructions from the Concessionaire in accordance with Clause 17.1.4(e)(vi), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice, in accordance with the Escrow Agreement.

(vii) Notwithstanding anything to the contrary in this Agreement, the Authority shall have no obligation to issue a Payment Certificate unless:

(A) the Performance Securities remain valid and in effect;

(B) the insurances to be obtained by the Concessionaire in accordance with Article 27 are valid and in effect;

(C) the Concessionaire Applicable Permits for construction of the Project Facilities are in full force and effect, unless the withdrawal or cancellation of any Applicable Permit is not attributable to the Concessionaire's failure to comply with Applicable Laws;

(D) the Concessionaire has complied with the ESHS Documents in undertaking the construction of the Project Facilities; and

(E) there is no subsisting Concessionaire Event of Default.

(F) the Concessionaire shall be paid the Construction Payments in Rupees. [However, if, in the Financial Proposal, the Selected Bidder specified any percentage of the Bid Project Cost which it would want to receive in a foreign currency during the Construction Period, then the Construction Payments corresponding to such percentage of the Bid Project Cost shall be paid to the Concessionaire in the relevant foreign currency. For the purpose of payment in a foreign currency, the exchange rate shall be [•]. It is clarified that the aggregate Construction Payments due to the Concessionaire shall not exceed [45% (forty five per cent)] of the Bid

Project Cost, as quoted by the Selected Bidder in Rupees and adjusted for inflation as per Clause 17.1.4(c), on account of a percentage of the Bid Project Cost being paid to the Concessionaire in foreign currencies][20].

17.1.5. Bonus on early completion

In the event that the Concessionaire shall achieve COD on or more than 30 (thirty) days prior to the Scheduled Completion Date, the Authority shall pay to the Concessionaire a bonus equal to [0.5% (zero point five per cent)] of [60 % (sixty per cent)] of the Bid Project Cost for the first [30 (thirty)] days by which COD shall precede the Scheduled Completion Date and thereafter the said bonus shall be calculated on the pro-rata basis for each day preceding the said [30 (thirty)] days period. The bonus shall be due and payable to the Concessionaire along with the 1st(first) Annuity Payment.

17.1.6. Payments during Operation Period

(a) The Parties acknowledge and agree that the Authority has paid [45% (forty five)] of the Bid Project Cost as payments during Construction Period pursuant to Clause 17.1.4 of this Agreement. The balance Bid Project Cost of remaining [55% (fifty five per cent)] (the**"Capex Annuity"**), the interest on the reducing balance of [55% (fifty five per cent)] of the Bid Project Cost, the O&M Charges and the Power Charges (the **"O&M Payments"**), shall be due and payable in Rupees during the next [20 (twenty)]years in equal [monthly/quarterly] payments in accordance with this Article17.1.6.

(b) The 1st(first) installment of Annuity Payments shall be due and payable within 15 (fifteen) days of the [30th(thirtieth)/90th (ninetieth)] day of COD and the remaining installments shall be due and payable within 15 (fifteen) days of completion of each of the successive [months/quarters] (the "**Annuity Payment Date**"). For the avoidance of doubt, the last Annuity Payment Date would be adjusted to in such a way that it falls at the end of the Operations Period.

(c) On and from the COD and during the O&M Period, the State Government or the Authority shall deposit the O&M Payments for each Project Facility in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuity (along with interest), the O&M Charges and the estimated Power Charges for the next [2 (two)] years for the Project Facility.

(d) Adjustment in O&M Charges

(i) The O&M Charges shall be adjusted during the O&M Period to reflect the variation in the O&M Price Index occurring after the Reference Index Date immediately preceding the Bid Due Date.

(ii) All Invoices to be submitted by the Concessionaire to the Authority for the [monthly/quarterly] O&M Charges shall be the product of the applicable O&M Charges for the relevant [month/quarter] and the Price Index Multiple applicable on the date of the Invoice.

(e) Capex Annuity

[20]Applicable for Projects funded through foreign sources

(i) The Capex Annuity shall be payable in [•] equal [monthly/quarterly] installments during the O&M Period.

(ii) Interest shall be payable on the reducing balance of 60% (sixty per cent) of the Bid Project Cost for the Project Facilities, at the rate of the SBI MCLR plus 3% (three per cent) per annum. Such interest shall be due and payable [monthly/quarterly] along with each installment of the Capex Annuity. The Parties agree that such interest shall be calculated on the basis of the number of days for which the relevant rate of the SBI MCLR was applicable during the period of calculation.

By way of illustration, assuming that the balance Bid Project Cost to be paid to the Concessionaire on the date of payment of the 1st (first) Capex Annuity installment is INR 50,00,00,000 (Rupees fifty crores), the applicable SBI MCLR for the first 50 (fifty) days is 8% and thereafter it is revised to 7.5% and remains unchanged till the date of payment of the 2nd (second) Capex Annuity, the interest would be calculated as ((50*11%*50)/365)+((50*10.5%*40)/365). For the avoidance of doubt, the interest shall be calculated on simple interest basis and the interest shall not be compounded for the purpose of payment.

(f) O&M Charges

(i) The Authority shall pay to the Concessionaire, every [month/quarter] the amount required by the Concessionaire to operate and maintain the Project Facilities, excluding the Power Charges, during the O&M Period (the **"O&M Charges"**).

(ii) The O&M Charges shall be made for every ton of Solid Waste collected in the Project Area, transported to the Processing Facility/decentralized units by the Concessionaire and processed at the Processing Facility/decentralized units during the Post-COD period. The O&M charges will include, *inter-alia,* Primary Collection operation cost including manpower, cost of fuel, etc., Secondary Collection operation cost including manpower, cost of fuel, etc., depreciation on costs of bins, carts, vehicles and trucks and Waste Processing cost including manpower, electricity, fuel and other consumables.

(iii) The O&M Charges for the first [month/quarter] after COD will be calculated on the basis of the O&M Charges quoted by the Selected Bidder in the Financial Proposal for the first month from the COD, which amount shall be adjusted for the Price Index Multiple applicable on the Reference Index Date preceding the date of the first Invoice for the O&M Payments.

(iv) For each subsequent [month/quarter] of the O&M Period, the O&M Charges will be adjusted for the Price Index Multiple applicable on the Reference Index Date preceding the date of the relevant Invoice for the O&M Payments.

(g) Power Charges

(i) The Power Charges for the Facilities shall initially be borne by the Concessionaire, which shall be reimbursed by the State Government or the Authority to the Concessionaire, subject to a cap of the Power Charges based on the Guaranteed Energy Consumption.

(ii) The Power Charges for any given [month/quarter] of the O&M Period will be calculated as follows:

(A) For the units of energy consumed from the grid (as evidenced by a copy of the bill issued by the distribution licensee), the Power Charges will be calculated by multiplying the number of units consumed in such [month/quarter] (subject to the Guaranteed Energy Consumption for the energy consumed by the relevant Project Facility) with the Power Unit Rate.

If the Concessionaire procures power from outside[Name of State of the Project], then, the Power Unit Rate will be the prevalent power unit rate in [Name of State of the Project]or the tariff at which the Concessionaire procures power from outside [Name of State of the Project], whichever is lower.

(B) If there is any interruption in the supply of power from the grid, and the Concessionaire uses backup power supply from the DG Sets, then,

(I) the Concessionaire's Representative and the Authority shall jointly take readings from the meters installed at the DG Sets to determine the number of units of energy consumed from the DG Sets for O&M of the Project Facilities;

(II) the number of units of energy consumed from the DG Sets (determined as per (I) above) shall be adjusted such that the aggregate of the total number of units consumed from the grid and the total number of units consumed from the DG Sets shall not exceed the Guaranteed Energy Consumption for the Project Facilities (the **"Adjusted DG Set Units"**);

(III) the quantity of diesel consumed to generate the Adjusted DG Set Units in the relevant [month/quarter] shall be calculated by the Authority based on the rated specific fuel consumption of the DG Sets specified by the manufacturers of the DG Sets; and

(IV) the Power Charges for the Adjusted DG Set Units will be calculated by multiplying the quantity of diesel consumed (determined as per (III) above) with the Fuel Price.

(C) For each Project Facility, the Concessionaire shall be liable to pay liquidated damages to the Authority for any units of energy consumed beyond the Guaranteed Energy Consumption (whether from the grid or

from the DG Sets) for such Project Facilities (the **"Power Consumption Liquidated Damages"**), which will be calculated as follows:

(I) For excess power consumption up to 5% (five per cent) of the Guaranteed Energy Consumption of the Project Facility:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant [month/quarter] – Guaranteed Energy Consumption for such [month/quarter]) * [Power Unit Rate] * 0.25

(II) For excess power consumption between 5% (five per cent) and 10% (ten per cent) of the Guaranteed Energy Consumption of the Project Facility:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant [month/quarter] – Guaranteed Energy Consumption for such [month/quarter]) * [Power Unit Rate] * 0.5

(III) For excess power consumption above 10% (ten per cent) of the Guaranteed Energy Consumption of the Project Facility:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant [month/quarter] – Guaranteed Energy Consumption for such [month/quarter]) * [Power Unit Rate]

(D) The Power Consumption Liquidated Damages payable by the Concessionaire in any [month/quarter] of the O&M Period will be deducted from the O&M Charges for the Project Facilities payable to the Concessionaire for such [month/quarter]. If the Power Consumption Liquidated Damages for a [month/quarter] exceed the O&M Charges for the Project Facilities for such [month/quarter], then the excess amounts shall, at the discretion of the Authority, either be adjusted against the O&M Charges for the Project Facilities for the subsequent [month/quarter] or recovered from the O&M Security.

(h) The O&M Payments shall be paid by the State Government or the Authority to the Concessionaire on a [monthly/quarterly] basis. For each of the Project Facilities, the Concessionaire shall submit an Invoice to the Authority for each [month/quarter] on or before the 7th (seventh) day of the [month/first month of the following quarter], which should set out: (i) the Capex Annuity due to the Concessionaire in such [month/quarter], along with interest; (ii) the O&M Charges due to the Concessionaire in such [month/quarter]; and (iii) the Power Charges incurred by the Concessionaire during such [month/quarter] for power drawn from the grid or the DG Sets, subject to the cap of the Power Charges based on the Guaranteed Energy Consumption for the Project Facilities. Any Invoice raised by the Concessionaire for O&M Payments shall be accompanied with a copy of the: (A) KPI adherence report for [the month/each month of the relevant quarter], duly certified by the Project Engineer; (B) copy of the bill(s) issued by the state distribution utility for the Power Charges, and if relevant, copy of the joint meter reading for consumption of power from the DG Sets; and (C) daily weights sheets of

the electronic weighbridge installed at the entrance of the Sanitary Land Fill/Processing Facilities Site/decentralized units as prescribed in **Schedule 16**, duly verified and approved by the Project Engineer.

If the Invoice is not accompanied with the supporting documents specified at (A), (B) and (C)above, the Authority shall not be required to process such Invoice.

(i) Within 10 (ten) days of receipt of an Invoice from the Concessionaire pursuant to Clause 9.4(h) above, the Authority shall verify and certify the amounts due and payable to the Concessionaire, and either:

(i) approve the Invoice and issue a Payment Certificate to the Escrow Bank with a copy to the State Government and the Concessionaire, conveying its approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with this Agreement and/or Applicable Laws (including any statutory dues); or

(ii) issue a notice to the Concessionaire disputing the Invoice and directing the Concessionaire to issue a revised Invoice, after rectifying the errors or discrepancies identified by the Authority.

The Concessionaire shall submit a revised Invoice to the Authority after rectifying the errors or discrepancies identified by the Authority and this process will be repeated until the Authority approves the Invoice and issues a certificate to the Escrow Bank, with a copy to the State Government and the Concessionaire, conveying its approval for release of the amount specified in the Invoice.

(j) Any dispute between the Parties in relation to a disputed Invoice will be settled in accordance with Article 26.

(k) If, within 10 (ten) days from the date of receipt of an Invoice, the Authority does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the Authority, and the Concessionaire may issue instructions to the Escrow Bank with a copy to the Authority and the State Government, to release the amounts specified in the Invoice, upon the expiry of the 10 (ten) day period.

(l) Immediately upon receipt of a Payment Certificate in accordance with Clause 9.4(i)(i) or upon receipt of instructions from the Concessionaire in accordance with Clause 9.4(l), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice, in accordance with the Escrow Agreement.

(m) Notwithstanding anything to the contrary in this Agreement, the Authority shall have no obligation to issue a Payment Certificate unless:

(i) the O&M Securities remain valid and in effect;

(ii) the insurances to be obtained by the Concessionaire in accordance with Article 27

are valid and in effect;

(iii) the Concessionaire Applicable Permits for O&M of the Project Facilities are in full force and effect, unless the withdrawal or cancellation of any Applicable Permit is not attributable to the Concessionaire's failure to comply with Applicable Laws;

(iv) the Concessionaire has complied with the ESHS Documents in undertaking the O&M of the Facilities; and

(v) there is no subsisting Concessionaire Event of Default.

(n) The O&M Payments shall be varied each year in the month of April (FY) in proportion to change in Consumer Price Index, issued by Ministry of Statistics and Program Implementation, Government of India.

17.2. Escrow Account

(a) Prior to the Compliance Date, the Concessionaire, the State Government, the Authority and the Escrow Bank shall enter into the Escrow Agreement and the State Government shall open the Escrow Account with the Escrow Bank in accordance with the Escrow Agreement, which shall be operational until the expiry of the Concession Period. The Escrow Agreement shall set out the terms of appointment of the Escrow Bank, the State Government's and Authority's obligation to deposit the Construction Payments and the O&M Payments in accordance with this agreement with the Escrow Bank and terms of withdrawal of amounts from the Escrow Account.

(b) Minimum Escrow Balance

At all times, to maintain the minimum balance in the Escrow Account (the **"Minimum Escrow Balance"**):

(i) the State Government shall deposit an amount equivalent to the first [2 (two)] Payment Milestones prior to the Compliance Date. From the Compliance Date and during the Construction Period, the State Government and the Authority shall ensure that the Escrow Account is funded with an amount equivalent to the next [2 (two)] Payment Milestones; and

(ii) on and from the COD until Termination Date, the State Government or the Authority shall deposit the O&M Payments in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuity (along with interest), the O&M Charges and the estimated Power Charges for the next [3 (three)] O&M Payments for Project Facilities,

If at any time during the Construction Period or the O&M Period, the balance in the Escrow Account falls below the Minimum Escrow Balance, the State Government or the Authority shall promptly, and in any event, no later than 90 (ninety) days, fund the

Escrow Account such that the Minimum Escrow Balance is maintained. A failure to maintain the Minimum Escrow Balance for 90 (ninety) days would be treated as an Authority Event of Default or State Government Event of Default and the consequences set out in Article 23 would follow.

It is clarified that any interest earned on the amounts deposited by the State Government or the Authority in the Escrow Account will be counted towards the Minimum Escrow Balance.

(c) The Concessionaire shall be entitled to withdraw amounts from the Escrow Account in accordance with the provisions of this Agreement and the Escrow Agreement.

17.3. Taxes and Royalties

(a) The Construction Payments and the O&M Payments are inclusive of all Taxes.

(b) the Authority may deduct from the Construction Payments, the O&M Payments and any other amounts due to the Concessionaire, any income tax or withholding tax that is required to be deducted at source.

(c) The Concessionaire shall be responsible for payment of all applicable Taxes, including all procedural compliances related to the payment of Taxes pursuant to this Agreement, and shall be solely responsible for any proceedings initiated by any Government Authority, in respect of any non-payment or short-payment of Taxes.

(d) The Concessionaire shall be responsible for payment of all applicable royalties on any fine and coarse aggregate, core sand, fine sand, grit and any other minerals extracted and/or used by the Concessionaire or any Sub-Contractor during the Construction Period and furnish proof of payment of such royalties to the Authority along with the Invoices for the Construction Payments.

(e) Upon a request from the Concessionaire, the State Government and the Authority will provide all relevant certificates and information to enable the Concessionaire to obtain any Tax exemptions available in relation to the Project. It is clarified that the Authority shall not be responsible in any manner for ensuring that any applicable Tax exemptions are available to the Concessionaire.

(f) The Concessionaire shall indemnify the State Government and the Authority from and against any cost or liability that may arise due to the Concessionaire's failure to pay all applicable Taxes, in connection with the Project.

(g) Any Taxes payable in relation to the Sites shall be borne by the Authority.

17.4. Default Interest

Upon any Party's failure to make a payment due and payable by it on the due date for such payment, the defaulting Party shall be liable to pay default interest on all such outstanding amounts at the prevailing SBI MCLR + 3% (three per cent) per annum or part thereof. This is

without prejudice to any Party's right to terminate this Agreement in accordance with Article 23 or any other right or remedy available to it under this Agreement or Applicable Laws.

17.5. Disputed Amounts

(a) The Parties shall, within [10 (ten)] days of receiving the amount due and payable to it, shall notify the other Party of the disputed amounts along with details thereof (the **"Disputed Amounts"**). Within [7 (seven)] days of receiving such notice, the defending Party shall present any information or evidence as may be reasonably required for determining that such Disputed Amounts are not payable. The Parties may, if necessary, meet a representative of the other Party for resolving the dispute and in the event that the dispute is not resolved the Dispute Resolution Procedure in accordance with Article 26 shall apply.

(b) If any amount is payable by either Party upon determination of a dispute regarding any Disputed Amount such amount shall be deemed to be payable on the date when it first became due and interest for the period of delay shall be due and payable at the rate specified in Article17.8.

17.6. Set-off

(a) The Concessionaire shall not be entitled to retain or set-off any amount due to the State Government or the Authority by it, but the State Government or the Authority may retain or set-off any amount owed to it by the Concessionaire under this Agreement which has fallen due and payable against any amount due to the Concessionaire under this Agreement.

(b) The State Government or the Authority shall notify the Concessionaire at the time it exercises its right to set-off and shall provide the Concessionaire its reasons for exercising such right to set-off.

17.7. [Power Tariff[21]

Payment shall be made by [Name of the State] State Electricity Board (SEB) or any other power utility company of Government of [Name of the State] on a tariff approved by [Name of the State] State Electricity Regulatory Commission (SERC) or revised tariff from time to time, for the number of units generated and made available at by the Waste to Energy Plant as per the Power Purchase Agreement (the **"PPA"**) signed between Concessionaire and SEB.]

[21]Should the Authority and Concessionaire choose to opt for Power Purchase Agreement, the payment mechanism under the PPA may be developed separately.

ARTICLE 18
KEY PERFORMANCE INDICATORS

18.1. Key Performance Indicators

Without prejudice to the obligations specified in this Agreement, the Concessionaire shall develop, operate and maintain the Project Facilities, machinery, and vehicles such that it achieves the performance indicators comprising Availability, Reliability, Operation, Punctuality, Frequency, Safety, upkeep and conformity with ISO certification, as specified in this Article, Good Industry Practice and Applicable Laws (the "**Key Performance Indicators**").

18.1.1. Bio-Remediation of Legacy Waste

(a) Availability

The Concessionaire shall ensure that the Availability of the machinery and facilities for Bio-remediation of Legacy Waste on every day during the Period of Bio-Remediation of Legacy Waste shall be [100% (one hundred per cent)] (the "**Guaranteed Availability**").

(b) Operation

(i) The Concessionaire shall at all times procure that, save and except any determined damage caused by theft, arson or vandalism:

(A) there are adequate arrangements for machinery and facilities for Bio-Remediation of Legacy Waste as per Specifications and Standards;

(B) all machinery, equipment and facilities are operational, function efficiently, and their availability is no less than [98% (ninety eight per cent)] in a month;

(C) the machinery and facilities at the Legacy Waste dumpsite are maintained in accordance with Maintenance Requirements;

(D) clearance of the Legacy Waste dumpsite for reclamation of land is on-schedule as per the Reclamation Plan;

(c) Punctuality and duration of work

(i) The Concessionaire agrees that the Punctuality as to the duration of work at the Legacy Waste dumpsite shall be measured on a monthly basis in terms of the percentage of days with minimum [8 (eight)] hours of operation to the total number of working days ("**Duration Punctuality**").

(ii) The Concessionaire agrees that the Duration Punctuality shall be equal to or more than [80% (eighty percent)] respectively.

(d) Safety of Operations

(i) The Parties agree that the Safety of operation of the work of Bio-Remediation shall be measured in terms of inverse of number of accidents per [1,00,000 MT (One Lakh Metric Tonnes)] (the "**General Safety**") and the number of fatalities per [10,00,000 MT (Ten Lakh Metric Tonnes)] (the "**Severe Safety**"), respectively. The General Safety and Severe Safety shall be calculated in terms of total quantum of Legacy Waste cleared divided by number of accidents multiplied by [1,00,000 (One Lakh)] and total quantum of Legacy Waste cleared divided by number of fatalities multiplied by [10,00,000 (Ten Lakh)], respectively.

(ii) The Concessionaire agrees that the General Safety and the Severe Safety, as the case may be, determined in accordance with Article 18.1.1(d)(i) shall be equal to or more than [1 (one)].

18.1.2. Collection and Transportation

(a) Availability

The Concessionaire shall ensure that the Availability of the collection and transportation vehicles on every day during the O&M Period shall be 100% (one hundred per cent) (the "**Guaranteed Availability**").

(b) Collection Coverage

Household level coverage of solid waste management services through door-to-door collection of domestic waste (the "**Collection Coverage**") shall be the percentage of households and establishments that are covered by a daily doorstep collection system, measured on a monthly basis. The Collection Coverage shall be no less than [95% (ninety five per cent)] in a month.

(c) Reliability

(i) The Parties agree that the average reliability of the collection and transportation vehicles shall be measured on a monthly basis in terms of the number of Breakdowns per [100 (one hundred)] kilometres travelled each by all collection vehicles and all transportation vehicles, separately (the "**Reliability**"). For this purpose, Breakdown shall mean mechanical failure of a vehicle that prevents it from being operational or impedes the operation so much that it is impossible or dangerous to operate

(ii) The Reliability hereunder shall be equal to the quotient of the cumulative distance travelled by all collection vehicles and all transportation vehicles, separately, divided by the aggregate number of Breakdown of all such collection vehicles and all such transportation vehicles multiplied by [100 (one hundred)].

(iii) The Concessionaire agrees that the Reliability for the collection vehicles and transportation vehicles each in accordance with Article 18.1.2(d) shall be equal to or more than [1 (one)].

(iv) The Reliability requirement shall be separately achieved for collection vehicles and the transportation vehicles.

(d) Operation

(i) The Concessionaire shall at all times procure that, save and except any determined damage caused by theft, arson or vandalism:

(A) there are adequate arrangements for collection and transportation of household waste in segregated form as per Specifications and Standards;

(B) the collection and transportation vehicles are maintained in accordance with Maintenance Requirements;

(C) the collection and transportation vehicles are operational, clean, and hygienic;

(D) the Waste Collection Information Systems[22] in the Project Area function efficiently;

(E) the Waste collection and transportation vehicles and machinery and facilities for bio-remediation of legacy waste and processing of fresh waste function efficiently, and their availability is no less than [98% (ninety eight per cent)] in a month.

(e) Punctuality

(i) Punctuality shall be measured on a monthly basis in terms of the percentage of on-time start of trips of the collection vehicles to the total number of trips operated on a daily basis ("**Start Punctuality**"). The total number of trips starting/arriving late during the month will be recorded and subtracted from the number of trips operated to arrive at the on-time trips operated figures separately in each case.

(ii) The Concessionaire agrees that the Punctuality for arrival at the respective destination shall be measured on a monthly basis in terms of the percentage of trips with on-time arrival at destination to the total number of trips operated on a daily basis ("**Arrival Punctuality**").

(iii) The Parties agree that the Concessionaire may exercise a relaxation equivalent to [5 (five)] minutes, for start of the schedule of the collection vehicles, and [10% (ten percent)] of the subsequent scheduled trip time (subject to a maximum of [15 (fifteen) minutes]) for start of subsequent schedules and arrival of trips.

(iv) Subject to the provisions of Article 18.1.2(f)(i), the Concessionaire agrees that the Start Punctuality determined in accordance with Article 18.1.2(f)(i) shall be

[22] Waste Collection Information System shall mean and include (but not limited to) the timings of collection of waste from different localities for purpose of information of Users/households.

equal to or more than [90% (ninety percent)] and the Arrival Punctuality shall be equal to or more than [80% (eighty percent)] respectively.

(f) Frequency of collection vehicles

(i) The frequency of operation of collection vehicles shall be measured on a monthly basis in terms of percentage of the cumulative trips travelled by all collection vehicles to the aggregate number of scheduled trips ("**Trip Frequency**") and a percentage of the cumulative kilometres of collection vehicles operated to the aggregate scheduled kilometres of collection vehicles ("**Collection Vehicles Kms Frequency**"), respectively.

(ii) The Concessionaire agrees that the Trip Frequency and the Collection Vehicles Kms Frequency, as the case may be, determined in accordance with Article 18.1.2(g) shall be equal to or more than [94% (ninety four percent)].

(iii) The collection vehicles shall be operated continuously such that the first collection vehicle in each direction shall depart no later than [0800 hours] and the last collection vehicle shall reach the secondary waste site or processing facility not later than [1300 hours] at the frequency specified in the Deployment Plan of collection vehicles and this Agreement; provided that on [Sunday/ any one day of the week] the collection services may not operate.

(iv) The collection vehicles in each direction shall be operated such that the [each household] of the Project Area is covered once a day for [6 (six)] days of the week within the time range allotted to each household as per the Waste collection information system of the Project Area;

(v) The average duration of stops at the designated points as per the Deployment Plan shall not be more than [15 (fifteen)] minutes each, save and except Breakdown of the vehicle or event of Force Majeure.

(g) Safety of Operations

(i) The Parties agree that the Safety of collection vehicles shall be measured in terms of inverse of number of accidents per [1,000 Kms (One Thousand kilometres)] (the "**General Safety**") and the number of fatalities per [10,000 Kms (Ten Thousand kilometres)] (the "**Severe Safety**"), respectively. The General Safety and Severe Safety shall be calculated in terms of cumulative Collection Vehicles Kms operated divided by number of accidents multiplied by [1,000 (One Thousand)] and cumulative Collection Vehicles Kms operated divided by number of fatalities multiplied by [10,000 (Ten Thousand)], respectively.

(ii) The Concessionaire agrees that the General Safety and the Severe Safety, as the case may be, determined in accordance with Article 18.1.2(h) shall be equal to or more than [1 (one)].

18.1.3. Facilities at Project Facilities (SLF Site an decentralized units)

(a) Availability

The Concessionaire shall ensure that the Availability of the Project Facilities at the SLF Site and decentralized units on every day during the Post-COD period shall be [100% (one hundred per cent)] (the "**Guaranteed Availability**").

(b) Operation

(i) The Concessionaire shall at all times procure that, save and except any determined damage caused by theft, arson or vandalism:

(A) there are adequate arrangements of Project Facilities as per Specifications and Standards;

(B) all machinery, equipment and facilities are operational, function efficiently, and their availability is no less than [98% (ninety eight per cent)] in a month;

(C) the Project Facilities are maintained in accordance with Maintenance Requirements;

(c) Punctuality and duration of work

(i) The Concessionaire agrees that the Punctuality as to the duration of work of the Project Facilities shall be measured on a monthly basis in terms of the percentage of days with minimum [8 (eight)] hours of operation to the total number of working days ("**Duration Punctuality**").

(ii) The Parties agree that the Concessionaire may exercise a relaxation equivalent to [2 (two)] hours, for start of the schedule of the Bio-Remediation work, for reasons attributable to rains, Force Majeure, [or any special circumstance].

(iii) The Concessionaire agrees that the Duration Punctuality shall be equal to or more than [80% (eighty percent)] respectively.

(d) Safety of Operations

(i) The Parties agree that the Safety of operation of the Project Facilities shall be measured in terms of inverse of number of accidents per [1,00,000 MT (One Lakh Metric Tonnes)] (the "**General Safety**") and the number of fatalities per [10,00,000 MT (Ten Lakh Metric Tonnes)] (the "**Severe Safety**"), respectively. The General Safety and Severe Safety shall be calculated in terms of total quantum of Legacy Waste cleared divided by number of accidents multiplied by [1,00,000 (One Lakh)] and total quantum of Legacy Waste cleared divided by number of fatalities multiplied by [10,00,000 (Ten Lakh)], respectively.

(ii) The Concessionaire agrees that the General Safety and the Severe Safety, as the case may be, determined in accordance with Article 18.1.1(d)(i) shall be equal to or more than [1 (one)].

18.1.4. Miscellaneous

(a) Extent of recovery of waste collected

The quantum of waste collected, which is either recycled or processed shall be expressed in terms of percentage of waste collected (the "**Extent of Recovery**"). The Extent of Recovery shall be annually increased by the Concessionaire up to [95% (ninety five per cent)] or above, with the minimum recovery not being less than [70% (seventy per cent)] during any year of operation. All rights and interest in the [residual inert waste, recyclables, fertilizers etc.], shall vest with the Concessionaire at all times during the O&M Period, unless transferred by the Concessionaire to a third party buyer/off-taker in accordance with this Agreement.

(b) Efficiency in redressal of customer complaint

The total number of Project related complaints redressed within 24 (twenty four) hours of the receipt of complaint, as a percentage of the total number of Project related complaints received in the given time period (the "**Efficiency in Redressal of Customer Complaint**") shall be increased by the Concessionaire annually up to 100% (one hundred per cent), with the efficiency not being less than 50% (fifty per cent) during any year of operation.

(c) Quantum of inert/ residual waste undisposed

The Concessionaire shall make reasonable endeavours to ensure sale of most of the recovered waste products, materials, etc., so as to limit the quantum of waste which remains undisposed to maximum of [30% (seven per cent)] in a [year]. The quantum of undisposed waste shall be calculated as the difference of total quantum of waste collected and the waste recycled/processed and/or the recycled/processed waste which could not sell.

By way of illustration, assuming that the total quantum of waste collected by the Concessionaire in a year is 1000 (one thousand) tons, the Concessionaire, in compliance of Article 8.1.4 (a), would have recycle/process at least 700 (seven hundred) tons. The remaining 300 (three hundred) tons would constitute of the undisposed waste. If 100 (one hundred) tons out of the 700 (seven hundred) tons of processed waste are not sold by the Concessionaire, the 100 (one hundred) tons would also constitute of undisposed waste. Hence, the total quantum of undisposed waste for the year would be equal to 400 (four hundred) tons which exceeds the limit of 30% (thirty per cent) on disposed waste. Hence, the Concessionaire may be liable to pay Performance Liquidated Damages.

(d) Certification

(i) The Concessionaire shall, prior to 1st (first) Anniversary of the COD, achieve and thereafter maintain throughout the Concession Period, [ISO standards] certification or a substitute thereof for the Project Facilities including Collection vehicles and Transportation vehicles, and shall provide certified copies thereof to the Authority, with a copy to the State Government, forthwith.

(ii) In the event of default in obtaining the certification specified in Article 18.1.4(c), the Concessionaire shall, within [15 (fifteen)] days thereof, submit to the Authority, with a copy to the State Government, an action plan that sets out the actions proposed to be taken by the Concessionaire for rectifying its deficiencies and obtaining such certification for the Project Facilities.

(iii) If the period of default in obtaining the ISO certification under this Article shall exceed a continuous period of [15 (fifteen)] months, the Concessionaire shall pay Damages to the Authority in an amount equal to [5% (five per cent)] of the Performance Security.

(e) Monthly Report

The Concessionaire shall, no later than [7 (seven)] days after the end of each month, furnish to the Authority, with a copy to the State Government, a report stating the KPI achievement of the Project Facility as measured on a daily basis. The Concessionaire shall promptly give such other relevant information as may be required by the Authority/State Government.

18.2. Availability of Project Facilities

18.2.1. The 'Availability' of each Project Facilities will be determined as a ratio of the number of hours in a day during which such Project Facility was available to carry out operations up to its design capacity, to the total number of hours in a day, and the term 'Available' shall be construed accordingly.

18.2.2. In computing the Availability of each Project Facilities, the Concessionaire agrees that the Project Facilities will be deemed to be Available at all times, other than during the period of:

(a) an Unscheduled Outage affecting such Project Facility;
(b) a Power Outage affecting such Project Facility;
(c) suspension of the O&M services for such Project Facility, for reasons attributable to the Concessionaire; or
(d) an Emergency affecting such Project Facility, attributable to the Concessionaire, during which the Project Facility will be deemed to be not Available.

18.2.3. Notwithstanding anything to the contrary contained in this Agreement, during the period of a Forced Unavailability or a Force Majeure, the Project Facility affected by such Forced Unavailability or a Force Majeure will be deemed to be Available.

18.2.4. If the Availability for a Project Facility on any given day is less than the Guaranteed Availability, the Authority shall issue a notice to the Concessionaire requiring the Concessionaire to cure the default causing the reduction in Availability in [3 (three)] days. Any failure to cure the default and achieve the Guaranteed Availability within [3 (three)] days of receipt of the notice from the Authority shall constitute a Concessionaire Event of Default. The Authority may claim Availability Liquidated Damages would be available till

the default is cured or the Agreement is terminated.

18.3. Damages for failure to achieve Key Performance Indicators

18.3.1. Availability Liquidated Damages

(a) If the Availability on any given day in a [month/quarter] is less than the Guaranteed Availability then the Concessionaire shall pay the liquidated damages (the **"Availability Liquidated Damages"**) equal to [0.1% (zero point one per cent)] of the O&M Security or Performance Security (in case of Availability Liquidity Damages for Bio-Remediation of Legacy Waste) for each such day.

(b) The aggregate Availability Liquidated Damages payable by the Concessionaire in any [month/quarter] of the O&M Period will be deducted from the O&M Payments due to the Concessionaire for such [month/quarter]. If the Availability Liquidated Damages for a [month/quarter] exceed the O&M Payments for such [month/quarter], then the excess amounts shall, at the discretion of the Authority or the State Government, either be adjusted against the O&M Payments for the subsequent [month/quarter] or recovered from the O&M Securities.

18.3.2. Performance Liquidated Damages

(a) If the compliance of KPIs (other than Availability of Project Facilities) on any given day(s) in a [month/quarter] is less than the benchmarks then the Concessionaire shall pay the liquidated damages (the **"Performance Liquidated Damages"**) equal to [0.1% (zero point one per cent)] of the O&M Security for each such day.

(i) Based on the KPI Adherence Report, if the Project Facility(ies) does not comply with the KPIs, then the process set out below shall follow:

(A) In the first instance of non-compliance (the **"First Breach"**), the Authority shall issue a notice to the Concessionaire on the first day of such non-compliance (the "**First Breach Notice"**) requiring the Concessionaire to cure the First Breach within [20 (twenty)] days from the date of the First Breach Notice. If the First Breach is cured within [2 (two)] days of the First Breach Notice, then the Concessionaire shall not be liable to pay any Performance Liquidated Damages. If, however, the First Breach continues beyond [2 (two)] days of the First Breach Notice, then, the Concessionaire shall be liable to pay the Performance Liquidated Damages as pre-decided by the Parties, from the [3rd (third)] day of the First Breach.

(B) If: (I) the First Breach continues for [20 (twenty)] days from the date of the First Breach Notice; or (II) another instance of non-compliance occurs within [6 (six)] months of the First Breach, then such breach shall constitute the **Second Breach**. Upon occurrence of the Second Breach, the Authority shall issue a notice to the Concessionaire on the first day of the Second Breach (the "**Second Breach Notice"**) requiring the

Concessionaire to cure the Second Breach within [20 (twenty)] days from the date of the Second Breach Notice. If the Second Breach continues beyond [2 (two)] days of the Second Breach Notice, then, the Concessionaire shall be liable to pay twice the amount of the Performance Liquidated Damages, as pre-decided by the Parties, from the [1st(first)] day of the Second Breach. In case of (I) above, it is clarified that the Concessionaire will be liable to pay Performance Liquidated Damages at the rate specified for the First Breach, for the first [2 (two)] days of a continuing breach from the date of the Second Breach Notice and twice the specified Performance Liquidated Damages from the [3rd(third)] day of a continuing Second Breach.

(C) If: (I) the Second Breach continues for [20 (twenty)] days from the date of the Second Breach Notice; or (II) another instance of non-compliance occurs within [6 (six)] months of the Second Breach, then such breach shall constitute the **Third Breach**. Upon occurrence of the Third Breach, the Authority shall issue a notice to the Concessionaire on the first day of the Third Breach (the "**Third Breach Notice"**) requiring the Concessionaire to cure the Third Breach within [20 (twenty)] days from the date of the Third Breach Notice. If the Third Breach continues beyond [2 (two)] days of the Third Breach Notice, then: (X) the Concessionaire shall be liable to pay thrice the amount of the Performance Liquidated Damages applicable to the First Breach, from the [1st (first)] day of the Third Breach; and (Y) the Capex Annuity for the relevant [month(s)/quarter(s)] will be reduced by an amount equal to the Capex Annuity for the relevant [quarter/90 (ninety)] days for each day that the Third Breach continues beyond the [1st (first)] day of the Third Breach. In case of (I) above, it is clarified that the Concessionaire will be liable to pay twice the Performance Liquidated Damages specified applicable to the First Breach, for the first [2 (two)] days of a continuing breach from the date of the Third Breach Notice and thrice the specified Performance Liquidated Damages from the [3rd (third)] day of the Third Breach, in addition to the reduction in the Capex Annuity.

(D) If: (I) the Third Breach is not cured within [20 (twenty)] days from the Third Breach Notice; or (II) a failure to comply with the KPIs results in occurrence of a Third Breach more than 3 (three) times in a continuous [12 (twelve)] month period, it will be treated as a Concessionaire Event of Default and the consequences set out at Article 23 shall apply.

(E) The Parties acknowledge that the Performance Liquidated Damages (including any escalation contemplated in this Article 18.3.2) are a genuine pre-estimation of and reasonable compensation for the environmental damage that may be caused by the Concessionaire's continuing failure to comply with the KPIs, and not as penalty. The payment of Performance Liquidated Damages will not absolve the Concessionaire from any other liability under Applicable Law, for causing any environmental pollution or health hazard due to its failure to

comply with the Discharge Standards and/or Applicable Law.[23]

(b) The Performance Liquidated Damages payable by the Concessionaire in any [month/quarter] of the O&M Period will be deducted from the O&M Payments due to the Concessionaire for such [month/quarter]. If the Performance Liquidated Damages for a [month/quarter] exceed the O&M Payments for such [month/quarter], then the excess amounts shall, at the discretion of the Authority or the State Government, either be adjusted against the O&M Payments for the subsequent [month/quarter] or recovered from the O&M Security.

(c) Within [7 (seven)] days from the end of each month, the Concessionaire shall be required to provide the monthly progress report for each of the Project Facilities (prepared in accordance with Article 15.7.2(c)(v)) on compliance of such Project Facilities with the KPIs and the reasons for such failure, if any. The Project Engineer shall be required to certify each such monthly report before it is provided to the Authority and the State Government. Such certified report on compliance with KPIs shall be referred to as **the KPI Adherence Report** and shall form the basis for O&M Payments being made to the Concessionaire during the O&M Period.

18.3.3. Notwithstanding anything to the contrary contained herein, in the event in any [month/quarter] the aggregate of Availability Liquidated Damages and Performance Liquidated Damages levied by the Authority on account of non-performance exceeds Rs.[•] (Rupees [•]), then the same shall be construed as Concessionaire Event of Default, which shall make this Agreement liable for termination.

18.4. Incentive for exceeding to achieve Key Performance Indicators

The Concessionaire shall ensure and procure compliance of each of the Key Performance Indicators specified in this Article and for repeated increase in performance during a [month/quarter], as may be determined by the Authority for reasons to be recorded in writing based on report of the Project Engineer [and inspections by the Authority], it shall pay incentive equal to [0.05% (zero point zero five per cent)] of the O&M Security for achievement in any such KPI.

[23]The Parties may also mutually decide penalty for individual instances of non-compliance. An indicative list of penalties has been provided in Article 18.3.3 as an option.

ARTICLE 19
ESCROW ACCOUNT

19.1 Escrow Account

19.1.1 The State Government shall, prior to the Compliance Date, open and establish an Escrow Account with a Bank (the "**Escrow Bank**") in accordance with the terms and conditions of this Agreement and the Escrow Agreement;

19.1.2 The nature and scope of the Escrow Account as fully described in the Agreement to be entered into amongst the Concessionaire, the Authority, the State Government, the Escrow Bank and the Senior Lenders (if any) through the Lenders' Representative, shall be substantially in the form set forth in **Schedule 17** (the "**Escrow Agreement**")

19.2 Deposits into Escrow Account

The Concessionaire shall deposit or cause to be deposited the following inflows and receipts into the Escrow Account:

(a) all funds constituting the financial package disbursed by Lenders in terms of the Financing Agreements;

(b) proceeds of any rentals, deposits, capital receipts or insurance claims; and;

(c) All payments by the Authority and the State Government, after deduction of any outstanding payments.

The Authority and the State Government shall at all times and in any month of the Concession Period, ensure that in the Reserve Sub-Account ("**Reserve Fund**") under the Escrow Account, an amount equivalent to next [90 (ninety] days payable to Concessionaire, in accordance with terms hereof, is deposited and maintained. The Parties agree that so long as the Concessionaire performs its obligations hereunder and the Authority does not notify the Escrow Bank in respect of any non-performance or breach of obligation by Concessionaire directing Escrow Bank to stop any appropriation from Reserve Fund; in case of any delay by the Authority/State Government in payment of due and undisputed amount to Concessionaire subject to and in accordance with terms hereof; the Concessionaire shall be entitled to tap the Reserve Fund to withdraw the amount due, which would be deposited and applied as per the application order agreed herein. In case of such tapping, the Authority and the State Government shall forthwith top up and maintain the required reserve in the Reserve Fund.

19.3 Withdrawals during Concession Period

19.3.1 The Concessionaire shall, at the time of opening the Escrow Account, give irrevocable instructions by way of an Escrow Agreement, to the Escrow Bank instructing, *inter-alia*, that deposits in the Escrow Account shall be appropriated in the following order every month, or at shorter intervals as necessary, and if not due in a month then appropriated

proportionately in such month and retained in the Escrow Account and paid out there from in the month when due:

(a) All taxes due and payable by the Concessionaire for and in respect of the Project;
(b) All payments relating to construction of the Project, subject to and in accordance with the conditions, if any, set forth in the Financing Agreements;
(c) O&M Expenses, subject to the ceiling, if any, set forth in the Financing Agreements;
(d) O&M Expenses and other costs and expenses incurred by the Authority/State Government in accordance with the provisions of this Agreement, and certified by the Authority as due and payable to it;
(e) Any amounts due and payable to the Authority/State Government;
(f) Monthly proportionate provision of Debt Service due in a Financial Year;
(g) All payments and Damages certified by the Authority/State Government as due and payable to it by the Concessionaire;
(h) Monthly proportionate provision of Debt Service payments due in a Financial Year in respect of Subordinated Debt;
(i) Any reserve requirements set forth in the Financing Agreements; and
(j) Balance, if any, in accordance with the instructions of the Concessionaire.

19.3.2 The Concessionaire shall not in any manner modify the order of payment specified in Article 19.3.1 above, except with the prior written approval of the Authority/State Government.

19.3.3 The Authority/State Government shall have the right, and the Concessionaire hereby expressly grants to the Authority/State Government the right, to recover the costs and Damages directly from the Escrow Account, and for that purpose, the Concessionaire hereby agrees to give irrevocable instructions to the Escrow Bank to make payment from the Escrow Account in accordance with the instructions of the Authority/State Government. Any demand from the Authority/State Government stating that a specified amount is payable shall be final, binding and conclusive on the Concessionaire and Escrow Bank and Escrow Bank shall pay and Concessionaire shall cause the Escrow Bank to pay such amount without any demur, delay, cavil or protest on receiving a demand for such costs and Damages.

19.4 Withdrawals upon Termination

19.4.1 Notwithstanding anything to the contrary contained in this Agreement, all amounts standing to the credit of the Escrow Account shall, upon Termination, be appropriated in the following order:

(a) All taxes due and payable by the Concessionaire for and in respect of the Project;
(b) Percentage of Debt Due excluding Subordinated Debt if required to be as per the terms of this Agreement;
(c) Outstanding payments due to the Authority/State Government;
(d) All payments and Damages certified by the Authority State Government as due and payable to it by the Concessionaire;
(e) Retention and payments relating to the liability for defects and deficiencies
(f) Outstanding Debt Service including the balance of Debt Due;
(g) Outstanding Subordinated Debt;
(h) Incurred or accrued O&M Expenses;
(i) Any other payments required to be made under this Agreement; and
(j) Balance, if any, in accordance with the instructions of the Concessionaire

Provided that no appropriations shall be made under Sub-Article (j) of this Article 19.4.1 until a vesting certificate has been issued by the Authority/State Government.

19.4.2 The provisions of this Article 19 and the instructions contained in the Escrow Agreement shall remain in full force and effect until the obligations set forth in Article 19.4.1 have been fully discharged.

ARTICLE 20
FORCE MAJEURE

20.1 Force Majeure Events

20.1.1. A **Force Majeure Event** means any act, event or circumstance or a combination of acts, events or circumstances or the consequence(s) thereof occurring after the date of this Agreement, which is/are:

(a) beyond the reasonable control of the Affected Party;
(b) such that the Affected Party is unable to overcome or prevent despite exercise of due care and diligence;
(c) which does/do not result from the negligence of such Affected Party or the failure of such Affected Party to perform its obligations hereunder; and
(d) such that it/they has/have a Material Adverse Effect.

20.1.2. A Force Majeure Event means the following events and circumstances to the extent that they satisfy the conditions set out in Article 20.1.1:

(a) Non-Political Force Majeure Events

(i) acts of God including storm, tempest, cyclone, hurricane, tsunami, flood, whirlwind, lightning, earthquake, washout, landslide, soil erosion, volcanic eruption, or extreme adverse weather or environmental conditions or actions of the elements;

(ii) fire or explosion caused by reasons not attributable to the Concessionaire or any Concessionaire Related Parties;

(iii) chemical or radioactive contamination or ionising radiation;

(iv) epidemic, plague or quarantine;

(v) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; and

(vi) accidents of navigation, air crash, shipwreck, train wreck or other similar failures of transportation of equipment and/or material necessary for construction or O&M of the Facilities.

Non-Political Force Majeure Event shall not include the following conditions, except to the extent resulting from a Non-Political Force Majeure Event:

(A) heavy rainfall;

(B) unavailability, late delivery or changes in cost of plant, machinery,

equipment, materials or spare parts required for undertaking the Project;

(C) a delay in the performance of any Subcontractor;

(D) non-performance resulting from normal wear and tear; or

(E) non-performance caused by the non-performing Party's (I) negligent or intentional acts, errors or omissions, (II) failure to comply with the Applicable Laws or Applicable Permits, or (III) breach of, or default under, this Agreement, as the case may be.

(b) Indirect Political Force Majeure Events

(A) hostilities (whether declared as war or not), riot, civil disturbance, revolution, rebellion, insurrection, act of terrorism, in each case involving the GoI or the Government of [Name of the State][24] or occurring in [State of Location];

(B) invasion, armed conflict, coup d'état, act of foreign enemy, blockade, embargo, revolution, insurgency, nuclear blast/explosion, politically motivated sabotage, religious strife or civil commotion, in each case involving the GoI or the Government of [Name of the State]or occurring in [State of Location];

(C) strikes or boycotts (including non-political strikes other than those involving the Concessionaire, Sub-Contractors or their respective employees/representatives, or attributable to any act or omission of any of them and the indirect political strikes such as industry-wide or state-wide strikes), lockout, or other industrial disputes which are not directly attributable to the actions of the Affected Party;

(D) any orders issued by the relevant Government Authority, which require the Concessionaire to suspend the construction or O&M of the Facilities provided that, such orders are not attributable to the Concessionaire's breach or violation of any Applicable Laws or Applicable Permits; and

(E) delay or failure by relevant Government Authorities in renewing or granting any Applicable Permit, despite the Concessionaire having applied for such Applicable Permit expeditiously and complied with the requirements of Applicable Laws in making such application or the unlawful revocation of any Applicable Permit.

(c) Direct Political Force Majeure Events

(A) occurrence of a Fundamental Change in Law in accordance with Article 22;

[24]Name of the State Government.

(B) compulsory acquisition in national interest or expropriation of the Site; and

(C) any order, notification or judgment issued or passed by any Government Authority/ Court of Law/ Tribunal which restricts the Concessionaire from constructing or operating the Facilities as contemplated in this Agreement on the Site, unless such restriction is, in any manner, attributable to the Concessionaire.

(d) Without prejudice to the provisions above,

(i) any act, event or circumstance which primarily affects any of the Concessionaire Related Parties associated with the Project shall constitute a Force Majeure Event if and to the extent that it is of a kind or character that, if it had directly affected the Concessionaire, it would have come within the definition of Force Majeure Event under this Article 20.1; and

(ii) any act, event or circumstance which primarily affects any of the State Government Related Parties or the Authority Related Parties shall constitute a Force Majeure Event if and to the extent that it is of a kind or character that, if it had directly affected the State Government or the Authority, it would have come within the definition of Force Majeure Event under this Article 20.1.

(e) If the Parties are unable to agree in good faith on the occurrence or existence of a Force Majeure Event, such dispute shall be finally settled in accordance with the dispute resolution procedure set out in Article 26, provided however that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Affected Party.

20.2 Notice of Force Majeure Events

20.2.1. The Affected Party shall give notice to the other Party in writing of the occurrence of any Force Majeure Event (the "**FM Notice"**), as soon as the same arises or as soon as reasonably practicable and in any event within 3 (three) days after the Affected Party knew of its occurrence, the adverse effect it has or is likely to have on the performance of its obligations under this Agreement, the actions being taken and an estimate of the time period required to overcome the Force Majeure Event and/or its nature and effects (if it is possible to estimate the same).

20.2.2. If, following the issue of the FM Notice, the Affected Party receives or becomes aware of any further information relating to the Force Majeure Event, it shall submit such further information to the other Party as soon as reasonably practicable.

20.2.3. Any party claiming to have been affected by a Force Majeure Event shall not be entitled to any relief unless it has complied with all the provisions of this Article20.2.

20.3 Excuse of Performance [25]

20.3.1. If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations to the extent it is unable to perform on account of such Force Majeure Event; provided that:

(a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;

(b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and

(c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

If a Force Majeure Event affects only one Project Facility, and not the other Project Facilities, then the Affected Party shall only be excused from the performance of its obligations in relation to the affected Project Facilities.

20.4 No Liability for Other Losses

Save and except as expressly provided in this Agreement, no Party shall be liable in any manner whatsoever to the other Parties in respect of any loss relating to or arising out of the occurrence or existence of any Force Majeure Event or the exercise by it of any right pursuant to this Article 20.

20.5 Resumption of Performance

The Affected Party shall in consultation with the other Parties, make all reasonable efforts to limit or mitigate the effects of a Force Majeure Event on the performance of its obligations under this Agreement. The Affected Party shall also make efforts to resume performance of its obligations under this Agreement as soon as possible and upon resumption, shall notify the other Parties of the same in writing. The other Parties shall afford all reasonable assistance to the Affected Party in this regard.

20.6 Allocation of costs during a Force Majeure Event

20.6.1. Upon occurrence of a Force Majeure Event prior to the COD, the Parties shall bear their respective Costs and no Party shall be required to pay any Costs to the other Parties.

[25] The Parties may mutually agree to engage an independent expert to evaluate the occurrence and effect, etc., of the Force Majeure Event.

20.6.2. Upon occurrence of a Force Majeure Event after the COD, the costs incurred and attributable to such event and directly relating to the Project Facilities (the "**Force Majeure Costs**") shall be allocated and paid as follows:

(a) upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure Costs and neither Party shall be required to pay to the other Party any costs thereof;
(b) upon occurrence of an Indirect Political Event, all Force Majeure Costs attributable to such Indirect Political Event, and not exceeding the Insurance Cover for such Indirect Political Event, shall be borne by the Concessionaire, and to the extent Force Majeure Costs exceed such Insurance Cover, one half of such excess amount shall be reimbursed by the Authority to the Concessionaire; and
(c) upon occurrence of a Political Event, all Force Majeure Costs attributable to such Political Event shall be reimbursed by the Authority to the Concessionaire.

Provided that upon occurrence of a Force Majeure Event post the COD, the Concessionaire shall be entitled to continue receiving the Capex Annuity (along with interest) and the O&M Charges during the subsistence of the Force Majeure Event.

(a) For avoidance of doubt, Force Majeure Costs may include interest payments on debt, O&M Charges, any increase in the cost of development, construction and operation and maintenance of the Project Facilities on account of inflation and all other costs directly attributable to the Force Majeure Event, but shall not include loss of Revenue, or debt repayment obligations, and for determining such costs, information contained in the Financial Package may be relied upon to the extent that such information is relevant.

(b) Save and except as expressly provided in this Article 20, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

20.7 Termination due to Force Majeure Event

20.7.1. **Termination due to a Non-Political Force Majeure Event**

If within a continuous period of [365 (three hundred and sixty five)] days, a Non-Political Force Majeure Event continues for a period of [180 (one hundred and eighty)] days or more, after the notification of a Non-Political Force Majeure Event or any extended period agreed in pursuance of Article 20.3, any Party shall, after the expiry of the period of [180 (one hundred and eighty)] days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

Notwithstanding anything contained in this Article 20.7:

(a) if the Project Facilities are affected by a Total Casualty, then the Concessionaire may terminate this Agreement without having to wait for the expiry of the period of [180 (one hundred and eighty)] days stipulated for a Non-Political Force Majeure Event;
(b) if the Project Facilities are affected by a Minor Casualty, then the Concessionaire shall

be required to repair and restore the Project Facilities to the same condition as previously existed and the Concessionaire shall not be entitled to terminate this Agreement on the grounds of a continuing Non-Political Force Majeure Event.

20.7.2. **Termination due to an Indirect Political Force Majeure Event**

If within a continuous period of [365 (three hundred and sixty five)] days, an Indirect Political Force Majeure Event continues for a period of [180 (one hundred and eighty)] days or more, after the notification of an Indirect Political Force Majeure Event or any extended period agreed in pursuance of Article 20.3, any Party shall, after the expiry of the period of [180 (one hundred and eighty)] days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

20.7.3. **Termination due to a Direct Political Force Majeure Event**

(a) If within a continuous period of [365 (three hundred and sixty five)] days, an Direct Political Force Majeure Event continues for a period of [180 (one hundred and eighty)] days or more, after the notification of a Direct Political Force Majeure Event or any extended period agreed in pursuance of Article 20.3, any Party shall, after the expiry of the period of [180 (one hundred and eighty)] days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

(b) All the other consequences of termination that are set out at Article 23 shall apply in case of termination of this Agreement due to a Force Majeure Event.

ARTICLE 21
SUSPENSION OF CONCESSIONAIRE'S RIGHTS

21.1 Suspension upon Concessionaire Default

Upon occurrence of a Concessionaire Event of Default, the Authority/State Government shall be entitled, without prejudice to its other rights and remedies under this Agreement including its rights of Termination hereunder, to (i) suspend all rights of the Concessionaire under this Agreement including the Concessionaire's right to receive Payments under Article 19, and other revenues pursuant hereto, and (ii) exercise such rights itself and perform the obligations hereunder or authorize any other person to exercise or perform the same on its behalf during such suspension (the "**Suspension"**). Suspension hereunder shall be effective forthwith upon issue of notice by the Authority/State Government to the Concessionaire and may extend up to a period not exceeding 180 (one hundred and eighty) days from the date of issue of such notice; provided that upon written request from the Concessionaire and the Lender's Representative, the Authority/State Government shall extend the aforesaid period of 180 (one hundred and eighty) days by a further period not exceeding [90 (ninety)] days.

21.2 Suspension by the Concessionaire

21.2.1. Suspension of construction or O&M of the Project Facilities

(a) At any time during the Concession Period, the Concessionaire may suspend, whether partially or wholly, the construction or O&M of any Project Facility, in case of an Emergency.

(b) The Concessionaire acknowledges that suspension of the construction of any Project Facility during the Construction Period pursuant to Article21.2.1(a) shall not entitle the Concessionaire to an extension of time, if such event is attributable to the Concessionaire.

(c) In case of suspension of the performance of the O&M services of any Project Facility pursuant to Article 21.2.1(a) for reasons attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, but not the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Article 21.2.1(a).

(d) In case of suspension of the performance of the O&M services pursuant to Article 21.2.1(a) for reasons not attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, and the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause Article 21.2.1(a).

(e) Upon the occurrence of an Emergency, the Concessionaire shall as soon as reasonably possible, and in no event later than [3 (three)] days after such occurrence, notify the Authority, with a copy to the State Government, of such occurrence.

(f) If, upon notification, the Authority/State Government does not concur with the

Concessionaire on the nature of such occurrence, then the Concessionaire shall be required to immediately re-commence the construction or O&M of the Project Facility, as the case may be. Upon re-commencement of the construction or O&M services, the Concessionaire may initiate a Dispute regarding its claim for the occurrence of such an event or circumstance, and such Dispute shall be finally settled in accordance with the dispute resolution procedure set out in Article 26, provided however that the burden of proof as to the occurrence or existence of such an event shall be upon the Concessionaire.

21.2.2. Mitigation, Resumption and Termination

(a) The Concessionaire shall make best endeavors to:

(i) mitigate the effects (including incremental costs and delays) of the events or circumstances resulting in suspension pursuant to Article 21.2.1(a) above. Notwithstanding anything to the contrary contained in this Agreement, if the Authority/State Government**,** in its sole assessment, is not satisfied with the steps being taken by the Concessionaire to mitigate the effects of the Emergency, the Authority/State Government shall have the right to step-in to this Agreement and undertake necessary measures to mitigate the effect of the Emergency at the cost and risk of the Concessionaire; and

(ii) resume the construction or O&M services of the Project Facility within 24 (twenty four) hours of the ceasing of any of the events or circumstances resulting in suspension pursuant to Article 21.2.1(a) or such longer period as may be approved by the Authority/State Government and notify the Authority/State Government of the resumption of the works or services.

(b) During the period of Suspension, the Authority shall, on behalf of the Concessionaire, collect all fee and revenues under and in accordance with this Agreement and deposit the same in the Escrow Account. The Authority/State Government shall be entitled to make withdrawals from the Escrow Account for meeting the costs incurred by it for discharging the Concessionaire's obligations;

(c) During the period of Suspension hereunder, all rights and liabilities vested in the Concessionaire in accordance with the provisions of this Agreement shall continue to vest therein and all things done or actions taken, including expenditure incurred by the Authority/State Government for discharging the obligations of the Concessionaire under and in accordance with this Agreement and the Project Agreement, shall be deemed to have been done or taken for and on behalf of the Concessionaire and the Concessionaire undertakes to indemnify the Authority for all costs incurred during such period.

(d) Without prejudice to Clause 21.2.2(a):

(i) if suspension of the construction or O&M of a Project Facility pursuant to Article 21.2.1(a) continues for a period of [60 (sixty)] days, and such event is attributable to the Concessionaire, then such suspension shall amount to a Concessionaire

Event of Default in accordance with Article 23; and

(ii) if suspension of the construction or O&M of a Project Facility pursuant to Article 21.2.1(a) continues for a period of [60 (sixty)] days, and such event is not attributable to the Concessionaire, then such event will be treated as a Force Majeure Event and the consequences set out in Article 20 shall apply.

21.3 Suspension by the Authority or the State Government

21.3.1. Suspension of construction and/or O&M of the Facilities

(a) At any time during the Concession Period, the Authority/State Government may suspend, whether partially or wholly, the construction or O&M of a Project Facility, in any of the following events or circumstances:

(i) upon the occurrence of an Emergency; or

(ii) if the Concessionaire fails to comply with Applicable Laws, Applicable Permits, the ESHS Documents, the O&M Manual or otherwise fails to perform its obligations in accordance with this Agreement (including the Technical Specifications).

(b) The Concessionaire acknowledges that suspension of the construction of the Project Facilities during the Construction Period pursuant to Article 21.3.1(a) shall not entitle the Concessionaire to an extension of time if such event is attributable to the Concessionaire.

(c) In case of suspension of the performance of the O&M services pursuant to Article 21.3.1(a) for reasons attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, less the Liquidated Damages payable by the Concessionaire for failure to operate the Project Facilities pursuant to Article 21.3.1(a). The Concessionaire shall not be entitled to the O&M Charges for the period during which it suspends the performance of the O&M services pursuant to Article 21.3.1(a).

(d) In case of suspension of the performance of the O&M services pursuant to Article 21.3.1(a) for reasons not attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, and the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Article 21.3.1(a).

21.3.2. Mitigation, Resumption and Termination

(a) The Concessionaire shall make best endeavors to:

(i) mitigate the effects (including incremental costs and delays) of the events or circumstances resulting in suspension pursuant to Article21.3.1 above. Notwithstanding anything to the contrary contained in this Agreement, if the

Authority/State Government, in its sole assessment, is not satisfied with the steps being taken by the Concessionaire to mitigate the effects of the Emergency, the Authority/State Government shall have the right to step-in to this Agreement and undertake necessary measures to mitigate the effect of the Emergency at the cost (as determined by the Project Engineer) and risk of the Concessionaire; and

(ii) resume the construction or O&M services of the relevant Project Facility within 24 (twenty four) hours of the ceasing of any of the events or circumstances resulting in suspension pursuant to Article 21.3.1 or such longer period as may be agreed between the Parties, and notify the Authority/State Government of the resumption of the works or services.

(b) Without prejudice to Article21.3.2(a):

(i) if suspension of the construction or O&M of the relevant Project Facility pursuant to Article 21.3.2(a)(i) and the Emergency is attributable to the Concessionaire, or a such suspension continues for a period of 60 (sixty) days, and such suspension is attributable to the Concessionaire then such suspension shall amount to a Concessionaire Event of Default in accordance with Article 23; and

(ii) if suspension of the construction or O&M of the relevant Facility pursuant to Article 21.3.2(a)continues for a period of 60 (sixty) days, and such suspension is not attributable to the Concessionaire, then such suspension will be treated as a Force Majeure Event and the consequences set out in Article 20 shall apply.

21.4 Revocation of Suspension

21.4.1 In the event that the Authority/State Government shall have rectified or removed the cause of Suspension within a period not exceeding 90 (ninety) days from the date of Suspension, it shall have the option to revoke the Suspension and restore the rights of the Concessionaire under this Agreement. For the avoidance of doubt, the Parties expressly agree that the Authority/State Government may, in its discretion, revoke the Suspension at any time, whether or not the cause of Suspension has been rectified or removed hereunder.

21.4.2 Upon the Concessionaire having cured the Event of Default within a period not exceeding 90 (ninety) days from the date of Suspension, the Authority/State Government shall revoke the Suspension forthwith and restore all rights of the Concessionaire under this Agreement.

21.5 Substitution of Concessionaire

At any time during the period of Suspension, the Lenders' Representative, on behalf of Senior Lenders, shall be entitled to substitute the Concessionaire under and in accordance with the Substitution Agreement, and upon receipt of notice there under from the Lender's Representative, the Authority/State Government shall withhold Termination for a period not exceeding [180 (one hundred and eighty)] days from the date of Suspension, and any extension thereof due to Concessionaire default, for enabling the Lenders' Representative to exercise its rights of substitution on behalf of Senior Lenders.

21.6 Termination

21.6.1 At any time during the period of Suspension under this Article 21, the Concessionaire may by notice require the Authority/State Government to revoke the Suspension and issue a Termination Notice. Subject to the rights of the Lenders' Representative to undertake substitution in accordance with the provisions of this Agreement, the Authority State Government shall, within [15 (fifteen)] days of receipt of such notice, terminate this Agreement under and in accordance with Article 21.

21.6.2 Notwithstanding anything to the contrary contained in this Agreement, in the event that Suspension is not revoked within [180 (one hundred and eighty)] days from the date of Suspension hereunder or within the extended period, if any, the Concession Agreement shall, upon expiry of aforesaid period, be deemed to have been terminated by mutual agreement of the Parties and all provisions of this Agreement shall apply, *mutatis mutandis*, to such Termination as if a Termination Notice had been issued by the Authority State Government upon occurrence of a Concessionaire Default.

ARTICLE 22
CHANGE IN LAW

22.1 Change in Law

The Concessionaire may claim the benefit of and/or relief for a Change in Law event subject to and in accordance with this Article 22.

22.2 Consequences of Change in Law

22.2.1. The Concessionaire shall not be allowed any relief and/or compensation for any Change in Law which is not a: (i) Qualifying Change in Law; or (ii) Fundamental Change in Law.

22.2.2. If a Qualifying Change in Law occurs, then the Concessionaire shall notify the State Government and the Authority of such Qualifying Change in Law along with details of:

(a) any necessary change in the Construction Plan, the O&M Manual or the Technical Specifications on the basis of which construction works and O&M services are required to be undertaken for the Facilities;

(b) any changes that are required to the terms of this Agreement to deal with such Qualifying Change in Law;

(c) any extension of the Scheduled Payment Milestone Completion Date or the Scheduled Construction Completion Date, to account for the delay, if any, resulting from the Qualifying Change in Law; and/or

(d) any increase in Costs that will result from the Qualifying Change in Law.

22.2.3. As soon as practicable and in any event, within 30 (thirty) days from the receipt of any notice from the Concessionaire under Article 22.2.2 above, the Parties shall agree on the consequences of the Qualifying Change in Law, as specified in the notice, and any way in which the Concessionaire can mitigate the effect of the Qualifying Change in Law, including:

(a) providing evidence that the Concessionaire has used reasonable endeavors (including, where practicable, the use of competitive quotes) to minimise any increase in Costs or oblige the Sub-Contractors to minimise any increase in Costs;

(b) providing evidence as to how the Qualifying Change in Law has affected prices of materials used for construction or O&M of Project facilities; and

(c) demonstrating to the State Government and the Authority that the Qualifying Change in Law is the direct cause of the increase in Costs or delay and the estimated increase in Costs, or extension of time could not reasonably be expected to be mitigated or recovered by the Concessionaire.

22.2.4. If the Parties fail to agree on the consequences of the Qualifying Change in Law within 30 (thirty) days from the receipt of any notice from the Concessionaire under Article

22.2.2above, the dispute will be finally settled in accordance with the dispute resolution procedure set out in Article 26.

22.2.5. If the Concessionaire has complied with Article 22.2.3 above and the Parties mutually agree or it is determined in accordance with Article 22.2.4 above, that the Concessionaire is required to incur additional Costs due to a Qualifying Change in Law, then:

(a) the Concessionaire shall be required to bear all Costs resulting from any one or more Qualifying Change in Law events, up to an aggregate amount equivalent to 0.5% (zero point five per cent) of the total Bid Project Cost (the **"Threshold Limit"**); and

(b) for any additional Costs resulting from the Qualifying Change in Law, which is in excess of the Threshold Limit, the Concessionaire shall be entitled to be compensated for such additional Costs, in excess of the Threshold Limit, by way of,

(i) a lump-sum payment of an amount equivalent to the additional Costs incurred by the Concessionaire, over and above the Threshold Limit; or

(ii) an appropriate adjustment in the O&M Charges.

(c) If the Concessionaire has complied with Article 22.2.3 above and the Parties mutually agree or it is determined in accordance with Article 26 that the Concessionaire will suffer any delay as a result of the occurrence of a Qualifying Change in Law, then the Concessionaire shall be entitled to an extension of time as mutually decided by the Authority, State Government and Concessionaire.

(d) In case of a dispute with respect to the quantum of relief (whether extension of time or compensation) that the Concessionaire shall be entitled to under this Article 22.2 shall be as agreed by the Parties or as determined in accordance with Article 26, provided always that:

(i) the Concessionaire shall bear any increased Cost to the extent of the Threshold Limit; and

(ii) the Concessionaire shall only be entitled to relief that is reasonable for such Qualifying Change in Law.

(e) Notwithstanding anything to the contrary in this Agreement, the Concessionaire shall not be entitled to any schedule relief and/or compensation or adjustment in the Bid Project Cost or the O&M Charges due to a Qualifying Change in Law, if such Qualifying Change in Law becomes applicable as a result of a delay in the execution of the Project, which is not attributable to a Delay Event.

(f) If a Fundamental Change in Law occurs, then,

(i) the affected Party may notify the other Parties of the effects of such Fundamental Change in Law on the validity and enforceability of this Concession Agreement or on the rights of the Concessionaire under this Agreement; and

(ii) any Party may propose amendments to the Concession Agreement, which would make the Concession Agreement compliant with Applicable Laws, while enabling the Parties to achieve their commercial objectives.

If the Parties are unable to agree on necessary amendments to the terms of this Agreement within 30 days of receipt of a notice from the affected Party or the Fundamental Change in Law event is such that it cannot be mitigated with amendments to the terms of this Agreement, the Fundamental Change in Law event shall be treated as a Direct Political Force Majeure Event in accordance with Article 20.

22.3 Increase in costs

22.3.1. Change in Law shall mean the occurrence or coming into force of any of the following, after the Compliance Date:

(a) The enactment of any new Indian law including laws related to environment, emission standards, etc.;

(b) The repeal, modification or re-enactment of any Applicable Law;

(c) A change in the interpretation or application of any Indian law by a court of record;

Provided that Change in Law shall not include:

(a) Coming into effect, after the Compliance Date, of any provision or statute which is already in place as of the Compliance Date,

(b) Any new law or any change in the existing law under the active consideration of or in the contemplation of any government as of the Compliance Date which is a matter of public knowledge (including *inter-alia*, by-laws, directions, orders, regulations to be issued under the SWM Rules);

(c) Any change in the rates of the Taxes which have a direct effect on the Project.

22.3.2. Subject to Change in Law resulting in Material Adverse Effect and subject to the Concessionaire taking necessary measures to mitigate the impact or likely impact of Change in Law on the Project, if as a result of Change in Law, the Concessionaire suffers an increase in costs or reduction in net after-tax return or other financial burden (the "**Additional Cost**"), the aggregate financial effect of which exceeds Rs. [•] (Rupees [•]) in any Financial Year, the Concessionaire may so notify the Project Engineer/ Authority/ State Government and notify with the information as required under Article 22.3.3 below and propose amendments to this Agreement so as to place the Concessionaire in the same financial position as it would have enjoyed had there been no such Change in Law resulting in increased costs, reduction in return or other financial burden as aforesaid. The said remedial measures would be discussed and consequences arising there from shall be dealt with as per terms of Article 22.3.4 below.

22.3.3. Upon occurrence of a Change in Law, the Concessionaire shall promptly, notify the Project Engineer/Authority/ State Government of the following:

(a) The nature and the impact of Change in Law on the Project;

(b) the estimate of the Additional Cost likely to be incurred by the Concessionaire on

account of Change in Law;

(c) The measures, which the Concessionaire has taken or proposes to take to mitigate the impact of Change in Law, including in particular, minimising the Additional Cost;

(d) The relief sought by the Concessionaire.

22.3.4. Upon notice by the Concessionaire, the Parties shall meet, as soon as reasonably practicable but no later than 30 (thirty) days from the date of notice, and either agree on amendments to this Agreement or on any other mutually agreed arrangement.

Provided that if no agreement is reached in respect of aforesaid remedial measure to cure the adverse effect of Change in Law within 90 (ninety) days of the aforesaid notice, the Concessionaire may by notice require the Authority/State Government to pay an amount equivalent to 50% (fifty per cent) of Additional Cost as determined/ certified by the Authority/State Government based on the facts and circumstances and verification of information submitted by the Concessionaire. For the avoidance of doubt, it is agreed that this Article 22 shall be restricted to changes in law directly affecting the Concessionaire's costs of performing its obligations under this Agreement.

ARTICLE 23
EVENTS OF DEFAULT AND TERMINATION

23.1 Events of Default

Event of Default shall mean either Concessionaire Event of Default or the Authority Event of Default or State Government Event of Default or all three as the context may admit or require.

23.2 Concessionaire Event of Default

23.2.1. In addition to any events specified elsewhere in this Agreement, events arising out of any acts or omissions of the Concessionaire and which have not occurred solely as a consequence of a Authority Event of Default, a State Government Event of Default, a Qualifying Change in Law, a Fundamental Change in Law or any other Force Majeure Event, and where the Concessionaire has failed to remedy the defects within any specified time period (to the extent any time period is provided), any of the following events shall constitute an Event of Default by the Concessionaire (the **"Concessionaire Event of Default"**):

(a) failure of the Concessionaire to complete the construction of a Project Facility by the expiry of the Grace Period;

(b) failure of the Concessionaire to pay the Delay Liquidated Damages within the timelines specified in this Agreement;

(c) failure of the Concessionaire to achieve successful completion of Trial Operations of Project Facilities;

(d) failure of the Concessionaire to remedy any reduction in Availability within [3 (three)] days of receipt of a notice from the Authority in accordance with Article18;

(e) failure of the Concessionaire to build and/or operate the Project in compliance with the KPIs and Technical Specifications;

(f) for any Project Facility, failure of the Concessionaire to achieve the KPIs for [2 (two)] consecutive days, [32 (thirty two)] times in a continuous [12 (twelve)] month period;

(g) suspension of the construction or O&M of a Project Facility pursuant to Article 21 (to the extent such Emergency is attributable to the Concessionaire) for a continuous period of 60 (sixty) days;

(h) a breach by the Concessionaire of its obligations under this Agreement which has a Material Adverse Effect on the ability of the Concessionaire to construct and/or operate and maintain the Project Facilities and such breach, if capable of being remedied, is not remedied within [30 (thirty)] days of issuance of written notice from Authority specifying such breach and requiring the Concessionaire to remedy the same;

(i) any representation made or warranties given by the Concessionaire under this Agreement being found to be false or misleading in any material respect;

(j) failure of the Concessionaire to submit and maintain a valid Performance Securities and O&M Securities in accordance with Article 9;

(k) failure of the Concessionaire to maintain a valid Mobilization Advance Guarantee in accordance with Article 9;

(l) breach by the Concessionaire of its obligations set forth in this Agreement;

(m) failure of the Concessionaire to obtain, renew and maintain any Concessionaire Applicable Permits;

(n) failure of the Concessionaire to comply with any Applicable Law (including specifically the EPA);

(o) failure of the Concessionaire to obtain and maintain insurance cover in accordance with Article 27;

(p) failure of the Concessionaire or the Sub-Contractors to comply with the ESHS Documents in accordance with Article 14;

(q) the breach of the Concessionaire's obligations under or the occurrence of an Event of Default or analogous event under the Financing Agreements or the Escrow Agreement, or termination of the Financing Agreements, or the Escrow Agreement (for reasons attributable to the Concessionaire).

(r) abandonment of the Project by the Concessionaire;

(s) the Concessionaire has unlawfully repudiated this Agreement or has otherwise expressed an intention not to be bound by this Agreement;

(t) a resolution for insolvency of the Concessionaire is passed, or any petition for insolvency of the Concessionaire is initiated before a court (including tribunal) of competent jurisdiction in accordance with the provisions of Insolvency and Bankruptcy Code, 2016 and such application has not been withdrawn within 14 (fourteen) days of the date thereof;

(u) if a trustee or receiver is appointed for the Concessionaire or for the whole or material part of its assets that has a material bearing on the Project;

(v) a resolution for winding up of the Concessionaire is passed, or any petition for winding up of the Concessionaire is admitted by a court (including tribunal) of competent jurisdiction in accordance with the provisions of Insolvency and Bankruptcy Code, 2016 or Companies Act, 1956/ Companies Act, 2013 and a liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Concessionaire is ordered to be wound up by Court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Concessionaire are

transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Concessionaire under this Agreement and the agreements in relation thereto; and provided that:

(i) the amalgamated or reconstructed entity has the capability and operating experience necessary for the performance of its obligations under this Agreement and the agreements in relation thereto; and

(ii) the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and the agreements in relation thereto and has a credit worthiness at least as good as that of the Concessionaire as at the Effective Date.

23.3 Authority Event of Default and State Government Event of Default

23.3.1. Any of the following events shall constitute an event of default by the Authority (the **"Authority Event of Default"**), when not caused by a Concessionaire Event of Default or Force Majeure Event:

(a) Authority has failed to make any payments due to the Concessionaire and more than 90 (ninety) days have elapsed since such default;

(b) Authority or the Department or the Project Engineer is in Material Breach of any of its obligations under this Agreement and have failed to cure such breach within 30 (thirty) days of receipt of notice thereof issued by the Concessionaire;

(c) Authority has unlawfully repudiated this Agreement or otherwise expressed its intention not to be bound by this Agreement;

(d) Authority has unreasonably withheld or delayed grant of any approval or permission within its respective jurisdictions and such delay and withholding is not attributable to Concessionaire or Force Majeure which the Concessionaire is obliged to seek under this Agreement, and thereby caused or likely to cause Material Adverse Effect;

(e) Any representations made or warranties given by the Authority under this Agreement have been found to be false or misleading.

23.3.2. A **State Government Event of Default** means any of the following events, unless such an event has occurred as a consequence of a Concessionaire Event of Default, or a Force Majeure Event and where the State Government has failed to remedy the defects within any specified time period (to the extent any time period is provided):

(a) a failure by the State Government to pay any undisputed amounts due and payable for 90 (ninety) consecutive days, notwithstanding service of a formal written demand by the Concessionaire;

(b) a failure by the State Government or the Authority to maintain the Minimum Escrow Balance for a period of 90 (ninety) days;

(c) any representation made or warranties given by the State Government under this Agreement being found to be false or misleading in any material respect.

23.4 Termination due to Event of Default

23.4.1 Termination for Concessionaire Event of Default

(a) Without prejudice to any other right or remedy which the Authority may have in respect thereof under this Agreement, upon the occurrence of a Concessionaire Event of Default, the Authority shall, be entitled to terminate this Agreement in the manner as set out under Article 23.4.1(b) and Article 23.4.1(c).

(b) Provided however that upon the occurrence of a Concessionaire Event of Default as specified under Article 23.2, the Authority may terminate this Agreement by issue of Termination Notice in the manner set out under Article 23.4.3 after giving the Concessionaire an opportunity of hearing.

(c) If the Authority decides to terminate this Agreement pursuant to preceding Article 23.4.1(a), it shall in the first instance issue Preliminary Notice to the Concessionaire. Within 30 (thirty) days of receipt of the Preliminary Notice, the Concessionaire shall submit to the Authority in sufficient detail, the manner in which it proposes to cure the underlying Event of Default (the "**Concessionaire's Proposal to Rectify**").

(d) In case of non-submission of the Concessionaire's Proposal to Rectify within the said period of 30 (thirty) days, the State Government and the Authority shall be entitled to terminate this Agreement by issuing Termination Notice, and the Performance Security of the Concessionaire shall get forfeited.

(e) If the Concessionaire's Proposal to rectify is submitted within the period stipulated therefor, the Concessionaire shall have further period of 30 (thirty) days to remedy/ cure the underlying Event of Default. If, however the Concessionaire fails to remedy/cure the underlying event of default within such further period allowed, the State Government and the Authority shall be entitled to terminate this Agreement, by issue of Termination Notice and the Performance Security of the Concessionaire shall get forfeited.

23.4.2 Termination for Authority Event of Default or State Government Event of Default

(a) Without prejudice to any other right or remedy which the Concessionaire may have in respect thereof under this Agreement, upon the occurrence of the Authority Event of Default or State Government Event of Default, the Concessionaire shall be entitled to terminate this Agreement by issuing Termination Notice;

(b) If the Concessionaire decides to terminate this Agreement pursuant to preceding Article 23.4.2(a) it shall in the first instance issue Preliminary Notice to the Authority or the State Government, as the case may be. Within 30 (thirty) days of receipt of Preliminary Notice, the Authority or the State Government, as the case may be, shall forward to the Concessionaire its proposal to remedy/ cure the underlying Event of Default (the

"**Authority/State Government Proposal to Rectify**"). In case of non-submission of Proposal to rectify by the Authority or the State Government, as the case may be, within the period stipulated therefor, Concessionaire shall be entitled to terminate this Agreement by issuing Termination Notice;

(c) If Authority/State Government Proposal to Rectify is forwarded to the Concessionaire within the period stipulated therefor, the Authority or the State Government, as the case may be, shall have further period of 30 (thirty) days to remedy/ cure the underlying Event of Default. If, however, the Authority or the State Government, as the case may be, fails to remedy/ cure the underlying Event of Default within such further period allowed, the Concessionaire shall be entitled to terminate this Agreement by issuing Termination Notice.

23.4.3 Termination Notice

If a Party has become entitled to do so decide to terminate this Agreement pursuant to the preceding sub Article 23.4.1 or 23.4.2, it shall issue Termination Notice setting out:

(a) in sufficient detail the underlying Event of Default;

(b) the Termination Date which shall be a date occurring not earlier than 60 (sixty) days from the date of Termination Notice;

(c) the estimated Termination Payment including the details of computation thereof; and,

(d) any other relevant information.

23.4.4 Obligation of Parties

Following issue of Termination Notice by either Party, the Parties shall promptly take all such steps as may be necessary or required to ensure that;

(a) until Termination is final the Parties shall, to the fullest extent possible, discharge their respective obligations so as to maintain the continued operation of the Project;

(b) the Termination Payment, if any, payable by the Authority/State Government in accordance with the Article 23.4.5 is paid to the Concessionaire within 30 (thirty) days of the Termination Date; and

(c) the Project is handed over to the Authority/State Government by the Concessionaire on the Termination Date free from any Encumbrance along with any payment that may be due by the Concessionaire to the Authority or the State Government.

23.4.5 Termination Payment for Authority Event of Default or State Government Event of Default

Upon Termination of this Agreement on account of Authority Event of Default or State Government Event of Default, the Concessionaire shall be entitled to receive back the Performance Security and also receive an amount equal to Debt Due and 110% (one hundred

and ten per cent) of the Adjusted Equity as Termination Payment.

23.4.6 Withdrawal of Termination Notice

Notwithstanding anything inconsistent contained in this Agreement, if the Party who has been served with the Termination Notice cures the underlying Event of Default to the satisfaction of the other Party at any time before the Termination occurs, the Termination Notice shall be withdrawn by the Party which had issued the same. Provided that the Party in breach shall compensate the other Party for any direct costs/ consequences occasioned by the Event of Default which caused the issue of Termination Notice.

23.4.7 Termination Payment for Concessionaire Event of Default

(a) Upon Termination of this Agreement on account of Concessionaire Event of Default before COD, no Termination Payment shall be made to the Concessionaire and the State Government or the Authority shall be entitled to forfeit the Performance Security of the Concessionaire;

(b) Upon Termination of this Agreement on account of Concessionaire Event of Default after COD, the State Government or the Authority shall be entitled to forfeit the Performance Security of the Concessionaire and pay Termination Payment to the Concessionaire as specified below:

An amount equal to 90% (ninety per cent) of Debt Due less Insurance cover; provided that, if any, insurance claims forming part of the Insurance cover are not admitted and paid, then 80% (eighty per cent) of such unpaid claims shall be included in the computation of Debt Due.

23.4.8 Upon termination of this Agreement

(a) The Concessionaire shall cease all work in relation to construction of the Project Facilities.

(b) The Concessionaire shall cease all work in relation to O&M of the Project Facilities.

(c) The Concessionaire shall take all necessary steps to safeguard and protect the Project Facilities (at whatever stage of completion or operation) and all other equipment, materials and goods on the Sites.

(d) The Concessionaire shall hand over the Sites and the immovable assets, to Authority or its nominee, to the extent applicable, as per Articles 23.4.9, 23.4.10, and 23.4.11.

(e) In case of termination of this Agreement due to an Authority Event of Default or State Government Event of Default, the Authority shall return the Performance Securities, the O&M Securities and the Mobilization Advance Guarantees, if not already returned to the Concessionaire, after adjusting any outstanding payments owed by the Concessionaire, within 30 (thirty) days from the Transfer Date.

(f) The Concessionaire agrees that on the service of a Termination Notice or 180 (one hundred and eighty) days prior to the expiry of the Concession Period by efflux of time, it shall conduct or cause to be conducted by the Project Engineer/ Authority / State Government, a survey (the **"Condition Survey"**) and inspection of the Project to ascertain the condition thereof, verify compliance with the Concessionaire's obligations under this Agreement and to prepare an inventory of the assets comprised in the Project;

(g) If, as a result of the Condition Survey, the Authority/State Government, and the Project Engineer shall observe/notice that the Project or any part thereof is not in the condition required thereof under this Agreement (except normal wear and tear) the Concessionaire shall, at its cost and expenses, take all necessary steps to put the same in the requisite conditions well before the Termination Date.

23.4.9 Transfer of the Sites and the Project Facilities

Upon the expiry or early termination of this Agreement, the Concessionaire shall hand over the Sites, the immovable assets such as Processing Facility, Material Recovery Facility, decentralized units, etc., to the Authority any other entity nominated by the Authority in accordance with this Article 23 on a date mutually decided by the Authority and the Concessionaire (the **"Transfer Date"**).

23.4.10 Inspection of the Sites and the Project Facilities

(a) No later than 30 (thirty) days from the end of the 19th(nineteenth) year of the O&M Period or 30 (thirty) days from the date of termination of the Agreement, as the case may be, the Authority/State Government shall or shall cause the Project Engineer to carry out a condition survey of the Sites and the Project Facilities to assess whether they have been maintained by the Concessionaire in accordance with its obligations under this Agreement, and are in working condition in line with the design life of the Project Facilities.

(b) Authority/State Government shall notify the Concessionaire at least 7 (seven) days prior to the date on which it wishes to carry out the survey of the Sites and the Project Facilities.

(c) If the survey carried out by the Authority/State Government or the Project Engineer shows that the Concessionaire has not or is not complying with its obligations under this Agreement, then the Authority/State Government shall notify the Concessionaire of the rectification and/or maintenance work which is required to ensure that the condition of the Sites and the Project Facilities is restored to the Hand-back Conditions.

(d) The Concessionaire shall carry out such rectification and/or maintenance work to achieve the Hand-back Conditions within 30 (thirty) days from the receipt of a notice from the Authority/State Government in accordance with Article 23.4.10(c) above, at its own cost and risk. Upon completion of the rectification and/or maintenance work, the Concessionaire shall request the Authority State Government to carry out a final survey and inspection of the Sites and the Project Facilities. The Authority shall carry

out the final survey within 7 (seven) days of receipt of a notice from the Concessionaire pursuant to this Article 23.4.10(d). [At the discretion of the Authority/State Government, the Concessionaire may be allowed extension of the period of [15 (fifteen)] days to rectify the defects notified by the Authority/State Government or Project Engineer if and to the extent that the Project Facilities cannot be used for the purposes for which they are intended after handing over by reason of a defect or damage attributable to the Concessionaire.]

(e) If the Authority/State Governments satisfied with the results of the final survey, then the Authority shall notify the Concessionaire within 7 (seven) days of carrying out the final survey that the Sites and the Project Facilities, comply with the Hand-back Conditions. If the Authority/State Governments not satisfied with the results of the final survey, then the Authority shall or shall cause the Project Engineer to estimate the cost of restoring the Sites and the Project Facilities to the Hand-back Conditions and recover such cost from the Concessionaire.

23.4.11 Hand-back Requirements

On the expiry or early termination of this Agreement, the Concessionaire shall, at its own cost:

(a) hand over to the Authority or any entity nominated by the Authority, the Sites and the Project Facilities;

(b) to the extent that such rights and interests are not already vested in the Authority, transfer all its rights and interest in the immovable assets comprising in the Project Facilities and execute such deeds and documents as may be necessary for this purpose and complete all related legal or other formalities;

(c) hand over all records and documents relating to the Sites and the Project Facilities including as-built records, Designs and Drawings, online monitoring and metering data, operating logs, manuals, reports, plans and records;

(d) transfer to the Authority or its nominee (free of cost) the license to use the Proposed Technology and other know-how relating to the Project Facilities;

(e) transfer or cause to be transferred to the Authority or its nominee any sub-contract that the Authority or its nominee has chosen to take over and terminate all other sub-contracts;

(f) transfer to the Authority or its nominee all Concessionaire Applicable Permits which the Authority or its nominee may require, and which can be legally transferred;

(g) remove from the Sites all employees and workmen, and movable assets, equipment and materials that are not required to be taken over by the Authority or its nominee; and

(h) cooperate with and assist the Authority with the Project post the handing over.

23.4.12 Consequences of termination due to a Force Majeure Event

In case of termination of the Agreement due to a Force Majeure Event, the following consequences shall apply:

(a) the Concessionaire shall hand over the Sites and the immovable assets, to Authority on an "as is where is" basis and to the extent relevant;

(b) Authority shall be required to return the Mobilization Advance Guarantees, Performance Securities or the O&M Securities, as the case may be, after adjusting any outstanding payments owed by the Concessionaire, to the Concessionaire within 30 (thirty) days from the Transfer Date; and

(c) in case of termination due to an Indirect Political Force Majeure Event or a Direct Political Force Majeure Event, Authority shall (or shall require the Project Engineer) to assess the Cost of the construction work undertaken by the Concessionaire in relation to the Project Facilities as on the date of the Termination Notice and based on such assessment, pay the Termination Compensation in accordance with Article 24.

23.5 Rights of Authority on Termination

23.5.1 Upon Termination of this Agreement for any reason whatsoever, Authority shall upon making the Termination Payment, if any, to the Concessionaire, have the power and authority to:

(a) enter upon and take possession and control of the Sites, constructed Project Facilities and the immovable assets, forth with;

(b) prohibit the Concessionaire and any person claiming through or under the Concessionaire from entering upon/ dealing with the Project including Project Facilities and the immovable assets;

23.5.2 Notwithstanding anything contained in this Agreement, Authority shall not, as consequence of Termination or otherwise, have any obligation whatsoever including but not limited to obligations as to compensation for loss of employment, continuance or regularization of employment, absorption or re-employment on any ground, in relation to any person in the employment of or engaged by the Concessionaire in connection with the Project, and the handover of the Project Facilities by the Concessionaire to the Authority shall be free from any such obligation/ fee/ penalties/taxes.

23.5.3 Termination Payment shall become due and payable to the Concessionaire within 15 (fifteen) days of a demand being made by the Concessionaire to the Authority/State Government with the necessary particulars, and in the event of any delay, the Authority/State Government shall pay interest at a rate equal to 3% (three per cent) above the State Bank of India Base Rate on the amount of Termination Payment remaining unpaid; provided that such delay shall not exceed 90 (ninety) days. For the avoidance of doubt, it is expressly agreed that the Termination Payments shall become due and payable by the Authority/State Government upon actual or constructive handover of the Sites, Project

Facilities and immovable assets by the Concessionaire to the Authority clear from all encumbrances, charges and liens whatsoever, unless expressly agreed by the Parties otherwise.

23.5.4 The Concessionaire expressly agrees that Termination Payment under this Article 23 shall constitute a full and final settlement of all claims of the Concessionaire on account of Termination of this Agreement for any reason whatsoever and that the Concessionaire or any shareholder thereof shall not have any further right or claim under any law, treaty, convention, contract or otherwise.

23.5.5 The Authority, the State Government, and the Concessionaire hereby unconditionally acknowledge and agree that, without prejudice to their any other right or remedy, the Authority or the State Government shall be entitled to pay the Termination Payment [to the extent required] to the Lenders' Representative for procuring discharge/ release of the any charge/ hypothecation created by Concessionaire on the movable assets for securing payment of Debt Due; and for this purpose the Lender is entitled to receive from the Authority/State Government, without any further reference to or consent of the Concessionaire, the Debt Due upon Termination of the Concession Agreement. For realisation of the Debt Due as aforesaid, the Lenders' Representative shall be entitled to make its claim from the Escrow Account in accordance with the provisions of the Concession Agreement and the Escrow Agreement; and Concessionaire hereby irrevocably agree that such payment by the Authority/State Government shall be full and final settlement of proportionate claim of Termination Payment to the Concessionaire under this Agreement.

23.6 Accrued Rights and liabilities of Parties

(a) Notwithstanding anything to the contrary contained in this Agreement, Termination pursuant to any of the provisions of this Agreement shall be without prejudice to accrued rights of either Party including its right to claim and recover money as damages and other rights and remedies which it may have in law or contract. All accrued rights and obligations of either Party under this Agreement, including without limitation those relating to the Termination Payment, shall survive the Termination but only to the extent such survival is necessary for giving effect to such rights and obligations.

(b) Nothing in Article 23 shall prevent or restrict a Party to seek injunctive relief or a decree of specific performance or other discretionary remedies of the court.

ARTICLE 24

TERMINATION COMPENSATION

24.1 Termination Compensation for Termination post the Compliance Date but prior to the Construction Completion Date

24.1.1. For an Authority Event of Default or State Government Event of Default

If the Agreement is terminated prior to the Construction Completion Date for an Authority Event of Default or State Government Event of Default shall be liable to pay to the Concessionaire the aggregate of:

(a) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by Authority as on the date of the Termination Notice;

(b) Debt Due;

(c) Equity infused in the Concessionaire as on the date of Termination Notice along with interest on the Equity at the rate of the prevailing SBI MCLR + 3% (three per cent);

LESS

(a) any unadjusted Mobilization Advance (and interest if any);

(b) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.1.2. For a Concessionaire Event of Default (in accordance with **Schedule 18**)

If the Agreement is terminated prior to the Construction Completion Date for a Concessionaire Event of Default, the Authority or the State Government shall pay to the Concessionaire, the aggregate of:

(a) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by Authority as on the date of the Termination Notice;

(b) 85% (eighty five per cent) of Debt Due;

LESS

(a) any unadjusted Mobilization Advance (and interest if any);

(b) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.2 Termination Compensation for Termination post the Construction Completion Date but prior to the COD

24.2.1. For an Authority Event of Default or State Government Event of Default

If the Agreement is terminated post the Construction Completion Date but prior to the COD for an Authority Event of Default or State Government Event of Default, the Authority or the State Government shall be liable to pay to the Concessionaire the aggregate of:

(a) Construction Payments, if not already paid as on the date of the Termination Notice;

(b) Debt Due;

(c) Equity infused in the Concessionaire as on the date of Termination Notice along with interest on the Equity at the rate of the prevailing SBI MCLR + 3% (three per cent);

LESS

(a) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.2.2. For a Concessionaire Event of Default (in accordance with **Schedule 18**)

If the Agreement is terminated post the Construction Completion Date but prior to the COD for a Concessionaire Event of Default, the Authority or the State Government shall pay to the Concessionaire, the aggregate of:

(a) Construction Payments, if not already paid as on the date of the Termination Notice;

(b) 85% (eighty five per cent) of Debt Due;

LESS

(a) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.3 Termination Compensation for Termination post the COD

24.3.1. For an Authority Event of Default or State Government Event of Default

If the Agreement is terminated post the COD for an Authority Event of Default or State Government Event of Default, the Authority or the State Government shall be liable to pay to the Concessionaire the aggregate of:

(a) Construction Payments that remain outstanding on the date of the Termination Notice;

(b) O&M Payments due to the Concessionaire as on the date of the Termination Notice;

(c) Capex Annuity for the unexpired portion of the O&M Period;

LESS

(a) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.3.2. For a Concessionaire Event of Default (in accordance with **Schedule 18**)

If the Agreement is terminated post the COD for a Concessionaire Event of Default, the Authority or the State Government shall pay to the Concessionaire, the aggregate of:

(a) Construction Payments that remain outstanding on the date of the Termination Notice;

(b) O&M Payments due to the Concessionaire as on the date of the Termination Notice;

(c) Such percentage of Capex Annuity payments for Post-COD facilities for the unexpired portion of the O&M period;

LESS

(a) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.4 Termination Compensation for Termination due to a Force Majeure Event

24.4.1. Non-Political Force Majeure Event and Indirect Political Force Majeure

(a) If the Agreement is terminated due to an Indirect Political Force Majeure Event or Non-Political Force Majeure Event, prior to the COD:

(i) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by Authority as on the date of the Termination Notice under Article 20;

(ii) Debt Due;

LESS

(i) any insurance proceeds received and retained by the Concessionaire

(b) If the Agreement is terminated due to an Indirect Political Force Majeure Event or Non-Political Force Majeure Event, post the COD, Authority or the State Government shall be liable to pay to the Concessionaire:

(i) Construction Payments that remain outstanding on the date of the Termination Notice in case of facilities under Article 20;

(ii) O&M Payments due to the Concessionaire as on the date of the notice of termination under Article 20;

(iii) Debt Due;

LESS

(i) any insurance proceeds received and retained by the Concessionaire.

(c) Direct Political Force Majeure

(i) If the Agreement is terminated due to a Direct Political Force Majeure Event, prior to the COD, Authority or the State Government shall be liable to pay to the Concessionaire:

(A) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by Authority as on the date of the notice of termination under Article 20;

(B) Debt Due;

(C) Equity infused in the Concessionaire as on the date of the notice of termination under Article 20 along with interest on the Equity at the rate of the prevailing SBI MCLR + 3% (three per cent);

LESS

(D) any unadjusted Mobilization Advance (and interest if any);

(E) any insurance proceeds received and retained by the Concessionaire; and

(F) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

(ii) If the Agreement is terminated due to a Direct Political Force Majeure Event post the COD, the Authority or the State Government shall be liable to pay to the Concessionaire:

(A) Construction Payments that remain outstanding on the date of the notice of termination under Article 20;
(B) O&M Payments due to the Concessionaire as on the date of the notice of termination under Article 20;
(C) Capex Annuity for the unexpired portion of the O&M Period;

LESS

(D) any insurance proceeds received and retained by the Concessionaire; and

(A) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

24.5 All Termination Compensation required to be paid by ***the State Government or the Authority*** to the Concessionaire shall be paid within 60 (sixty) days of transfer of the Sites and the Project Facilities in accordance with Article 23.

24.6 Limitations on Termination Compensation

(a) Termination Compensation, due and payable under this Agreement shall be limited to the Debt Due and Adjusted Equity, as the case may be, which form part of the Bid Project Cost, in accordance with the provisions of this Agreement. For avoidance of doubt, it is agreed that within a period of [60 (sixty)] days from COD, the Concessionaire shall notify to the Authority (with a copy to the State Government), the Bid Project Cost and its disaggregation between Debt Due and Equity, and only the amounts so conveyed shall form the basis of computing Termination Compensation, and it is further agreed that in the event such disaggregation is not notified to the Authority, the Equity and Debt Due shall be arrived at by adopting the proportion between debt and equity as specified in the Financing Agreements. The Parties also agree that, notwithstanding anything contained in this Agreement, for the purposes of computing Termination Compensation, the Debt Due shall at no time exceed [50% (fifty per cent)] of the Bid Project Cost.

(b) The amount payable in respect of any Debt Due expressed in foreign currency shall be computed at the Reference Exchange Rate for conversion into the relevant foreign currency as on the date of Termination Compensation. Provided, however, that the provisions of this Article 24.6 (b) shall not apply if the Concessionaire does not notify the particulars of any foreign currency loans within [60 (sixty)] days of the date of conversion of such foreign currency loans into Indian currency. Provided further that all borrowings in foreign currency shall be restricted to the financing of the Bid Project Cost ad any borrowings in excess thereof shall not qualify for computation of Termination Compensation.

24.7 Full and Final Settlement

Notwithstanding anything to the contrary elsewhere in this Agreement, any Termination Compensation determined pursuant to this Article 24 shall, once paid, be in full and final settlement of any claim, demand and/or proceedings of the Concessionaire against the Authority or the State Government, in relation to Termination of this Agreement and the Concessionaire shall be excluded from all other rights and remedies in respect of such Termination.

24.8 The provisions of this Article 24 shall survive the Termination of this Agreement.

ARTICLE 25
SUBSTITUTION OF THE CONCESSIONAIRE

25.1 Substitution by Lenders' Representative

In the event of Concessionaire's default, Authority shall, if there be any Lenders, send copy of the Termination Notice to the Lenders' Representative to inform and grant 15 (fifteen) days to the Lenders' Representative, for making representation on behalf of the Lenders stating the intention to substitute the Concessionaire. In case Authority receives representation on behalf of the Lenders, within the aforesaid period, the Authority shall withhold the termination for period not exceeding 180 (one hundred and eighty) days, for enabling the Lenders' Representative to exercise the Lenders' right of substitution in accordance with the Substitution Agreement, and substitute the Concessionaire with Nominated Company.

25.2 Substitution by the Authority

In the event that no company is nominated by the Lender's Representative to act as the Nominated Company, Authority may either substitute the Concessionaire with its own Nominated Company in accordance with the Substitution Agreement, or terminate the Agreement.

25.3 Substitution Process

While carrying out substitution, the Lender's Representative or the Authority, as the case may be, shall invite competitive bids from the prospective parties for acting as the Nominated Company and substituting the Concessionaire. Such Nominated Company shall have to agree to bear all the liabilities of the Concessionaire in terms of this Agreement and Financing Agreement.

25.4 Consequences of Substitution

Authority shall grant, to the Nominated Company, the right to develop, design, finance, construct, operate and maintain the Project (including entering into Sub-Contracts) together with all other rights of the Concessionaire under this Agreement, subject to fulfillment of the Concessionaire's entire obligation under this Agreement by such Nominated Company, for the remainder of the term of this Agreement. Such rights shall be granted by the Authority through the novation of the Agreement, if applicable, in favour of the Nominated Company.

The Authority shall also execute new Substitution Agreement with the Nominated Company and the Lenders, if there be any. All Sub-Contracts and agreements in respect of the Project including Financing Agreements and all Sub-Contracts executed by the Concessionaire shall stand transferred and novated in favour of the Nominated Company. Further all rights of the Concessionaire on the Sites and Project Assets in terms of the Agreement shall stand transferred and novated in favour of the Nominated Company. All approvals/ clearances of the Authority received by the Concessionaire shall stand transferred and novated in favour of the Nominated Company. The Concessionaire shall get replaced by the Nominated Company for all purposes related to the Project.

ARTICLE 26
DISPUTE RESOLUTION

26.1. Amicable Resolution

26.1.1. Save where expressly stated to the contrary in this Agreement, any dispute, difference or controversy of whatever nature between the Parties, howsoever arising under, out of or in relation to this Agreement, including those arising with regard to acts, decision or opinion of the Authority State Government (the "**Dispute**") and so notified in writing by either Party, shall in the first instance be attempted to be resolved amicably by the representatives of the Parties in accordancewiththeproceduresetforthinArticle26.1.2below.

26.1.2. In the event of a Dispute, either Party may require such Dispute to be referred to the competent authority, the State Government, the Authority (or the Person holding charge) and the Chief Executive Officer of the Concessionaire for the time being, for amicable settlement. Upon such reference, the representatives of the Parties shall within 15 (fifteen) days of service of a written notice from one Party to the other Party(ies) (the **"Dispute Notice")** hold a meeting (the **"Dispute Meeting"**) in an effort to resolve the Dispute in good faith. In the absence of any agreement to the contrary, the Dispute Meeting shall be held at the office of the Authority/State Government in [Location] and the Dispute may be mutually settled between the parties.

26.1.3. The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

26.1.4. If the Dispute is not amicably settled within 15 (fifteen) days of the Dispute Meeting, either Party may refer the Dispute to conciliation or arbitration in accordance with the provisions of Article 26.2 and 26.3below.

26.2. Conciliation

In the event of any Dispute between the Parties, either Party may call upon the Project Engineer, as the case may be, to mediate and assist the Parties in arriving at an amicable settlement thereof. Failing mediation by the Project Engineer or without the intervention of the Project Engineer, as the case may be, either Party may require such Dispute to be referred to the State Government, the Principal Secretary to the Authority and the Chairman of the Board of Directors of the Concessionaire for amicable settlement, and upon such reference, the said persons shall meet no later than [7 (seven)] days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the [7 (seven)] day period or the Dispute is not amicably settled within [15 (fifteen)] days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within [30 (thirty)] days of the notice in writing referred to in Article 26.1.1 or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the provisions of Article 26.3.

26.3. Arbitration

26.2.1. Procedure

Subject to the provisions of Sub-Clauses 26.1 and 26.2, any Dispute which is not resolved amicably shall be finally settled by reference to arbitration. Such arbitration shall be held in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi, or such other rules as may be mutually agreed by the parties, and shall be subject to the provisions of the Arbitration and Conciliation Act, 1996. The expenses of arbitration shall be borne equally by both the Parties.

26.2.2. Arbitration Panel

There shall be a panel of three arbitrators, of whom each Party shall appoint one, and the third arbitrator shall be appointed by the two arbitrators so selected, and in the event of disagreement between the two arbitrators, the appointment shall be made in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi.

26.2.3. Place of Arbitration

The place of arbitration shall ordinarily be [Location] but by agreement of the Parties, the arbitration hearings, if required, may be held elsewhere.

26.2.4. Language

The request for arbitration, the answer to the request, the terms of reference, any written submissions, any orders and awards shall be in English and, if oral hearings take place, English shall be the language to be used in the hearings. Any party using other than English as language shall supply the other party an authorized transcript of true translation of its submissions into English at its costs and expenses.

26.2.5. Enforcement of Award

(a) The arbitrators shall make a reasoned award (the "**Award**"). Any Award made in any arbitration held pursuant to this Article 26 shall be final and binding on the Parties as from the date it is made, and the Concessionaire and the Authority/State Government agree and undertake to carry out such Award without delay subject to the rights of the aggrieved parties to secure relief from any higher forum.

(b) The Concessionaire and the Authority State Government agree that an Award may be enforced against the Concessionaire and/or the Authority/State Government, as the case may be, and their respective assets wherever situated.

(c) This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

26.4. Performance during Dispute

Pending the submission of and/or decision on a Dispute and until the arbitral Award is published, the Parties shall continue to perform their respective obligations under this

Agreement without prejudice to a final adjustment in accordance with such Award.

26.5. Adjudication by Regulatory Authority or Commission

In the event of constitution of a statutory regulatory authority or commission with powers to adjudicate upon Disputes between the Concessionaire and the Authority/State Government, all Disputes arising after such constitution shall, instead of reference to arbitration under Article 26.3, be adjudicated upon by such regulatory authority or commission in accordance with the Applicable Law and all references to Dispute Resolution Procedure shall be construed accordingly. For the avoidance of doubt, the Parties hereto agree that the adjudication hereunder shall not be final and binding until an appeal against such adjudication has been decided by an appellate tribunal or High Court, as the case may be, or no such appeal has been preferred within the time specified in the Applicable Law.

ARTICLE 27
INSURANCE

27.1. Insurance Cover

27.1.1. The Concessionaire shall, at its cost and expense, purchase and maintain effective from the Compliance Date and during the Concession Period such insurance policies for such maximum sums as are necessary and customary under Financing Documents and Applicable Laws, and/or in accordance with Good Industry Practice (or may in the future become available) on commercially reasonable terms and reasonably required to be maintained consistent with projects and facilities of the size and type of the Project, including but not limited to the following:

(a) Builders'/Sub-Contractors' all risk insurance;

(b) Erection insurance and/or break down insurance;

(c) Public liability insurance applicable for the Concession Period, Termination and post-Termination period;

(d) Statutory insurances such as workmen's compensation insurance or any other insurance required by the Applicable Laws;

(e) Comprehensive Third Party liability insurance including injury or death to Persons who may enter the Sites;

(f) Insurance policies related to any of the Concessionaire's obligations hereunder;

(g) Any other insurance that may be considered necessary by the Authority/ State Government/ Lenders of the Concessionaire, if any, to protect the Concessionaire, its employees and its assets (against loss, damage or destruction at replacement value) or otherwise, including all Force Majeure Events that are insurable and not otherwise covered in items (a) to(f).

27.2. Insurance Companies and Costs

27.2.1. The Concessionaire shall insure all insurable Project Assets comprised in the Project;

27.2.2. All insurance policies supplied by the Concessionaire shall include a waiver of any right of subrogation of the insurers there under against, *inter-alia*, the State Government, the Authority, and its assigns, subsidiaries, affiliates, employees, insurers and underwriters and of any right of the insurers of any set-off or counterclaim or any other deduction, whether by attachment or otherwise, in respect of any liability of any such person insured under any such policy.

27.2.3. The Concessionaire hereby further releases, assigns and waives any and all rights of recovery against, *inter-alia*, the State Government, the Authority, and its affiliates, subsidiaries, employees, successors, assigns, insurers and underwriters, which the Concessionaire may otherwise have or acquire in or from or in any way connected with any

loss covered by policies of insurance maintained or required to be maintained by the Concessionaire pursuant to this Agreement (other than Third Party liability insurance policies) or because of deductible articles in or inadequacy of limits of any such policies of insurance, unless otherwise mentioned in this Agreement.

27.3. Evidence of Insurance Cover

The Concessionaire shall, from time to time, provide to the State Government and the Authority copies of all insurance policies (or appropriate endorsements, certifications or other satisfactory evidence of insurance) obtained by the Concessionaire in accordance with this Agreement.

27.4. Application of Insurance Proceeds

All moneys received under insurance policies shall be promptly applied by the Concessionaire towards repair or renovation or restoration or substitution or replacement of the Project or any part thereof, which may have been damaged or destroyed. The Concessionaire shall carry out such repair or renovation or restoration or substitution or replacement to the extent possible in such manner that the Project or any part thereof, shall, after such repair or renovation or restoration or substitution or replacement be as far as possible in the same condition as they were before such damage or destruction, normal wear and tear expected.

27.5. Validity of the Insurance Cover

The Concessionaire shall pay the premium payable on such insurance policies so as to keep the policies in force and valid throughout the Concession Period and furnish copies of the same to the State Government and the Authority. Each insurance policy shall provide that the same shall not be cancelled or terminated unless 10 (ten) days' clear notice of cancellation is provided to the State Government and the Authority in writing. If at any time the Concessionaire fails to purchase and maintain in full force and effect any and all of the insurances required under this Agreement, the State Government or the Authority may at its option purchase and maintain such insurance and all sums incurred by the State Government or the Authority in this behalf shall be reimbursed by the Concessionaire forthwith on demand, failing which the same shall be recovered by the State Government or the Authority by exercising right of set-off or otherwise from the Performance Security.

ARTICLE 28
VARIATION

28.1 State Government, Authority and the Concessionaire may, at any time during the Concession Period, propose a Variation to the Scope of Work, Technical Specifications, and/or the Designs and Drawings.

28.2 State Government/Authority Proposed Variation

28.2.1. State Government/Authority may propose a Variation in the Scope of Work, Technical Specifications or the approved Designs and Drawings. Provided that, State Government/Authority shall not propose a Variation, which: (i) is not technically feasible; or (ii) is not in compliance with any Applicable Law or Applicable Permit.

28.2.2. Within 15 (fifteen) days of receipt of a request for Variation from State Government/Authority**,** the Concessionaire shall submit a proposal to State Government/Authority(with a copy to the Project Engineer) setting out in sufficient detail the implications of the proposed Variation, including any implications on the Construction Plan, the Scheduled Milestone Completion Date, the Scheduled Construction Completion Date and Scope of Work and additional Costs incurred in undertaking the Variation or any reduction in Costs resulting from the Variation. It is clarified that the additional Costs incurred in undertaking the Variation or any reduction in Costs resulting from the Variation will be determined on the basis of State Government/Authority's schedule of rates for similar works.

28.2.3. Notwithstanding anything to the contrary in this Article 28.2, the Concessionaire shall have the right to reject a Variation proposed by State Government/Authority if, in the Concessionaire's view, the proposed variation will result in: (i) the Concessionaire incurring additional Costs, of more than 25% (twenty five per cent) of the Bid Project Cost; (ii) reduction in the Bid Project Cost by more than 25% (twenty five per cent); or (iii) a delay of more than 120 (one hundred and twenty) days in a Scheduled Milestone Completion Date or the Scheduled Construction Completion Date.

28.2.4. Based on its review of the proposal submitted by the Concessionaire, State Government/Authority may, at its sole discretion: (i) accept the proposal and the corresponding adjustment to the Construction Plan and/or the additional Costs or reduction in the Bid Project Cost for undertaking the Variation; (ii) provide its comments on the proposal seeking amendments and/or justification for the implications put forth by the Concessionaire; or (iii) reject the proposal submitted by the Concessionaire and withdraw the proposed Variation, within 15 (fifteen) days from the date of receipt of the Concessionaire's proposal under Sub-Clause 28.2(b) above.

28.2.5. To the extent State Government/Authority seeks amendments and/or justification in the proposal submitted by the Concessionaire, the Concessionaire shall incorporate or address, in writing, State Government/Authority's comments and submit a revised proposal.

28.2.6. On approval of the proposal or the revised proposal, as the case may be, State Government/Authority shall issue a Variation Order and Concessionaire shall proceed with the Variation in accordance with the Variation Order.

28.2.7. If the Parties are unable to agree on the implications of a Variation proposed by State Government/Authority, which in State Government/Authority's view is necessary or desirable for the Project, State Government/Authority shall have the right to require the Concessionaire to carry out the proposed variation at the cost determined in accordance with State Government/Authority's schedule of rates for similar works. Where State Government/Authority's schedule of rates do not provide schedule of rates for similar works, then the cost of the works covered by the proposed Variation will be determined by State Government/Authority, in consultation with the Project Engineer. Any dispute on the terms of the Variation will be resolved in accordance with Article 26.

28.2.8. On implementation of a Variation Order, the Concessionaire shall be entitled to the agreed adjustment to the Construction Plan, Scheduled Milestone Completion Date, Scheduled Construction Completion Date and/or payment of additional amounts, if any, set out in the Variation Order.

28.3 Concessionaire Proposed Variation

28.3.1. The Concessionaire may propose a Variation if it considers such Variation necessary or desirable to improve the efficiency, quality, reliability, durability, maintainability or safety of the Project Facilities.

28.3.2. To propose a Variation, the Concessionaire shall submit a proposal to Authority (with a copy to the Project Engineer and the State Government), with a statement setting out:

(a) the need for a Variation;

(b) the additional work required; and

(c) adjustment to the Compliance Date, Construction Plan, Scheduled Milestone Completion Date and Scheduled Construction Completion Date;

28.3.3. Based on its review of the proposal submitted by the Concessionaire, if State Government/Authority is of the view that the proposed Variation is justified, then it will determine the cost of the proposed Variation using State Government/Authority's schedule of rates for similar works and where State Government/Authority's schedule of rates do not provide schedule of rates for similar works, then the cost of the works covered by the proposed Variation will be determined by State Government/Authority, in consultation with the Project Engineer. Thereafter, State Government/Authority shall notify the Concessionaire of the additional cost determined by State Government/Authority for the proposed Variation and any other comments that State Government/Authority may have on the implications of the proposed Variation. To the extent State Government/Authority seeks amendments and/or justification in the proposal submitted by the Concessionaire, the Concessionaire shall incorporate or address, in writing, State Government/Authority's comments.

28.3.4. On the Concessionaire's acceptance of the costs determined by State Government/Authority for the proposed Variation and any other amendments sought by State Government/Authority to the Concessionaire's proposal, State Government/Authority shall issue a Variation Order and Concessionaire shall proceed with the Variation in accordance with the Variation Order.

28.3.5. On implementation of a Variation Order, the Concessionaire shall be entitled to the agreed adjustment in the Construction Plan and/or additional costs, as set out in the Variation Order.

28.4 Notwithstanding anything to the contrary in this Article 28, the Concessionaire shall be bound to implement any Variation that is necessitated by a Change in Law and any consequent adjustment in the Construction Plan and additional Costs shall be determined in accordance with Article 22.

28.5 Notwithstanding the above, a Variation made necessary due to any act, omission or default of the Concessionaire or any Sub-Contractor in the performance of the Concessionaire's obligations under this Agreement shall not entitle the Concessionaire to any adjustment in the Construction Plan or any other compensation or relief.

28.6 No Variation shall invalidate this Agreement.

ARTICLE 29
INTELLECTUAL PROPERTY ANDCONFIDENTIALITY

29.1 Proprietary Material

29.1.1. The property in all designs, drawings, processes, methods, details, plans, concepts, technology, specifications, schedules, programs, reports, calculations, documents and other works relating to the Project, including intellectual property rights therein or thereto, whether registered or not, which have been or are hereafter written, originated, made or generated by the Concessionaire or any of its employees, Sub-Contractors, consultants or agents in connection with this Agreement or the design, development, construction, operation and maintenance of the Project/Project Facilities/Project Assets, shall be and remain at all times the property of the Concessionaire, vest exclusively in the Concessionaire and ensure to the exclusive benefit of the Concessionaire (the **"Proprietary Material"**).

29.1.2. The Concessionaire, as beneficial owner, hereby grants to the Authority a perpetual non-exclusive license to use such Proprietary Material in connection with the Project, irrevocably and free of cost. Such license shall carry the right to use the Proprietary Material for all purposes connected with the Project; however, it shall not be transferable to a Third Party. Such license shall automatically get extended to the Authority for Project purpose only, and not for Third Party use or transfer, upon the Termination of this Agreement or the discharge by the Concessionaire of its duties hereunder.

29.2 Confidentiality

29.2.1. The Project Engineer/ Authority/ State Government shall not at any time divulge or disclose or suffer or permit its servants or agents to divulge or disclose, transfer, communicate to any Person or use in any manner for any purpose unconnected with the Project any Proprietary Material or other information, material, documents, records or data, concerning the Project, the Concessionaire and the Project Engineer, the State Government, the Authority(including any information concerning the contents of this Agreement) except of its directors, officials, employees, Sub-Contractors, consultants, agents or representatives on a need to know basis or as may be required by any law, rule, regulation or any judicial process.

29.2.2. The Authority/State Government shall use such Proprietary Material and information only for the purposes of this Agreement or as otherwise expressly permitted by the Concessionaire in writing.

29.2.3. The Concessionaire shall ensure that all its directors, employees, Sub-Contractors, consultants, agents or representatives execute, deliver and comply with customary confidentiality and non-disclosure agreements reasonably required by the Authority/State Government, have been duly approved by the Authority/ State Government, with respect to the Project.

29.2.4. The aforesaid provisions shall not apply to the following information:-

(i) Obtained from a Third Party who is free to divulge the same and which was not obtained under any obligation of confidentiality; or

(ii) Already in the public domain otherwise than by breach of this Agreement;

(iii) Disclosed due to a court order or under any Act of GoI/Government of [Name of the State] or required by Applicable Laws.

29.3 Survival

The Concessionaire and the Authority accept and confirm that the provisions of this Article 29 shall survive the Termination of this Agreement.

ARTICLE 30
ACCOUNTS AND AUDIT

30.1 The Concessionaire shall maintain full accounts of all revenues derived/collected by it from and on account of use of the Project and of O&M expenses and other costs paid out of the Escrow Account and shall provide to the Authority and the State Government copies of the said accounts duly audited and certified by the Concessionaire's Statutory Auditors within 120 (one hundred twenty) days of the close of each Financial Year to which they pertain, during the subsistence of this Agreement. Such audited accounts shall form the basis of various payments by either Party under this Agreement. The Concessionaire shall also furnish, within one week of its publication, certified copies of the audited accounts and annual report published by the Company under the Applicable Laws.

30.2 The Concessionaire shall appoint and have during the subsistence of this Agreement as its Statutory Auditors (the "**Statutory Auditors**") a firm of Chartered Accountants duly licensed to practice in India out of the mutually agreed list of [10 (ten)] independent and reputable firms of Chartered Accountants in India (the "**List of Chartered Accountants**"). The criteria for preparing the List of Chartered Accountants are set forth in **Schedule 19**. Subject to a 30 (thirty) days' notice to Authority and the State Government and the replacement Statutory Auditors being appointed from the List of Chartered Accountants, the Concessionaire may terminate the appointment of any Statutory Auditor appointed in accordance with this Article. The fees and expenses of the Statutory Auditors shall be borne by the Concessionaire.

30.3 On or before the 15th (fifteenth) day of April each year, the Concessionaire shall provide for the preceding Financial Year a statement duly audited by its Statutory Auditors giving summarized information, the revenues derived from the Project and such other information as the Authority and the State Government may reasonably require.

30.4 Notwithstanding anything to the contrary contained in this Agreement, the Authority and the State Government shall have the right but not the obligation to appoint at its cost another firm of Chartered Accountants from the List of Chartered Accountants (the "**Additional Auditor**") to audit and verify all those matters, expense, costs, realisations and things which the Statutory Auditors of the Concessionaire, are required to do, undertake or certify pursuant to this Agreement.

30.5 In the event of there being any difference between the finding of the Additional Auditor, and the certification provided by the Statutory Auditors of the Concessionaire, such Auditors shall meet to resolve such differences and if they are unable to resolve the same such disputed certification shall be resolved by recourse to the Dispute resolution procedure.

ARTICLE 31
MISCELLANEOUS

31.1 Assignment and Charges

31.1.1. The Concessionaire shall not assign in favor of any person this Agreement or the rights, benefits and obligations hereunder save and except with prior consent of the Authority and the State Government.

31.1.2. Restraint set forth in Article 31.1.1 shall not apply to:

(a) liens/ encumbrances arising by operation of law (or by an agreement evidencing the same) in the ordinary course of business of the Concessionaire;

(b) mortgage/pledge/hypothecation of movable assets/goods purchased by Concessionaire, revenue and receivables received by Concessionaire (excluding Insurance proceeds) in favor of the Lenders for the Project.

Provided, no charge/ mortgage/ lien/ hypothecation or encumbrance of any kind whatsoever can be created or construed as allowed to be created over the Project Assets including the Sites, assets and equipment provided by the Authority for the Project.

Provided further that irrespective of security hereinabove permitted, Concessionaire is irrevocably obligated to procure release of such security and hand over to the Authority, upon Termination of this Agreement, their respective Project Assets free of all Encumbrances whatsoever.

31.1.3. The Concessionaire shall not create nor permit to subsist any further Encumbrance over the Sites.

31.2 Interest and Right of Set-Off

Any sum which becomes payable under any of the provisions of this Agreement by one Party to the other Party shall, if the same is not paid within the time allowed for payment thereof, shall be deemed to be a debt owed by the Party responsible for payment thereof to the Party entitled to receive the same. Such sum shall until payment thereof carry interest at prevailing PLR of State Bank of India per annum from the due date for payment thereof until the same is paid to or otherwise realized by the Party entitled to the same. Without prejudice to any other right or remedy that may be available under this Agreement or otherwise under law, the Party entitled to receive such amount shall also have the right of set-off.

Provided the stipulation regarding interest for delayed payments contained in this Article 31.2 shall neither be deemed nor construed to authorize any delay in payment of any amount due by a Party nor be deemed or construed to be a waiver of the underlying breach of payment obligations.

31.3 Governing Law and Jurisdiction

This Agreement shall be governed by the laws of India. The Courts in the State of [Name of the State] shall have jurisdiction over all matters arising out of or relating to this Agreement.

31.4 Waiver

Waiver by either Party of any default by the other Party in the observance and performance of any provision of or obligations under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorized representative of such Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation hereunder nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver/breach of any terms, conditions or provisions of this Agreement.

31.5 Survival

(a) Termination of this Agreement shall not relieve the Concessionaire or the Authority/State Government of any obligations already incurred hereunder which expressly or by implication survives Termination hereof, and except as otherwise provided in any provision of this Agreement expressly limiting the liability of any Party, shall not relieve any Party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

(b) Termination shall:

(i) not relieve the Concessionaire or the Authority/State Government, as the case may be, of any obligations hereunder which expressly or by implication survive Termination hereof; and

(ii) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of, or caused by, acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

All obligations surviving Termination shall only survive for a period of [3 (three) years] following the date of such Termination.

31.6 Amendments

This Agreement and the Schedules together constitute a complete and exclusive understanding of the terms of the Agreement between the Parties on the subject hereof and no amendment or modification hereto shall be valid and effective unless agreed to by all the Parties hereto and evidenced in writing.

31.7 Notices

Unless otherwise stated, notices to be given under this Agreement including but not limited to a notice of waiver of any term, breach of any term of this Agreement and termination of this Agreement, shall be in writing and shall be given by hand delivery, recognized international courier, mail, telex or facsimile transmission and delivered or transmitted to the Parties at their respective addresses as specified below or such address, email address, telex number, or facsimile number as may be duly notified by the respective Parties from time to time, and shall be deemed to have been made or delivered:

(a) in the case of any communication made by letter, when delivered by hand, by recognized international courier or by mail (registered, return receipt requested) at that address, and

(b) in the case of any communication made by telex or facsimile, when transmitted properly addressed to such telex number or facsimile number.

31.8 Severability

If for any reason whatsoever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties shall negotiate in good faith with a view to agreeing upon one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable. Provided failure to agree upon any such provisions shall not be subject to Dispute Resolution under this Agreement or otherwise.

31.9 No Partnership

Nothing contained in this Agreement shall be construed or interpreted to create an association, joint venture or partnership between the Parties. Neither Party shall have any authority to bind the other in any manner whatsoever.

31.10 Language

All notices required to be given under this Agreement and all communications, documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in English language and true translation into English language if other than English is used at the costs and expenses of the Party sending such communication, notice, documentation and proceedings.

31.11 Counterparts

This Agreement may be executed in [6 (six)] counterparts, each of which when executed and delivered shall constitute an original of this Agreement but shall together constitute one and only the Agreement.

31.12 Liability for Review

Except to the extent expressly provided in this Agreement:

(a) no review, comment, certification, verification or approval by the Authority or State Government, of any Project Agreement, design, detailed engineering, or document, accounts, invoice, etc., submitted by the Concessionaire nor any observation, testing, certification, validation or inspection of the construction, operation or maintenance of the Project nor the failure to review, approve, comment, observe, test or inspect hereunder shall relieve or absolve the Concessionaire from its obligations, duties and liabilities under this Agreement, the Applicable Laws and Applicable Approvals; and

(b) the State Government, the Authority, their advisors or shall not be liable to the Concessionaire by reason of any review, comment, approval observation, testing, certification, verification, validation or inspection referred in Sub-Clause (a)above.

31.13 Unforeseen Event

Any event or condition that has not been explicitly covered under the provisions of this Agreement shall be resolved after discussion and mutual agreement between the Parties.

31.14 Liability and Indemnification

(a) The Concessionaire shall indemnify, defend and hold harmless (the "**Indemnifying Party**") the Authority and the State Government(the "**Indemnified Parties**") during the Concession Period from and against all liabilities, damages, losses, expenses, claims, suits, proceedings, judgments, settlements, actions, costs of any nature whatsoever, whether directly or indirectly arising, for personal injury, for damage to or loss of any property and any Third Party liability, including reasonable attorneys' fees, actually incurred or suffered by the Indemnified Parties, arising out of or in any way connected with (i) any breach, negligence, default, omission, violation, infringement etc., as the case may be, by the Indemnifying Party or Persons claiming through or under it or due to such Party's representations and warranties herein; covenants, agreements or obligations contained herein or the terms and conditions hereof; any intellectual property right of any Person; (ii) failure of the Indemnifying Party or Persons claiming through or under it to comply with Applicable Laws or the Applicable Permits or to pay taxes or make contractual or other payments due and payable to any Person; (iii) the employment, sickness, injury or death of any Person employed directly or indirectly by the Indemnifying Party or Persons claiming through or under it ;or(iv) as provided elsewhere herein.

(b) The Concessionaire shall be responsible for executing, performing its obligationshereunderinaccordancewiththeprovisionsofthisAgreementatitsrisk and consequence and shall be responsible for any liability whatsoever arising under, in connection with or in relation to the discharge of obligations hereunder by the Concessionaire or Persons claiming through or under it and shall indemnify, keep indemnified and hold the Authority and the State Government and its advisors harmless in this behalf.

(c) The Authority and the State Government shall not be liable to the Concessionaire for any indirect, consequential, incidental, punitive or exemplary damages, loss of profit, consequential financial or economic loss or any disruption in the flow of Solid Waste into the Project for any reason whatsoever.

(d) The Concessionaire shall keep the Authority and the State Government indemnified during the Concession Period against any claims, damages, liabilities, costs, penalties etc. (i) from or by any Government Authority, including the CPCB or the SPCB, and Third Parties for damages to the environment or any acts, omissions, defaults or negligence of the Concessionaire that damages the environment; and (ii) resulting from accidents at work, occupational diseases and contingencies that may arise at or around the Sites or in the employment of labor and personnel at the Project. The Concessionaire shall remain liable for its acts or omissions in implementing the Project in accordance with the Technical Specifications and the Applicable Laws even after the Termination of this Agreement by efflux of time or otherwise.

(e) Except as expressly provided in this Agreement, the Concessionaire shall carry out and perform its rights and obligations under this Agreement and the Project Agreements at its own cost and risk. It shall be fully responsible for and shall bear the financial risks in relation to the Project and all its rights and obligations under or pursuant to this Agreement and the Project Agreements till the Termination Date.

(f) The provisions of this Article 31.15 shall survive the Termination of this Agreement.

31.15 Liability for review of Documents and Drawings

Except to the extent expressly provided in this Agreement:

(a) no review, comment or approval by the Authority or the State Government or the Independent Expert of any Project Agreement, Document or Drawing submitted by the Concessionaire nor any observation or inspection of the construction, operation or maintenance of the Project nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the Concessionaire from its obligations, duties and liabilities under this Agreement, the Applicable Laws and Applicable Permits; and

(b) the Authority and the State Government shall not be liable to the Concessionaire by reason of any review, comment, approval, observation or inspection referred to in Sub-Article (a) above.

31.16 Reservation of Rights

No forbearance, indulgence, relaxation or inaction by the Concessionaire at any time to require performance of any of the provisions of this Agreement shall in any way affect, diminish or prejudice the right of the Authority or the State Government to require performance of that provision, and no delay in exercising or omitting to exercise any right, power or remedy accruing to the Authority or the State Government upon any default or

otherwise under this Agreement shall impair any such right, power or remedy or shall be construed to be a waiver thereof or any acquiescence in such default, nor shall the action or inaction of the Authority or the State Government in respect of any default or any acquiescence by it in any default, affect or impair any right, power or remedy of the Authority or the State Government in respect of any other default.

31.17 Third Parties

This Agreement and all rights hereunder are intended for the sole benefit of the Parties and, to the extent expressly provided, for the benefit of the Authority Related Parties, the State Government Related Parties, the Concessionaire Related Parties and the Lenders, and shall not imply or create any rights on the part of, or obligations to, any other Person.

31.18 Entire Agreement

This Agreement and the Schedules together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the subject hereof, and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in this behalf by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Agreement are abrogated and withdrawn. For the avoidance of doubt, the Parties hereto agree that any obligations of the Concessionaire arising from the RFP, shall be deemed to form part of this Agreement and treated as such.

ARTICLE 32

DEFINITIONS

In this Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

1. **"Access Road"** means a motorable approach road required to be built (if any) for providing access to the Site(s) to the Concessionaire;

2. **"Additional Cost"** means the additional capital expenditure and/or the additional operating costs or both as the case may be, which the Concessionaire is required to incur, post the Compliance Date, on account of Change in Law;

3. **"Additional Performance Security** "means the performance security that must be submitted by the Selected Bidder to the Authority**,** together with the Performance Security and ESHS Performance Security to secure the obligations of the Concessionaire/Bidder in accordance with the requirements of this Agreement;

4. **"Adjoining Property"** means any land and/or property adjoining or adjacent or any part of the Site, including all conduits, roads, footpaths, walls, fences, buildings and other erections, structures and other apparatus on, under or within such land and/or property.

5. **"Adjusted DG Set Units"** has the meaning ascribed to it in Article 17.1.6(g)(B)(II).

6. **"Adjusted Equity"** means the Equity funded in Indian Rupees and adjusted on the first day of the current month (the "**Reference Date**"), in the manner set forth below, to reflect the change in its value on account of depreciation and variations in Wholesale Price Index (WPI) applicable to 'All Commodities' announced by Government of India, and for any Reference Date occurring:

   (a) on or before Commercial Operation Date (COD), the Adjusted Equity shall be a sum equal to the Equity funded in Indian Rupees and expended on the Project, revised to the extent of one half of the variation in WPI occurring between the first day of the month of Compliance Date and the Reference Date;

   (b) from Commercial Operation Date (COD) and until the 5th (fifth) anniversary thereof, an amount equal to the Adjusted Equity as on COD shall be deemed to be the base (the "Base Adjusted Equity") and the Adjusted Equity hereunder shall be a sum equal to the Base Adjusted Equity, revised at the commencement of each month following COD to the extent of variation in WPI occurring between COD and the Reference Date;

   (c) after the 5th (fifth) anniversary of COD, the Adjusted Equity hereunder shall be a sum equal to the Base Adjusted Equity, reduced by 0.33% (zero point three three percent) thereof at the commencement of each month following the 5th (fifth) anniversary of COD and the amount so arrived at shall be revised to the extent of variation in WPI occurring between COD and the Reference Date;

   (d) For the avoidance of doubt, the Adjusted Equity shall, in the event of Concession Period, be computed as on the Reference Date immediately preceding the Concession

Period Date; provided that no reduction in the Base Adjusted Equity shall be made for a period equal to the duration, if any, for which the Concession Period is extended, but the revision on account of WPI shall continue to be made;

7. **"Affected Party"** means the Party claiming to be affected by a Force Majeure Event in accordance with Article 20;

8. **"Agreement"** or **"Concession Agreement"** means this agreement executed between the State Government, the Authority and the Concessionaire including its Schedules and annexures and includes any amendments made thereto in accordance with the provisions hereof;

9. **"Applicable Law"** means all laws, acts, ordinances, rules, regulations notifications and guidelines in force and effect, including *inter-alia* the the Environment Protection Act, 1986, Solid Waste Management Rules, 2016, the Construction and Demolition Waste Management Rules, 2016, the Plastic Waste Management Rules, 2016, the E-Waste Management Rules, 2016, the Hazardous Waste Management Rules, 2016, Guidelines for Disposal of Legacy Waste, 2019 by CPCB and CPHEEO Manual on Municipal Solid Waste Management, 2016, National Building Code, ISO standards and BIS standards, and shall also include judgments, decrees, injunctions, writs or orders of any court of record as may be in force and effect as of the date hereof and shall include any amendment or re-enactment thereof from time to time, having jurisdiction over any Party, this Agreement, the Project, the Project Agreements and each document, instrument and agreement delivered hereunder or in connection herewith;

10. **"Applicable Permits"** means all the authorizations, licenses, clearances, permits, no-objections, sanctions and consents as required under Applicable Laws, at its respective cost, to be procured by the Concessionaire in connection with the implementation of the Project;

11. **"Article"** means an article of this Agreement.

12. **"Associate"** means, in relation to the Concessionaire, [the Selected Bidder or a member of the Selected Bidder], a person who controls, or is controlled by, or is under the common control of the same person who controls the concessionaire, the selected bidder or member of the selected bidder, as the case may be.

13. **"Authority Event of Default"** shall have the meaning assigned thereto in Article 23;

14. **"Authority's Representative** "means any officer nominated by the Authority, from time to time, to act on its behalf and liaise with the Concessionaire and the State Government for the purposes of this Agreement and notified as such in writing to the Concessionaire and the State Government.

15. **"Availability"** means the availability of the Project Facilities to collect, transport process and dispose Solid Waste and bio-remediate legacy waste, as determined in accordance with Articles 18.1.1(a), 18.1.2(a) and 18.1.3(a).

16. **"Availability Liquidated Damages"** means the liquidated damages payable by the Concessionaire to the Authority for failure to achieve the Guaranteed Availability, in

accordance with Article 18.2.1.

17. **"Bio-Remediation"** shall hold the meaning ascribed to it under the Guidelines on Legacy Waste Management on Old Municipal Dumpsites, 2019.

18. **"C&T"** or **"Collection and Transportation"** refers to primary and secondary collection and transportation of Solid Waste from the Project Area to the Processing Facility/ Sanitary Landfill;

19. **"Change in Law"** shall have the meaning assigned thereto in Article 22**;**

20. **"Clause"** means a clause of this Concession Agreement.

21. **"Compliance Date"** means the later of the date by which the Condition Precedent of the Parties under Article 4are achieved or waived;

22. **"Compliance Period"** shall have the meaning assigned thereto in Article 4.2.1;

23. **"Concession"** shall have the meaning as assigned thereto in Article 3.1.1;

24. **"Concessionaire Event of Default"** shall have the meaning assigned thereto in Article 23;

25. **"Conditions Precedent"** means conditions to be satisfied before commencement of the Project as specified in Article 4;

26. **"Commercial Operations Date"** or **"COD"** means the date when the Concessionaire begins commercial operations of the Processing Facility pursuant to issuance of Completion Certificate by the Authority;

27. **"Commencement Date"** shall have the meaning as assigned to it in Article 5.1;

28. **"Completion Certificate(s)"** shall refer to the Certificate to be issued by the Authority/Project Engineer as set out in Schedule 15, upon successful commissioning and functioning of the Processing Facility;

29. **"Concessionaire's Representative"** means the Person nominated by the Concessionaire, from time to time, to act on its behalf and liaise with the State Government and the Authority for the purposes of this Agreement and notified as such in writing to the State Government and the Authority.

30. **"Conditions Precedent"** means collectively, the obligations of the Concessionaire that are set out at Article 4, the obligations of the State Government and the Authority that are set out at Article 6 and '**Condition Precedent**' means any one of these.

31. **"Construction & Demolition (C&D) Debris" or "Debris"** means solid waste resulting from construction, re-modelling, repair, renovation or demolition of Structures or from land clearing activities. "**Structures**" for the purposes of this definition means buildings of all types (both residential and non-residential), utilities, infrastructure facilities and any other type of man-made structure. "**Debris"** includes, but is not limited to bricks, concrete rubble

and other masonry materials, soil, rock, wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, roofing, waterproofing material and other roof coverings, asphalt pavement, glass, plastics, paper, gypsum boards, electrical wiring and components containing no hazardous materials, pipes, steel, aluminium and other non-hazardous metals used in construction of structures;

32. **"Construction Payment"** means the payments to be made to the Concessionaire during the Construction Period, upon satisfactory completion of the Payment Milestones, which shall, in aggregate, be equivalent to 45% of the Bid Project Cost, as adjusted from time to time to reflect the variation in the Construction Price Index.

33. **"Construction Price Index"** shall comprise: (a) 70% of WPI; and (b) 30% of CPI(IW),which constituents may be substituted by such alternative index or indices as the Parties may mutually agree;

34. **"Contractor" or "Sub-Contractor"** means any Person with whom the Concessionaire has entered into/may enter into any material contract in relation to the Project;

35. **"Cost"** means all documented expenditure reasonably incurred by the Concessionaire, whether on or off the Site, including overhead and similar charges, but does not include profit.

36. **"CPCB"** means the Central Pollution Control Board of the Government of India;

37. **"CPI (IW)"**means the Consumer Price Index for Industrial Workers published by the Labour Bureau, GoI and shall include any index which substitutes the CPI(IW), and any reference to CPI(IW) shall, unless the context otherwise requires, be construed as a reference to the CPI(IW) published on the last date of the preceding quarter;

38. **"Daily Weight Sheet"** shall have the meaning assigned thereto in Schedule 16;

39. **"Dead Remains"** means the dead bodies, carcasses, bones or skeletal remains of animals, rodents and other living beings (other than plants)**;**

40. **"Debt Due"** means the aggregate of the following sums expressed in Indian Rupees outstanding on the Termination Date:

(a) the principal amount of the debt provided by Lenders under the Financing Agreements for financing the Bid Project Cost (the "**principal**") but excluding any part of the principal that had fallen due for repayment 6 (six) months prior to the Termination Date;

(b) all accrued interest, financing fees and charges payable under the Financing Agreements on, or in respect of, the debt referred to in Sub-Article (a) above until the Termination Date but excluding (i) any interest, fees or charges that had fallen due 3 (three) months prior to the Termination Date, (ii) any penal interest or charges payable under the Financing Agreements to any Lender, and (iii) any pre-payment charges in relation to accelerated repayment of debt except where such charges have arisen due to Authority Default or State Government Default; and

(c) any Subordinated Debt which is included in the Financial Package disbursed by lenders for financing the Bid Project Cost; provided that if all or any part of the Debt Due is convertible into equity at the option of Lenders and/or the Concessionaire, it shall for the purposes of this Agreement be deemed to be Debt Due even after such conversion and the principal shall be dealt with as if such conversion had not been undertaken. For the Purposes of this Agreement, the term "Subordinated Debt" shall mean the debt provided by lenders or the Concessionaire's shareholders for meeting the Bid Project Cost and shall be subordinate to the financial assistance provided by Senior Lenders.

41. **"Debt Service"** means the sum of all payments on account of principal, interest, financing fees and charges due and payable in a Financial Year to the Lenders under the Financing Agreements;

42. **"Design and Drawings"** means: (a) the Basic Engineering Designs; (b) the Screening Report and (c) the detailed 'good for construction' designs and drawings, technical information, plans, samples, patterns, models and specifications for the works required for achieving the first Payment Milestone.

43. **"Designated Bins"** means the collection bins placed by the Concessionaire at locations recommended by the Concessionaire and approved by the Authority for receiving the Primary Collection & Transportation of Solid Waste within the Project Area;

44. **"Disposal** "means the final and safe disposal of post processed residual solid waste and inert street sweepings and silt from surface drains on land as specified in Schedule I of the SWM Rules 2016 to prevent contamination of groundwater, surface water, ambient air, and attraction of animals and birds;

45. **"Dispute"** shall have the meaning assigned thereto in Article 26hereof;

46. **"Dispute Resolution Procedure"** means the procedure for resolution of disputes as set forth in Article 26;

47. **"Dumpsite"** means a land utilised by Authority for disposal of solid waste without following the principles of sanitary land filling;

48. **"EIA"** means the Environment Impact Assessment for the Project;

49. **"Emergency"** means conditions or situation that is likely to endanger the safety of the individuals on or about the Project or which poses an immediate threat of material damage to the Project;

50. **"Encumbrances"** means any encumbrance such as mortgage, charge, pledge, lien, hypothecation, security interest or other obligations and shall also include physical encumbrances, including encroachments on the Site;

51. **"Engineered Sanitary Landfill Site"** or **"Sanitary Landfill Site" or "Sanitary Landfill" or "SLF"** means the Sanitary Landfill Site to be developed, constructed and operated by

the Concessionaire at the allocated site in conformance with the terms of this Agreement for disposal of residual inert matter and rejected waste; and the site where the concessionaire conducts a final and safe disposal of residual inert matter, residual solid waste and inert waste, which is designed with protective measures against pollution of ground water, surface water and fugitive air dust, wind-blown litter, bad odour, fire hazard, animal menace, bird menace, pests or rodents, green-house gas emissions, persistent organic pollutants slope instability and erosion in accordance with the terms of this Agreement;

52. **"Equity"** means the sum expressed in Indian Rupees representing the paid up equity share capital of the Concessionaire for meeting the equity component of the Total Project Cost, and for the purposes of this Agreement shall include convertible instruments which has converted into equity share capital of the Company;

53. **"Event of Default"** shall have the meaning assigned thereto in Article 23;

54. **"Escrow Account"** means the interest-bearing account opened by State Government with the Escrow Bank in accordance with the Escrow Agreement, which shall be operational until the expiry of the Concession Period.

55. **"Escrow Bank"** means the Scheduled Bank with which State Government opens the Escrow Account, pursuant to the Escrow Agreement;

56. **"Escrow Agreement**" means the agreement to be executed among the State Government, the Authority, the Concessionaire, and the Escrow Bank in relation to the opening and operations of the Escrow Account, in the form set out at Schedule 17;

57. **"Excluded Waste"** means waste material of the nature that the Project is not designed or authorised to receive, manage, process and dispose which includes (i) Hazardous Waste, (ii) Bio-Medical Waste (iii) Dead Remains, (iv) E- Waste and (v) construction and demolition waste;

58. **"Execution Date"** means the date of signing of the Concession Agreement;

59. **"Event of Default** "means the State Government Event of Default, Authority Event of Default or a Concessionaire Event of Default, as the context may require.

60. **"Facility"** means any establishment wherein the solid waste management processes namely segregation, recovery, storage, collection, recycling, processing, treatment, or safe disposal are carried out

61. **"Financing Agreements" or** "**Financing Documents"** means collectively the agreements entered into for providing the debt financing for the implementation of the Project and shall include the security documents creating the relevant security (such as mortgages or charges or liens) on the Project or any part thereof in line with this Agreement, for securing the debt provided for funding the Bid Project Cost;

62. **"Financial Assistance** "means all funded and non-funded financial assistance, including loans, advances and guarantees or any re-financing that the Concessionaire may avail of for

the Project from the Lenders;

63. **"Financial Close** "means, the date on which the Financing Documents become effective, the conditions precedent under the Financing Documents for disbursements are fulfilled and the Concessionaire has access to the Financial Assistance;

64. "**Financial Default** means occurrence of breach of the terms and conditions of the Financing Agreements or continuous default in Debt service by the Concessionaire for period of 3 (three) months;

65. "**Financial Model**" means the financial model adopted by Senior Lenders, setting forth the capital and operating costs of the Project and revenues there from on the basis of which financial viability of the Project has been determined by the Senior Lenders, and includes a description of the assumptions and parameters used for making calculations and projections therein;

66. **"Financial Package"** means the financing package indicating the total capital cost of the Project and the means of financing thereof, as set forth in the Financial Model and approved by the Senior Lenders, and includes Equity, all Financial Assistance specified in the Financing Agreements, Subordinated Debt, if any;

67. **"Financial Year"** shall mean a year commencing on 1st April of a calendar year and ending on 31st March of the immediately succeeding calendar year;

68. **"Force Majeure"** or **"Force Majeure Event"** means an act, event, condition or occurrence as specified in Article 20;

69. **"Fundamental Change in Law"** means any Change in Law that:

(a) renders unenforceable, illegal, invalid or void any material right or material obligation of the Concessionaire under this Agreement; or

(b) renders a material part of this Agreement invalid, illegal or unenforceable; or

(c) results in the Concessionaire being deprived of the whole or a substantial part of the benefit of this Agreement.

70. **"GoI"** means the Government of India;

71. "**Good Industry Practice"** means the exercise of that degree of skill, diligence, prudence and foresight in compliance with the undertakings and obligations under this Agreement which would reasonably and ordinarily be expected of a skilled and an experienced person engaged in the implementation, operation and maintenance or supervision or monitoring thereof or any of them or facilities similar to the Project Facilities;

72. **"Government Agency"** means GoI, Government of [Name of the State], PLBs, the Authority or any Governmental Department, Commission, Board, Body, Bureau, Agency, Authority, Instrumentality, Court or Other Judicial or Administrative body, Central, State, or local, having Jurisdiction over the Concessionaire, the Site/Project or any portion thereof, or the performance of all or any of the services or obligations of the Concessionaire under or pursuant to this Agreement;

73. **"Grace Period"** shall mean as defined in Article 14.11.5;

74. **"Guaranteed Energy Consumption"** means the maximum number of units of power (in kWh) per ton quoted by the Selected Bidder in the Financial Proposal, which it expects to consume during the O&M Period [(other than any units expected to be generated and consumed from the Power Plant)], to operate and maintain the Project, at varying volumes and compositions of solid waste. The Guaranteed Energy Consumption for any quarter during the O&M Period will be determined on the basis of the number of units of power (in kWh) per ton quoted by the Selected Bidder in the Financial Proposal for the average volume and composition of waste processed and disposed at the Site(s) in such quarter (such average to be calculated in accordance with the KPI Adherence Report).

75. **"Hand-back Conditions"** mean the condition in which the Site, the Facilities, and the Power Plant, if any, shall be handed back to the Authority or any entity nominated by the Authority on expiry or early termination of this Agreement, which is consistent with the due performance of the Concessionaire's obligations under this Agreement.

76. **"Hand-back Requirement"** means the obligations of the Concessionaire in relation to transfer of the Facilities upon expiry or early termination of the Project, as set out in Article 23.4.11;

77. **"Hazardous Waste"** shall have the meaning as defined under the Hazardous Wastes Management Rules, 2016 and as amended thereto;

78. **"ICT Infrastructure"** shall mean all Information & Communication Technology Infrastructure, equipment and systems (including software, hardware, firmware, networks and websites) including but not limited to sensors, geographical positioning systems, cameras, electronic weigh bridges and associated software, to facilitate the functioning of the project on day to day basis;

79. **"Intellectual Property Rights"** means patents, copyrights, database rights, design rights, trade-marks, service marks, trade names, domain names, rights in reputation, rights in undisclosed or confidential information (such as know-how, trade secrets and inventions, whether patentable or not), and other rights of a like nature (whether registered or unregistered) and all applications for such rights as may exist anywhere in the world;

80. **"Invoice** "means an invoice for payment of: (a) the Construction Payments during the Construction Period; or (b) the Capex Annuity (along with interest), the O&M Charges and the Power Charges during the O&M Period, submitted by the Concessionaire to the Authority (with a copy to the State Government) in accordance with Article 17;

81. **"KPI Adherence Report"** shall have the meaning ascribed to it under Article 18.3.2(c);

82. **"KPI"** means the key performance indicators set out in Article 18, which the Project must achieve during the Construction Period and the O&M Period.

83. **"Legacy Waste"** shall have the meaning as provided under the CPCB Guidelines for Disposal of Legacy Waste, 2019;

84. **"Lenders" or "Senior Lenders"** means any person, financial institutions, banks, funds and trustees for bond holders or debenture holders, who have provided loans for financing the Bid Project Cost as evidenced in Financing Documents;

85. **"Letter of Award"** or **"LOA**" means the letter no. [•] dated [•], issued by the Authority to the Selected Bidder for developing the Project in terms of this Agreement;

86. **"Liquidated Damages"** means the Delay Liquidated

87. Damages, the Availability Liquidated Damages, the Performance Liquidated Damages and the Power Consumption Liquidated Damages.

88. **"MNRE"** means Ministry of New & Renewable Energy, GoI;

89. **"Material Adverse Effect"** means a material adverse effect of any act or event on the ability of any Party to perform any of its obligations under and in accordance with the provisions of this Agreement and which act or event causes a material financial burden or loss to any or all Party(ies);

90. "**Material Breach**" means a breach by any Party of any of its obligations under this Agreement which has or is likely to have a Material Adverse Effect on the Project and which such Party shall have failed to cure;

91. **"Material Recovery Facility"** means a facility where non-compostable solid waste can be temporarily stored by the Authority or any other entity mentioned in Rule 2 of the SWM Rules 2016 or any person or agency authorised by any of them to facilitate segregation, sorting and recovery of recyclables from various components of waste by authorised informal sector of waste pickers, informal recyclers or any other work force engaged by the Authority or entity mentioned in Rule 2 of the SWM Rules 2016 for the purpose before the waste is delivered or taken up for its processing or disposal;

92. **"Minor Casualty"** means any fire or other casualty that results in physical damage to the Project Facilities to the extent that the total cost (as estimated by the Project Engineer) of repairing and/or replacing the damaged portion of the Project Facilities as the case may be, to the same condition as previously existed would not exceed the amount of [INR 25, 00,000 (Rupees twenty five lakhs)].

93. "**Nominated Company** means the entity that is selected either by the Lenders or by the Authority/State Governmentfor substituting the Concessionaire, upon occurrence of Concessionaire's Event of Default, in terms of the provisions of the Agreement and the Substitution Agreement;

94. "**Operational Plan**" means a comprehensive plan with location of Designated Bins, their pickup schedule, vehicle planning & scheduling for Secondary Collection and Transportation of Solid Waste in the Project Area, as prepared by the Concessionaire and approved by the Authority and the State Government;

95. **"O&M"** means operation and maintenance;

96. **"O&M Charges** "means the amount required by the Concessionaire per quarter to operate and maintain the Project, excluding the Power Charges, during the O&M Period. The O&M charges for the first quarter after the COD will be determined on the basis of the O&M charges quoted by the Selected Bidder (in the Financial Proposal) for the first month from the COD, which amount shall then be adjusted to reflect the variation in the O&M Price Index.

97. **"O&M Expenses"** means the expenses incurred in the operation and maintenance of the Project and includes all matters connected with or incidental to such operation and maintenance, provision of services and facilities in accordance with the provisions of this Agreement. For the avoidance of doubt, fees and expenses payable to the Escrow Bank shall form part of the O&M Expenses.

98. **"O&M Manual"** means the manual, required to be prepared by the Concessionaire and approved by the Authority and the State Government for the operation and maintenance of the Project in accordance with Article 15.

99. **"O&M Payments"** means, collectively the: (a) Capex Annuity; (b) interest on the reducing balance of [55% (fifty five per cent)] of the completion cost; (c) O&M Charges; and (d) Power Charges (subject to the cap of the Power Charges based on the Project Guaranteed Energy Consumption), to be paid by the Authority and the State Government to the Concessionaire during the O&M Period, in accordance with this Agreement.

100. **"O&M Period"** means the period commencing from the COD and ending on the Termination Date, during which the Concessionaire is required to operate and maintain the Project.

101. **"O&M Price Index"** shall comprise: (a) 70% of CPI(IW); and (b) 30% of WPI, which constituents may be substituted by such alternative index or indices as the Parties may mutually agree;

102. **"O&M Security"** has the meaning ascribed to it in Article 9;

103. **"Organic Waste"** means such type of Solid Waste that can be degraded by micro- organisms, but shall not include excluded wastes;

104. {"**Participating Local Bodies**" or "**PLBs**" means the under mentioned local bodies:
(a) Municipal Corporation of *** ("PLB1")
(b) Municipal Council of ***("PLB2")
(c) *** Gram Panchayat ("PLB 3")}

105. **"Payment Milestone"** means the milestones listed in Article 14 for release of the Construction Payments to the Concessionaire, and 'Payment Milestone' shall mean any one of them, as the context may require;

106. **"P&D" or "Processing & Disposal"** refers to Processing & Disposal of Solid Waste collected from the Project Area, as is more clearly defined in SWM Rules, 2016;

107. **"Performance Security"** means the guarantee for performance of its obligations as per terms of this Agreement, to be furnished by the Successful Bidder (or the Concessionaire), in accordance with Article 9 in the format given at Schedule 6;

108. **"Person"** means (unless otherwise specified or required by the context), any individual, company, corporation, partnership, joint venture, trust, society, unincorporated organization, government or government body or any other legal entity;

109. **"Post-COD Period"** means the period starting on and from the COD and ending on the Termination Date;

110. **"Power Charges"** means the cost of the power consumed by the Concessionaire to operate and maintain the Project during the O&M Period, which will be calculated on the basis of the prevailing Power Unit Rate, the Fuel Price, to the extent applicable and such other applicable charges as per the guidelines of the relevant Government Authorities.

111. **"Power Outage"** means any interruption in the supply of electricity from the grid or any Diesel-Generators (DG) Sets maintained by the Concessionaire at the Sites, which disrupts the continuous operation of the Project.

112. **"Power Unit Rate"** means the cost per unit of power drawn from the grid (through the relevant distribution licensee for the Sites), which will be the prevailing tariff per unit of power charged by the relevant distribution licensee in the relevant month during the O&M Period.

113. **"Pre-COD Period"** means the period commencing from the Execution Date and extending up to the COD;

114. "**Preliminary Notice"** means the notice of intended Concession Period by the Party entitled to terminate this Agreement to the other Party setting out, inter alia, the underlying Event of Default;

115. **"Price Index** "means, for the Construction Payments, the Construction Price Index, and for the O&M Payments, the O&M Price Index.

116. **"Price Index Multiple"** means, the variation multiple in the Price Index occurring between the Reference Index Date preceding the Proposal Due Date and the Reference Index Date preceding the date of the Invoice, which is calculated by dividing the Price Index on the Reference Index Date preceding the date of the Invoice by the Price Index on the Reference Index Date preceding the Proposal Due Date.

For the avoidance of doubt and by way of illustration, if (a) the Price Index on the Reference Index Date preceding the Proposal Due Date, say 30 May, 2018, is 200; (b) the Invoice is submitted on 15 April, 2020; and (c) the Price Index as on 31 March, 2020 is 210, then the Price Index Multiple for determination of the amount due in respect of such Invoice shall be 1.05.

117. **"Primary Collection and Transportation** "means the door to door collection, collection

from public spaces, street cleaning and delivering to the to the Designated Bins at the designated collection points;

118. **"Processing"** means any scientific process by which segregated solid waste is handled for the purpose of reuse, recycling or transformation into new products

119. **"Processing Facility"** means the facility created by the Concessionaire for processing of the Solid Waste, prior to its final disposal at engineered Sanitary Landfill Site, and also includes a [refuse-derived fuel (RDF), bio-methanation, incineration] or any other approved technology for waste processing or any combination thereof;

120. **"Project"** shall mean the collection, transportation, processing and disposal of Solid Waste from Waste Generators in the Project Area and reclamation of land through Bio-Remediation of Legacy Waste at Municipal Dumpsite and discharging the Scope of Services more specifically set out in Schedule 1;

121. **"Project Agreements"** means any material contracts or agreements entered into by the Concessionaire after the date of this Agreement relating to the construction, operation and maintenance of the Project;

122. **"Project Area"** means the area presently under boundaries of the Authority or any extension thereof during the Concession Period;

123. **"Project Assets"** means all physical and other assets relating to and forming part of the Project including (a) rights over the Sites and Secondary Collection Points in the form of or license rights, Right of Way or otherwise; (b) tangible assets such as civil works and equipment including but not limited to foundations, buildings, complaint redressal centre, Processing Facility, electrical systems, communication systems, transport vehicles, Designated Bins, ICT Infrastructure and administrative office; (c) Project Facilities situated on the Sites and Secondary Collection Points; (d) all rights of the Concessionaire under the Project Agreements; (e) financial assets, such as receivables, security deposits etc.; (f) insurance proceeds; and (g) Applicable Permits and authorizations relating to or in respect of the Project;

124. **"Project Facilities"** means all the amenities and facilities required as basic and support infrastructure for implementation of the Project including construction/renovation, operation and maintenance of facilities for Bio-Remediation of Legacy Waste and the integrated solid waste management system such as infrastructure, collection and transportation vehicles, ICT infrastructure, machinery and equipment procured, inherited, installed and operated and all other Project related physical assets**;**

125. **"Project Engineer"** means the unit set up by the State Government and the Authority as specified in Article 13 to monitor and supervise the activities of the Concessionaire;

126. **"Proposed Technology"** means the proven technology(ies) proposed to be used by the Concessionaire to develop the Project and Project Facilities, as specified by the Concessionaire in its Designs and Drawings.

127. **"Proprietary Material"** shall be as defined in Article 29.1;

128. **"Qualifying Change in Law"** means any Change in Law, which:

(a) is directly applicable to the Project;

(b) impacts the Cost or time for undertaking the Project; and

(c) which was not reasonably foreseeable by the Concessionaire as on the Bid Due Date.

129. **"Reference Index Date"** means, in respect of the specified month, that last day of the preceding month with reference to which the Price Index or CPI (IW), as the case may be, is revised.

130. **"Related Parties"**:

"Concessionaire Related Parties" means any of the following:

(a) the Selected Bidder or Associates of the Selected Bidder;

(b) an officer, servant, employee or agent of the Concessionaire acting in that capacity;

(c) any Subcontractor engaged by the Concessionaire and their directors, officers, servants, employees or agents acting in that capacity; or

(d) any Person acting on behalf of the Concessionaire.

"Authority Related Parties" means any of the following:

(a) an officer, servant, employee or agent of the Authority, acting in that capacity;

(b) any contractor or subcontractor of the Authority and their directors, officers, servants, employees or agents, acting in that capacity; or

(c) any Person acting on behalf of the Authority.

For the avoidance a doubt, 'Authority Related Parties' does not include the Concessionaire or the State Government.

"State Government Related Parties "means any of the following:

(a) an officer, servant, employee or agent of the State Government, acting in that capacity;

(b) any contractor or subcontractor of the State Government and their directors, officers, servants, employees or agents, acting in that capacity; or

(c) any Person acting on behalf of the State Government.

For the avoidance a doubt, 'the State Government Related Parties' does not include the Concessionaire or the Authority.

131. **"Residual Inert Matter"** means the inert matter left for final disposal in engineered Sanitary Landfill Site after processing of the Solid Waste by one or more of the relevant Project;

132. **"Residual Solid Waste"** means and includes the waste and rejects from the Solid Waste which are not suitable for recycling or further processing;

133. "**Right of Way**" means the constructive possession of the Sites, together with all way leaves, easements, unrestricted access and other rights of way, howsoever described, necessary for construction, operation and maintenance of the Project, in accordance with this Agreement;

134. **"Schedules"** means any of the annexure, appendices, supplements or documents annexed to this Agreement and as amended from time to time;

135. **"Sanitary Land Fill" or " SLF"** means the site/s where the Concessionaire conducts a final and safe disposal of residual inert matter, residual solid waste and inert waste, which is designed with protective measures against pollution of ground water, surface water and fugitive air dust, wind-blown litter, bad odour, fire hazard, animal menace, bird menace, pests or rodents, green-house gas emissions, persistent organic pollutants slope instability and erosion in accordance with the terms of this Agreement;

136. **"Scheduled Construction Completion Date** "means the date which is 24 (twenty four) months from the Execution Date, by which the Concessionaire is required to complete bio-remediation of legacy waste on the designated dumpsites and the construction of the Project Facilities.

137. **"Scheduled Maintenance** "means a planned maintenance of the Project that:
(a) has been scheduled and allowed by the Authority in accordance with the Scheduled Maintenance Programme; and
(b) is for inspection, testing, preventive and corrective maintenance, repairs, replacement or improvement of such Facilities, as the case may be;

138. **Scheduled Maintenance Programme** means, for each year of the O&M Period, the schedule for undertaking preventive and corrective maintenance of the Project, as prepared by the Concessionaire and approved by the Authority in accordance with Article 15;

139. **Scheduled Payment Milestone Completion Date** means the scheduled date of completion of the construction work corresponding to the relevant Payment Milestone.

140. **"Screening Report"** means the environmental and social design safeguards screening report prepared by the Concessionaire and submitted to the Authority for its review as part of the Designs and Drawings;

141. **"SEB"** means [Name of the State] State Electricity Board;

142. **"Secondary Collection and Transportation"** means the transportation of Solid Waste from the secondary collection points and Designated Bins in the Project Area to the Processing Project Facility/ Sanitary Landfill, by the Concessionaire;

143. **"Secondary Collection Points"** means Designated Bins and other collection points, areas of any land, constructed space allocated by the Authority, if any, in consultation with the Concessionaire to temporarily store the Solid Waste collected;

144. **"Selected Bidder" or "Successful Bidder"** means the Entity selected by the Authority through a competitive bidding process for implementing and managing the Project;

145. **"SERC"** means [Name of the State] State Electricity Regulatory Commission;

146. "**Site**" means the identified land parcel, in respect of which the Concessionaire shall be granted License in accordance with terms hereof, for undertaking development/construction

of Processing Facilities, Sanitary Landfill sites;

147. **"Solid Waste"** means and includes solid or semi-solid domestic waste, sanitary waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, radioactive waste generated in the area under the local authorities and other entities mentioned under Rule 2 of the SWM Rules 2016;;

148. **"SPCB"** means State Pollution Control Board particularly [Name of the State] State Pollution Control Board;

149. **"State Government Representative"** means any officer nominated by the State Government, from time to time, to act on its behalf and liaise with the Concessionaire and the Authority for the purposes of this Agreement and notified as such in writing to the Concessionaire and the Authority;

150. **"Subordinated Debt"** the aggregate of the following sums expressed in Indian Rupees or in the currency of debt, as the case may be, outstanding as on the Transfer Date:

(a) the principal amount of debt provided by lenders or the Concessionaire's shareholders for meeting the Bid Project Cost and subordinated to the financial assistance provided by the Senior Lenders; and

(b) all accrued interest on the debt referred to in sub-clause (a) above but restricted to the lesser of actual interest rate and a rate equal to [5% (five per cent)] above the bank rate in case of loans denominated in Indian Rupees and lesser of the actual interest rate and [6 (six) month] LIBOR (London Inter-Bank Offer Rate) plus [2% (two per cent)] in case of loans denominated in foreign currency, but does not include any interest that had fallen due 1 (one) year prior to the Transfer Date;

provided that if all or any part of the Subordinated Debt is convertible into Equity at the option of the lenders and/or the Concessionaire's shareholders, it shall for the purposes of this Agreement be deemed to be Subordinated Debt even after such conversion and the principal thereof shall be dealt with as if such conversion had not been undertaken;

151. **"Substitution Agreement"** is an agreement that may be executed between the Concessionaire, the State Government, the Authority and the Lenders in the form set out in Schedule 9, pursuant to which, in case of Default by the Concessionaire including any Financial Default, Lenders (through its nominee) shall be allowed to take charge of the Concessionaire's roles and responsibilities under this Agreement;

152. **"Supplementary Fuel"** means any fuel that can be used as a supplement to the Solid Waste to enrich RDF / fuel during commissioning / start of activities. Use of supplementary fuel would be permissible as per MNRE guidelines;

153. "**SWM Rules"** means the Solid Waste Management Rules, 2016 framed by the Government of India under the Environment (Protection) Act, 1986 (Act 29 of 1986) and

includes any statutory amendments / modifications thereto or re- enactments thereof, from time to time;

154. **"Taxes"** means all taxes, levies, imposts, cesses, duties and other forms of taxation, including (but without limitation) income tax, sales tax, goods and service tax, value added tax, service tax, octroi, entry tax, corporation profits tax, advance corporation tax, capital gains tax, residential and property tax, customs and other import and export duties, excise duties, stamp duty or capital duty, and any interest, surcharge, penalty or fine in connection therewith which may be payable by the Concessionaire or the sub-contractors and the term **Tax** shall be construed accordingly;

155. **"Technology Performance Security"** has the meaning ascribed to it in Article 9.11;

156. **"Termination"** shall mean the expiry or termination of this Agreement and the Concession hereunder;

157. **"Termination Compensation"** means the compensation payable by the State Government and the Authority upon termination of this Agreement, in accordance with Article 24;

158. **"Termination Date"** means the date specified in the Termination Notice as the date on which the Concession Agreement expires or terminates earlier;

159. **"Termination Notice"** means the notice of Termination by any of the Parties to the other Party, in accordance with the applicable provisions of this Agreement;

160. **"Termination Payments"** means the payments payable pursuant to Articles 20 and 23 of this Agreement;

161. **"Third Party"** means any Person other than the Parties to this Agreement;

162. **"Tests"** means the tests to be carried out by the Concessionaire at its cost, in the presence of Project Engineer as may be required for getting Statutory clearances / Approval or asked by Project Engineer in respect of the Processing Project Facility and SLF to ensure that the same confirms to the requirements as per Good Industry Practice and Applicable Law or Applicable Permits;

163. **"Total Casualty"** means any fire or other casualty that results in physical damage to the Project Facilities, to the extent that the total cost of repairing, replacing or restoring the damaged portion of the Project Facilities (as determined by the Project Engineer), to the same condition as existed previously, would be more than 25% (twenty five per cent) of the total replacement cost of the Facilities.

164. **"Transfer Date"** shall be as defined in Article 23.4.9;

165. **"Transportation** "means conveyance of solid waste, either treated, partly treated or untreated from a location to another location in an environmentally sound manner through specially designed and covered transport system so as to prevent the foul odour, littering and unsightly conditions;

166. **"Trial Operations** "means the operation of the Project Facilities on a trial basis for a period of 3 (three) months from the Construction Completion Date or such longer period as may be determined;

167. **"Trial Operations Completion Certificate"** means the certificate issued by the Authority to the Concessionaire upon successful completion of the Trial Operations;

168. **"Unscheduled Outage** "means an interruption of or a reduction in the Availability of any Facilities that is not the result of a Forced Unavailability.

169. **"Vacant Possession"** means delivery of possession of the Site free from all Encumbrances to the Authority and the grant of all rights and all other rights appurtenant thereto within the scope of this Agreement;

170. **"Variation** "means any alteration in the Scope of Work, technical specifications or the Designs and Drawings, as instructed by the Authority or the State Government or proposed by the Concessionaire, in accordance with Article 28;

171. **"Variation Order** "means an order issued by the Authority or the State Government certifying its approval of a proposed Variation and recording the terms and condition on which the proposed Variation is required to be implemented;

172. **"Waste Generators"** means all residential, commercial, institutional and industrial establishments generating Solid Waste and located within the Project Area;

173. **"Waste to Energy"** means all activities, processes and technologies of converting Solid Waste into Electricity for commercial use;

174. **"Wilful Misconduct** "means an intentional or reckless breach or disregard by a Party of any of its obligations under this Agreement.

175. **"WPI"** means the Wholesale Price Index for all commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month.

In witness whereof the Parties[26] hereto have signed this Agreement on this _____day of _____ 20**.

[Name of the State Department] (The State Government)

By:

Name:

Title:

[Name of the Authority] (The Authority)

By:

Name:

Title:

[Name of the Concessionaire (The Concessionaire)

By:

Name:

Title:

.

[26] For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution.

SCHEDULES

SCHEDULE 1
SCOPE OF SERVICES
(See Article 2)

1. Bio-Remediation of Legacy Waste and reclamation of land

1.1 Role of Concessionaire

(a) The Concessionaire will be given earmarked land area for reclamation through Bio-Remediation of Legacy Waste and there will be a separate area for dumping of fresh waste.

(b) [The Concessionaire should conduct a drone survey at its own cost. Initial and final contour level survey for determination of volume of waste has also to be done by the Concessionaire at its own cost.][27]

(c) Excavate the existing mixed dumped garbage and sieve the waste through mechanical sieving machines/ any other equipment at the cost of the Concessionaire.

(d) The Concessionaire shall deploy sufficient machinery, manpower and required resources to execute the Project scope within the Project duration.

(e) Construction of temporary shed, platform and creation of facilities for handling, separating, segregating, storing and quantifying of the excavated MSW and Processing material

(f) Construction/Provision of temporary site office, water, power, sanitation facilities to workers as per statutory standards.

(g) The Concessionaire shall take necessary steps and processes to minimize environmental pollution while carrying out Bio-Remediation/ reclamation of Legacy Waste at the Dumpsite(s). The Concessionaire shall take all reasonable steps to ensure to undertake required efforts to mitigate the impact of odor and dust. Also, ensure treatment of leachate from legacy waste prior to its disposal. The Concessionaire shall mitigate menace caused by flies, rodents and bird and fire hazards in and around the Dumpsite(s) during the period of reclamation.

(h) The Bioremediation activity should be carried out in accordance with *Guidelines for Disposal of Legacy Waste (Old Municipal Solid Waste), 2019* and other Applicable Laws.

(i) Excavate and segregate MSW into as many kinds and categories as possible. Maximize the separation of recyclables viz. glass, metal etc. from the Dumpsite(s). Maximize the separation of waste into useful components such as compost, soil conditioner, recyclables, raw RDF, filler material (Soil, C&D) and un-useful material from the Dumpsite(s).

(j) Baling, packing, stacking, storing and sale of non-recyclable fraction of high calorific as raw material to RDF producer/ user or sale to waste to energy or co-Processing in cement plants or to thermal power plants.

(k) Set up an eco-friendly Processing system in order to reduce the impact of the dumping site on the adjacent areas.

(l) Set a soil baseline (in accordance with IS: 2720) and ground water baseline (in accordance with IS: 10500) so that the same will be available to evaluate post Bio-Remediation of Legacy Waste quality of reclaimed land.

[27]The Authority shall provide this data pre-bid but the Concessionaire may choose to conduct an additional survey as per its requirement.

(m) Monitor ground water quality (in accordance with CPCB norms), work zone air quality and ambient air quality monitoring (as per the standards laid down in MSW Rules 2000, MSW Rules 2016 and CPHEEO Municipal Solid Waste Management Manual) within the Dumpsite from National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratories/agencies and submit the report on quarterly basis. The Concessionaire shall make reasonable endeavours to ensure that the pre Bio-Remediation and post Bio-Remediation of Legacy quality of groundwater and work zone air shall not deteriorate due to reasons attributable to the Concessionaire.[28]

(n) Carry out leachate management of existing leachate (if any) at the Dumpsite in accordance to the Applicable Laws, particularly the standards of treated leachate laid down in the MSW Rules 2016.[29]

(o) The record of weighment of processed waste sold to recyclers and also the rejects shall be maintained after measuring their weight in computerized weigh-bridge. All recyclables going out of the Dumpsite boundary and rejects stored separately have to be weighed and record to be maintained by the Contractor.

(p) Provide on-site storage facility for various fractions of processed waste and proper channelization further for sale or reuse to industry/vendors.

(q) Ensure arrangement for water and power supply at site. Adequate power back-up shall be ensured for smooth operation of Processing plant, lighting of work area and water requirements.

(r) The Concessionaire shall take all Applicable Permits and approvals in sequence and comply with the CPCB and SPCB norms therein from time to time.

(s) The Concessionaire shall make reasonable endeavors to maximize the utilization of the waste from the Dumpsite(s) and for this purpose shall ensure that maximum waste is utilized / reused by the Concessionaire, so as to produce products/outputs such as soil enricher/compost, recyclables, RDF and products from construction and demolition waste.

(t) Selling, diverting for recycling, marketing and recycling the excavated materials within 15 (fifteen days) of segregation, without any accumulation in the storage facility at the Project site will be the responsibility of the Concessionaire.

(u) While reclaiming and excavating MSW from the present open Dumpsite(s)(s) following aspects must be handled carefully:

(i) Exposure to hazardous material, leachate, gases, odor, etc.

(ii) Contaminated wastes that maybe uncovered during reclamation operations require special handling and disposal requirements

(iii) Precautions must be taken while excavating as it releases gases like methane, sulphur dioxide and other gases which causes explosion and fire

(v) The Concessionaire shall explore the possibility of minimizing the disposal of Processing rejects and maximize the usage of such Processing rejects including but not limited to making of curb side blocks, filling of low-lying areas, construction of roads etc.

(w) The Concessionaire shall ensure that there should be no un-usable fraction of solid waste/rejects of total legacy waste quantity present in the Dumpsite handed over to the

[28]The Authority may choose to design a KPI on Concessionaire matching the MSW rules standards for groundwater quality and air quality.

[29]The Authority may depending on the peculiar circumstances of the Dumpsite determine the KPI for leachate treatment.

Concessionaire.

(x) Concessionaire shall be responsible for Disposal of the recovered material from the legacy waste to the identified vendors without stocking them at site.

(y) Concessionaire shall ensure that the Dumpsite will be cleared to the ground level. For the purposes of this clause, ground level shall be determined based on the level of the Access Roads to the Dumpsite. If any waste is found below the ground level, the Authority and Concessionaire may mutually arrive at the decision to undertake bio-remediation of legacy waste found below the ground level.[30]

(z) Concessionaire shall be responsible for development and maintenance of infrastructure, facilities and amenities for sieving the excavated garbage and storing the segregated materials, etc. at their own risk and cost. Provide adequate number of Processing machines for achieving its daily target of handling at least [•] Metric Tons of legacy waste per day.

(aa) The Project and other Projects facilities shall be designed in such capacity that the entire waste at the Dumpsite(s) to be bio-remediated, taken out and processed within the period of [24 months] from the Compliance Date.

(bb) Provide weighbridge to measure the quantity of waste subjected to Bio-Remediation at Dumpsite(s) and rejects going out of the Dumpsite(s) as approved by the Authority. The Concessionaire shall ensure that the weighbridge is installed from the start date of Bio-Remediation activity. The weighing system shall be fully online electronic, automatic system equipped with the latest technology along with backup server facility. Data of weighing system shall be maintained properly for the entire Concession Period with backup server facility and shall be provided as & when required by the Authority/Project Engineer.

(cc) Deploy the necessary manpower, materials, equipment, tools to the site. The Concessionaire shall be responsible for construction of plants, sheds, support facilities for handling, separating, segregating and storing for the operation of the plant.

(dd) Provide security arrangements for the planned Project Site, machineries, equipment, etc., at the cost of the Concessionaire.

(ee) Legacy C&D waste if found during excavation, sorting/segregation and final disposal of such legacy C&D Waste shall be the sole responsibility of the Concessionaire. The Concessionaire shall be free to explore alternate uses for C&D waste as per the C&D Waste Rules, 2016. Further, if the said C&D Waste is found to be lying around the Dumpsite(s) or found to be not properly disposed of, the Concessionaire shall be liable to be penalized for the same in accordance with the terms of the Concession Agreement.

(ff) Hazardous waste such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive waste, if found, during excavation, sorting or segregation shall be handled as per the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016.

(gg) The revenue or the income from the sale of the segregated Useful Material such as reusable and recyclable, Compost, soil conditioner, raw RDF, C&D, Soil or any other by-product materials shall go to the Concessionaire account.

(hh) The Concessionaire shall use a portion of the reclaimed land area for development of Processing facilities and Sanitary Land Filling at Dumpsite(s).

[30]The scope of work of the Agreement may be amended accordingly. The Authority shall clearly mention the level of clearance of legacy waste (ground level or below ground level) it desires in the RFP/RFQ documents.

(ii) Carrying out the entire Project work in accordance with the detailed plan of action and schedule proposed by Concessionaire and approved by the Authority.

(jj) Ensure use of only covered body vehicles for the transportation of materials at the cost of the Concessionaire

(kk) Providing security arrangement for the Project Sites, machineries, equipment etc. at its own cost

(ll) The Concessionaire shall ensure that the Authority is provided with adequate information of any event or any other matter affecting the Project Facilities to enable them to control/minimize any adverse consequences.

(mm) The frequency and formats for the reports to be submitted shall be finalized in consultation with the Authority and form part of the O&M Plan and Operations Protocol.

(nn) The following data should be included in the progress reports submitted by the Concessionaire:

(i) Daily excavated waste quantity with extent of area reclaimed.

(ii) Quantity of waste segregated in each day.

(iii) Quantity of waste taken out in each day including RDF, recyclable material, bio- soil, C&D and residual solid waste etc. as far as category wise.

(iv) Leachate generation and management reports

(v) Inert and Product Quality test reports as and when made.

1.2 Conditions for Weigh Bridge:

(a) It shall be fully online electronic with real time monitoring systems, automatic system equipped with the latest technology along with backup server facility. Data of weighing system shall be maintained properly for the entire Concession Period with backup server facility and shall be provided as & when required by the Authority/Project Engineer.

(b) It shall be operated in CCTV surveillance with data storage of entire Concession Period. For CCTV surveillance High Definition IP based cameras in adequate numbers shall be provided by the Concessionaire.

(c) CCTV Recordings of operation of weighing system shall be provided as and when required by the Authority/Project Engineer.

2. Sanitary Land Filling Site

2.1 Role of Concessionaire

(a) The Concessionaire shall Design, Construct and Operate Project Facility of Sanitary Land Filling (SLF) including Processing facility, Material Recovery Facility, etc., of Designed Capacity at the Site provided by the Authority. The Site for SLF to be finalized by the Authority and handed over to the Concessionaire within [1 (one)] month from Execution Date. The Sanitary Landfill shall be setup in accordance with the requirement of SWM Rules, 2016 and CPHEEO Manual.

(b) The Concessionaire shall install a weighbridge from the start date of disposal activity of appropriate capacity. The weighing system shall be fully online electronic, automatic system equipped with the latest technology along with backup server facility. Data of weighing system shall be maintained properly for the entire Concession Period with backup server facility and shall be provided as & when required by the Authority/Project Engineer.

(c) Concessionaire to ensure by weighment that inert/residual Processing waste from Processing Facilities to the Sanitary Landfill should not be disposed more than 20% of the total incoming waste at Processing facility and as per SWM Rules 2016.

(d) SLF shall comprise compacted earth bunds with impermeable liner systems comprising compacted clay liners, or geo-membranes, or geosynthetic clay liners. The landfill cells will incorporate leachate collection systems comprising gravel and geotextile filter layers and pipe collection and transfer systems.

(e) The Concessionaire shall also set up a leachate treatment facility at the landfill site involving any suitable technology to meet the standards as per regulatory norms.

(f) Shall be responsible for all the health, security, environment and safety aspects of the Project at all times during the Concession Period.

(g) Ensure arrangement for water and power supply at site at its own cost.

(h) Transportation of inert/residual Processing waste to the Sanitary Landfill is to be done by the Concessionaire from each Site/Collection Point.

(i) Ensure that the Project Facilities remain free from all encroachments and take all steps necessary to remove encroachments, if any.

(j) Pay all Taxes, duties and outgoings, including utility charges relating to the Project Facilities.

(k) The Concessionaire shall provide fencing along the perimeter of the Site and arrange adequate lighting system for easy operations in the working area as well as to the access ways.

(l) Provide fire protection measures and safety equipment for all workers at the site. Entrance into the Site from outside the Site shall be restricted to one point. However, several emergency exits may be provided.

(m) Adequate measures to avoid trespassing shall be taken by the Concessionaire. Ensure adequate power back-up for smooth operation of the machinery and equipment installed.

(n) All the necessary regulatory approvals (including Environmental clearance, consent to establish and operate from SPCB, etc.) shall be taken prior to the commencement of

SLF construction and operations.

(o) The Concessionaire shall provide access to the Municipalities to dispose of desilting and road sweeping waste in the SLF.

(p) The Concessionaire shall carry out scientific closure of the Dumpsite(s) after the concession period before handing over the Site.

2.2 Conditions for Weigh Bridge

(a) It shall be fully online electronic with real time monitoring systems, automatic system equipped with the latest technology along with backup server facility. Data of weighing system shall be maintained properly for the entire Concession Period with backup server facility and shall be provided as & when required by the Authority/ Project Engineer.

(b) It shall be operated in CCTV surveillance with data storage of entire Concession Period. For CCTV surveillance High Definition IP based cameras in adequate numbers shall be provided by the Concessionaire.

(c) CCTV Recordings of operation of weighing system shall be provided as and when required by the Authority/ Project Engineer.

2.3 Role of the Authority

(a) Provide land for SLF within [1 (one)] month to the Concessionaire from the Execution Date.

(b) the Authority shall approve the Implementation Plan submitted by the Concessionaire within a period of 21 days from the date of submission. The Authority shall, where appropriate, coordinate/assist Concessionaire in securing Applicable Permits.

(c) To appoint Project Engineer (Project Engineer) to monitor, supervise, and review Concessionaire's progress against the submitted timelines and also verify and approve the Concessionaire's monthly/running bills. The Project Engineer shall also approve the weighbridge proposed by the Concessionaire.

(d) The Authority shall make timely payments.

(e) the Authority shall meet and defray any cost or penalty levied upon the Concessionaire pursuant to any judgment or order of any court of competent jurisdiction or statutory authority, in connection with any damages resulting from legacy waste, which is not directly attributable to Concessionaire's non-observance/non-performance of its Bio-Remediation or any other obligation hereunder.

(f) [Assist the participating Municipalities to allocate Secondary Collection Points in consultation with the Concessionaire within 90 (ninety) days from the Execution Date.]

(g) Sign, Operate and maintain an escrow account with the Concessionaire to ensure a

single account for cash flow.

2.4 [Role of Participating Municipalities

(a) Handover the Dumpsite(s) for Bio-remediation of Legacy Waste at the Dumpsite(s) within 30 (thirty) days from the signing of agreement. There will be no lease of land to the Concessionaire nor is he permitted to raise money mortgaging the land. Concessionaire can use the land for the purpose of this Project only till Concession Period or termination of contract whichever is earlier;

(b) Identify, earmark / allocate secondary collection points in consultation with the Concessionaire within 90 (Ninety) days from the signing of agreement;

(c) Handover the existing infrastructure of Secondary Collection and Transportation, Processing &Disposal assets, deployed and used at Site, on as is where is basis to the Concessionaire, within 30 (thirty) days of the date of signing of Concession Agreement;

(d) Facilitate in a timely manner all such approvals, permissions and authorizations which Concessionaire may require or is obliged to seek from them under this Agreement, in connection with implementation of the Project and the performance of its obligations;

(e) Ensure a separate waste collection stream from bulk waste generators, vegetable and flower markets for the purpose of collecting segregated Organic Waste.

(f) Assist in getting connection for water and electricity connection at each of the Site(s).

(g) Shall ensure source segregation of MSW.

(h) Shall ensure regular primary collection of waste from households i.e. on daily basis.

(i) Shall assure a minimum waste input of desirable quantity for the Processing facility i.e. minimum [x% (x per cent)] of proposed Processing facility capacity at Secondary Collection Points for Collection and Transportation to Processing facility on daily basis;

(j) Ensure a separate waste collection stream from bulk waste generators, vegetable and flower markets for the purpose of collecting segregated Organic Waste by the Concessionaire which is to be collected directly by Concessionaire from secondary collection points and transported to the nearest decentralized unit set-up for this purpose.

(k) The Concessionaire shall submit monthly reports to Municipalities and Project Engineer regarding progress of the Project. Municipalities shall validate the data provided by the Concessionaire in monthly progress reports after seeking comments of the Project Engineer;

(l) observe and comply with all obligations set forth in this Agreement, and any other Agreement to be executed with the Concessionaire;

(m) Have right over assets and technology in case of Concession Period or expiration of

Concession Period, whichever is earlier;

(n) Assurance to Concessionaire that any of its officers, employees or workmen shall not, at any time, during the Concession Period interfere with or obstruct in the functioning, running and the overall management of the Project and in any matter in relation to or connected therewith;

(o) Spot inspection of Secondary Collection Points shall be conducted by participating Municipalities for monitoring.]

3. Setting-up of Processing Facilities

3.1. Role of Concessionaire

(a) The Concessionaire shall be obligated to set up at its cost and expense, a Processing Facility at the earmarked Site and discharge obligations set out in Schedule 1 for Processing of Solid Waste prior to its final disposal at engineered Sanitary Landfill Site, as per the Construction Plan submitted by the Concessionaire. The Implementation Schedule shall be submitted in MS Word format.

(b) [The Processing Facility also includes a setting up a Waste to Energy Plant having capacity as provided in Concession Agreement]. The Concessionaire shall have the Processing Facility fully set up and obtain an Completion Certificate from the Authority/ Project Engineer for the newly installed Project Facility within a period no later than [12 (twelve) months] from the Scheduled Construction Completion Date. The Concessionaire shall also be obligated to promptly rectify and remedy any defects or deficiencies that are pointed by the Project Engineer and furnish a report in respect thereof to the Project Engineer.

(c) In the event the Concessionaire is unable to achieve COD within the said time period, the Concessionaire shall be granted an additional period of [•] days without levy of any damages. In case of any further delay to achieve COD, Liquidated Damages at the rate of [0.1% (zero point one percent)] of the Performance Security per day of delay beyond [•] days from Scheduled Construction Completion Date shall be levied by the Authority on the Concessionaire, subject to a maximum of [90 (ninety)] days beyond which it shall tantamount to Concessionaire Event of Default. Provided however, if the delay to achieve COD is due to any Force Majeure event or due to delay on part of the Authority/ Project Engineer in issuing Completion Certificate, no such Liquidated Damages shall be levied.

4. Primary collection of waste from the point of generation

4.1. Role of Concessionaire

(a) The Concessionaire shall undertake daily collection (door to door) of Solid Waste generated within the Project Area commencing latest by COD.

(b) Transportation of street sweeping waste from the designated points in consultation with

the Authority.

(c) The Concessionaire shall collect Solid Waste at pre-informed timings. The timings are to be planned after consultation with the Authority.

(d) The Concessionaire shall provide the Authority with a route plan and timings of visit/time table as decided between the Authority and the Concessionaire by [31st March and 30th September], every year, for the duration of Concession Period.

(e) The Concessionaire shall arrange for all vehicles, devices, community bins at its own cost to collect all Solid Waste generated in the Project Area.

(f) The Solid Waste shall be collected using containerized motorized vehicles (such as auto tippers) or containerized tricycles, handcarts, community bins or any other device which is suitable for collection of waste without necessitating deposition of waste on the ground and multiple handling of waste.

(g) The containers shall be colour-coded as per the SWM Rules.

(h) All such vehicles, devices, community bins shall display a logo of the Authority/ Project Engineer of at least 12 inches by 12 inches size (font size of 6-9 inches) size.

(i) The selected private entity shall preferably segregate the waste at source by educating and creating awareness among customers and by providing different collection containers for biodegradable and non- biodegradable wastes.

(j) The Concessionaire shall ensure that the collection bins, vehicles and devices are cleaned on a daily basis using disinfectants.

(k) The Concessionaire must put a system in place which indicates that the bins are picked up on being full to their capacity.

(l) The Project Engineer/ the Authority reserves right to conduct random checks

5. Secondary Storage of Waste

5.1. Role of Concessionaire

(a) The Concessionaire shall endeavor to create no secondary storage facility and its vehicle planning & scheduling shall be developed in such a manner that primary waste collected is transferred directly in vehicles with no storage facility. However, the Authority may provide existing land(s) or structure(s) for Secondary Collection Points (including land for Processing facility/transfer point, if any) free of cost within 30 (thirty) days of signing of Concession Agreement. The land or structure provided shall only be used for the purposes of the Project.

(b) Dedicated mobile transfer stations/ dumper placers/ container bins of at least 2 (two)

cubic meters capacity or any such equipment which is suitable for storage of waste (the "**Equipment for secondary storage**") may be positioned by the Concessionaire at such Secondary Collection Points to receive Solid Waste from the vehicles and devices engaged in the primary collection of waste.

(c) Equipment for secondary storage shall be designed for at least twice the designed capacity (as per the CPHEEO manual specifications). Waste density to be assumed as [500 kg/ cum]. The bins should be designed in line with the transportation system so as to avoid any manual handling of waste.

(d) The Concessionaire shall provide equipment for secondary storage at its own cost.

(e) All equipment for secondary storage shall be covered and colour coded as per SWM Rules. All equipment for secondary storage shall be marked with the Authority/Project Engineer of at least 12 inches by 12 inches (font size of 6-9 inches) size. The Concessionaire shall display any other form of advertisement on the equipment for secondary storage only after prior approval of the Project Engineer. For any other advisories that would be under taken, the Concessionaire shall abide by the Applicable Laws.

(f) The land for setup of Processing facility, upon request of the Concessionaire, may be provided, if available, by the Project Engineer/ the Authority in accordance with license agreement within 30 (thirty) days of signing of the Concession Agreement. The Processing facility shall be constructed by the Concessionaire at its own cost. The Concessionaire shall construct the Processing facility within a period of six months from the date of handing over the vacant land by the Authority/ Project Engineer to the Concessionaire.

(g) The Processing facility shall be designed for all weather operations. The Processing facility shall be operated under cover, so that dust, litter and noise could be effectively controlled. The Processing facility shall be cleaned daily and the floors washed.

(h) The walls of the Processing facility shall be whitewashed every six months for the duration of Concession Period. And all the vehicles/ equipment shall be re-painted every six months.

(i) The Processing facility shall be equipped with internal roads, ramp and platforms at different levels. These shall be concrete built with a capacity to withstand the load of moving machineries/vehicles.

(j) The Concessionaire shall erect at least one (1) signboard with details (capacity, contact details and warnings) about the transfer station in [Local Language(s)] and English of a size not less than 2 ft. by 4 ft. each, adjacent to the main entrance to in a manner that it

is ordinarily visible to any person using such entrance.

(k) The workers involved in Solid Waste handling shall be provided with gloves, masks, uniforms, aprons and other safety gear.

(l) The Concessionaire shall make provisions to restrict entry of stray animals into the transfer stations, e.g. animal catchers, etc.

(m) The Processing facility shall display a logo of the Authority/ Project Engineer of at least 12 inches by 12 inches each (font size of 6-9 inches) size on the outside of all of its walls. Additionally, all the outer walls of the transfer station shall also be painted with this advisory about solid waste management. The Concessionaire shall display any other form of advertisement on the Processing facilities only after prior approval of the Project Engineer. For any other advisories that would be undertaken, the Concessionaire shall abide by the Applicable Laws.

(n) The Concessionaire shall have right to advertise on Processing Project Facility, transfer station, transportation vehicles and Sanitary Landfill. This will be an additional source of revenue for the Concessionaire.

6. Secondary Transportation of Waste to the Processing Facility(ies)

6.1. Role of Concessionaire

(a) The Concessionaire shall transport Solid Waste from Secondary Collection Points to the Processing Project Facility on a daily basis.

(b) The Concessionaire shall deploy closed vehicles such as tipper trucks, compactors etc. to transport the Solid Waste generated in the Project Area to the Processing Facility at its own cost.

(c) The vehicles deployed shall be roadworthy conforming to approval from the State Transport Authority.

(d) The Concessionaire shall comply with all Applicable Laws, including all rules and regulation prescribed in the regard, from time to time by any other statutory and Competent Authorities concerned, regarding fuel used or pollution control standards or any other norm.

(e) The Concessionaire shall at periodic intervals check their adequateness and their conformity with the manufacturer's specification for their maintenance and replacement.

(f) The Authority/ Project Engineer reserves right to conduct random checks.

(g) The Concessionaire shall provide automatic position identification systems using

Global Positioning System (GPS) technology, which shall ensure automatic tracking and recording of vehicle identification and movement in all vehicles and provide a live GPS feed to the Project Engineer/Authority.

(h) The Concessionaire shall display the Authority/ Project Engineer (and social message given by Project Engineer) of at least 12 inches by 12 inches size (font size of 6-9 inches) on the transportation vehicles and shall display any other form of advertisement on the transportation vehicles. For any other advisories that would be undertaken, the Concessionaire shall abide by the Applicable Laws.

(i) The drivers appointed/engaged by the Concessionaire shall have a valid driving license as desired for the specific vehicle.

(j) All vehicles shall have High Security Registration Plate and be equipped with electronic toll collection tag.

(k) All penalties, levies and fines levied in relation to the activities/operations of the Concessionaire under the Project, shall be borne by the Concessionaire only without any liability of the Authority.

7. Processing & Disposal of Solid Waste

7.1. Role of Concessionaire

(a) The Concessionaire shall setup Processing Project Facility& Sanitary Landfill on the designated lands provided by the Authority. The land provided shall only be used for the purposes of the Project.

(b) The Concessionaire shall take all Applicable Permits in sequence and comply with the provisions therein from time to time.

(c) The Concessionaire shall design, construct, operate and maintain all the Project Assets and Project Facilities including Processing Facility & SLF in compliance with all applicable laws at its own cost.

(d) For the Processing Project Facility, use …….. technology for RDF/ thermal/ biological Processing (as mentioned in Technical Proposal) for the in line with the Applicable Laws including but not limited to CPCB. The Sanitary Landfill shall be setup in accordance with the requirement of SWM Rules.

(e) The Concessionaire shall at its cost and expense procure all machinery and equipment for Processing Project Facility and Sanitary Landfill. The Concessionaire shall comply with proprietary rights, licenses, agreements and permissions for materials, methods, processes and systems used or incorporated in the Project

(f) The Processing Facility shall achieve COD within a period of [24 (twenty four)] months from the date of signing of this Agreement. The Concessionaire shall submit monthly progress reports during the above period to Project Engineer.

(g) The Concessionaire shall operate and maintain the Processing Project Facility in accordance with the Applicable Laws.

(h) The Concessionaire shall ensure that the inert/Processing rejects generated from the Processing Facility should achieve total elimination of landfill but in any circumstances not in excess of 10% (ten per cent) of input waste quantity. The Concessionaire will all time ensure the daily capping of SLF as per Solid Waste Management Rules, 2016. The Concessionaire will also ensure treatment and discharge of leachate generated from Processing Project Facility in accordance with the CPCB standards.

(i) All non-biodegradable waste viz. plastic, metal, glass, electronics & other items are to be segregated and sold to re-processors/ recyclers/ Govt. authorized agencies or recycled/ reprocessed through recycling/ re-processing facilities directly or indirectly within the allotted site and appropriate/retain the whole of the sale proceeds. Other wastes such as rubber, tyres, upholstery, bags, etc., may be sold to cement or other factories as energy source. The resources recovery shall be carried out at the cost and risk of the Concessionaire. It shall also be ensured that no part of construction & demolition waste is dumped in the landfill of the plant.

(j) All penalties, levies due to any non-compliance will be borne by the Concessionaire.

(k) The Concessionaire shall retain revenue generated through products produced out of such Processing. The Concessionaire shall also retain revenue generated through carbon credits.

(l) The Concessionaire shall maintain daily records of quantum of incoming, processed waste, rejects, products and product quality in the formats approved by the Project Engineer. The monthly report shall be submitted by the Concessionaire to the Project Engineer. The monthly report may be subject to verification by Project Engineer.

(m) The Concessionaire shall arrange for all facilities and equipment for weighing - minimum 2 (two) electronic weighbridges with CCTV cameras, platforms etc. The Concessionaire shall also store at least past 2 months of such video feed and make it available for inspection at the request of the Authority.

(n) The flue gas vented to atmosphere shall be required to be treated adequately by scrubbing, neutralization and filtering so that the pollutants are dust levels are well within the acceptance level as statutory requirements.

(o) The Concessionaire shall develop the surrounding of the plant with greenhouse concept having plants, lawns, gardens etc. as model spot for educating students/ public on environmental protection and best environment practices.

(p) The Concessionaire shall erect at least (1) signboard with details (capacity, contact details and signage) about the SLF in [Local Language(s)] and English of a size not less than 2ft. by 4ft. each, adjacent to the main entrance in a manner that is ordinarily visible to any person using such entrance.

(q) The Concessionaire shall at all times comply with the statutory norms of CPCB/ SPCB for pollution control.

(r) The Concessionaire will place a board at the entrance of the Processing facility displaying emission and discharge parameters of air & water.

(s) The Concessionaire shall display layout at the entrance and indicate warning signs in the SLF.

(t) The workers involved in Solid Waste handling shall be provided with gloves, masks, uniforms, aprons and other Personal Protective Equipment (PPE).

8. Setup Complaint Redressal Centre

8.1. Role of Concessionaire

(a) The Concessionaire shall setup at least 1 (one) Complaint Redressal Centre which shall be functional by the Commencement Date such that it allows for (a) easy monitoring of operations of the Project and (b) establishment of standard protocol to address customer complaints.

(b) The Complaint Redressal Centre shall be capable to registering complaints by the way of written communication, telephonically or personal visits by the consumers. The Complaint Redressal Centre shall be supported in English and [local language(s)].

(c) The Complaint Redressal Centre shall have at least 3 (three) operational dedicated phone lines for receiving customer calls / complaints.

(d) The telephone numbers of the Complaint Redressal Centre shall be clearly reflected on all secondary storage equipment and transportation vehicles. These numbers shall be mentioned in English and [local language(s)].

(e) The "Complaint Redressal Centre" shall be kept operational by the Concessionaire from 6 am to 10 pm, 7 (seven) days a week. Concessionaire shall maintain a digital record of all complaints received containing identification number, customer name, service address, phone number, date and time of initial call, date and time of any follow-up calls and type of complaint. Complaints shall be verified and shall be redressed within 24 hours of their receipt.

(f) The Concessionaire shall also develop a website and a mobile application for filing complaints by any of aggrieved citizens/ tourists.

(g) The aggrieved residents for registering of their complaints may also contact the offices of the Authority who shall immediately forward such complaints to the Complaint Redressal Centre. The Authority shall designate one of their officers not below the rank of Junior Engineer as the Nodal Officer to receive such complaints. The Concessionaire shall be bound to take action on the complaint so forwarded on an immediate basis and

send status report to such Nodal Officer within 24 (twenty four) hours of having redressed the complaint specifying the action taken. In the event, the Concessionaire fails to take action or send status report within the aforesaid time period, it shall be liable to pay Liquidated Damages in accordance with Article 18 of the Agreement.

9. Organize and manage Information, Education & Communication (IEC)activities

9.1. Role of Concessionaire

(a) The Concessionaire shall undertake the IEC activities or alternatively may hire agency having proven credentials in IEC activities. The agency hired by the Concessionaire may be an NGO, Society or Body Corporate. The Concessionaire shall impart Project specific training to the hired agency prior to deployment.

(b) IEC activities shall be aimed at creating awareness among the community, and prepare residents for upcoming Project, inform about SWM Rules, source segregation, health and environment impacts, roles of ULB and Concessionaire in the Project, etc. through website, mass media communication strategies such as newspapers releases, hoardings, glow sign boards, radio, TV, street plays, awareness campaigns at schools etc. At least 1 (one) advertisement in 1 (one) newspaper of at least 3 by 3 inches shall be released by the Concessionaire every 3 (three) months. Concessionaire can also distribute the pamphlets with list do's and don'ts as an awareness media.

(c) The Concessionaire shall organize training programs for residents to motivate the community towards waste management for ensuring the sustainability of a system at least once in 3 (three) months for first year of operations and thereafter at the interval of six months for balance concession period.

(d) The Concessionaire shall submit an annual program of the IEC activities planned for each year (on a monthly basis) to the Project Engineer within the first month of each calendar year clearly notifying the components & expenditure under each head of expense.

(e) All staff uniform and vehicles involved in the Project shall have advisory messages about solid waste management.

SCHEDULE 2
APPLICABLE PERMITS
(See Article 4)

1. Concessionaire Applicable Permits

S. No.	Applicable Permit	Authority
1.	Temporary Power Connection (During Construction Period)	Electricity Board/ other temporary sources
2.	Consent to Operate	State Pollution Control Board
3.	Consent for storage of hazardous materials	Director of Explosives
4.	Consent Firefighting system	Firefighting Department
5.	CEIG approval – stage 1 for construction & stage 2 on completion of project	Chief Electrical Inspector to Government

The Concessionaire will be liable to obtain all Applicable Permits (other than the Authority Applicable Permits) that are necessary for construction, operation and maintenance of the Project Facilities.

The Authority shall assist the Concessionaire in obtaining all the required permits.

2. Authority Applicable Permits[31]

S No.	Applicable Permit	Authority
1.	Electricity Board approval during various stages – request for load sanction, remittance of deposit, installation of incomings, etc	Electricity Board
2.	Layout and building plan approval	ULB/DTCP
3.	Consent to establish	State Pollution Control Board (SPCB)
4.	Tree cutting	Forest Department
5.	Road cutting & crossing	Public Works Department
6.	Railway Crossing	Commissioner Railway safety
7.	Revenue road cutting & crossing	Panchayat/Local Authority
8.	Access Road to new Project Facilities	Forest Department/ Panchayat/Local Authority/Irrigation Department
9.	Consent to Operate for Existing Facilities	ULB and SPCB

The State Government and the Concessionaire shall proactively assist the Authority in obtaining all the required permits.

[31]List of Applicable Permits which may be required to be obtained by the State Government, if any, to be added in this Schedule.

SCHEDULE 3

SPECIFICATIONS AND STANDARDS

(See Article 5.1)

1. **Project Facilities**

1.1. The Project Facilities shall conform to the Specifications and Standards as specified in this Schedule and in this Agreement.

1.2. The Specifications and Standards applicable to the design and construction of the Processing facilities, Material Recovery Facilities at the Sanitary Land Filling site and the decentralized units for Processing of Organic Waste shall conform with the National Building Code of India, relevant specifications and standards specified by the Bureau of Indian Standards (BIS), International Organization for Standardization (ISO), other Applicable Laws and Good Industry Practice.

1.3. ln the absence of any specific provision in this Agreement, the following standards shall apply in order of priority:

(i) [National Building Code
(ii) Bureau of Indian Standards (BIS)
(iii) International guidelines
(iv) Any other specifications/standards/codes proposed by the Concessionaire and reviewed by the Project Engineer.]

The latest version of the specified codes and standards which were notified published at least [60 (sixty)] days prior to the Bid Date in respect of this Agreement shall apply.

SCHEDULE 4
MAINTENANCE REQUIREMENTS
(See Article 5.1)

1. **Maintenance Requirements**

1.1. The Concessionaire shall, at all times, operate and maintain the Project in accordance with the provisions of the Agreement, Applicable Laws, Applicable Permits and Good Industry Practice. In particular, the Concessionaire shall, at all times during the Operation & Maintenance Period, conform to the Maintenance Requirements set forth in this Schedule.

1.2. The Concessionaire shall repair or rectify any defect or deficiency set forth in Clause 2 of this Schedule within the time limit specified therein and any failure in this behalf shall constitute a breach of the Agreement.

2. **Repair/rectification of defects and deficiencies**

2.1. The obligations of the Concessionaire in respect of Maintenance Requirements shall include repair and rectification of the defects and deficiencies in the Project within the time limit set forth in Annex-I of this Schedule.

2.2. The Concessionaire shall at all times maintain an adequate inventory of spares and consumables to meet the Maintenance Requirements.

3. **Other defects and deficiencies**

3.1. In respect of any defect or deficiency not specified in Annex-I of this Schedule, the Concessionaire shall undertake repair or rectification in accordance with Good Industry Practice and within the time limit specified by the Project Engineer.

3.2. In respect of any defect or deficiency not specified in Annex-I of this Schedule, the Project Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Concessionaire in accordance with Good Industry Practice and within the time limit specified by the Project Engineer.

4. **Extension of time limit**

Notwithstanding anything to the contrary specified in this Schedule, if the nature and extent of any defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Concessionaire shall be entitled to additional time in conformity with Good industry Practice. Such additional time shall be determined by the Project Engineer and conveyed to the Concessionaire and the Authority and the State Government with reasons thereof.

5. **Emergency repairs/restoration**

Notwithstanding anything to the contrary contained in this Schedule, if any defect, deficiency

or deterioration in the Project poses a hazard to safety or risk of damage to property, the Concessionaire shall promptly take all reasonable measures for eliminating or minimising such danger.

6. **Inspection by the Concessionaire**

The Concessionaire shall, through its engineer, undertake a periodic (at least weekly) visual inspection of the Project and maintain a record thereof in a register. Such record shall be kept in safe custody of the Concessionaire and shall be open to inspection by the Authority and the State Government and the Project Engineer at any time during office hours.

Annex-I
(Schedule)

The Concessionaire shall repair and rectify the defects and deficiencies[32] specified in this Annex-I to Schedule within the time limit set forth herein:

S. No.	Nature of defect or deficiency	Time limit for repair/ rectification
Access Roads		
i.	Damage of pavement edge exceeding l0 cm	15 days
ii.	Debris on roads	2 hours
iii.	Damage to shape or position of road side furniture, signs and marking; poor visibility or loss of retro-reflectivity	24 hours
Lighting at the Project Facilities		
i.	Any major failure of the system	6 hours
ii.	Faults and minor failures	2 hours
iii.	Lighting level falling below [200] lux	1 hour

Other Maintenance Requirements

[Add any additional Maintenance Requirements for upkeep of the Project Facilities]

[32]The list is indicative

SCHEDULE 5
SAFETY REQUIIREMENTS
(See Article 5.1)

1. **Guiding principles**

1.1. Safety Requirements aim at reduction in injuries, loss of life and damage to property resulting from accidents on or about the Project, irrespective of the person(s) at fault.

1.2. Safety Requirements apply to all phases of construction, development, operation and maintenance with emphasis on identification of factors associated with accidents, consideration of the same, and implementation of appropriate remedial measures.

1.3. Safety Requirements include measures associated with safe movement, safety management, safety equipment, fire safety, enforcement and emergency response, with particular reference to the Safety Guidelines specified in Annex-l of this Schedule.

2. **Obligations of the Concessionaire**

The Concessionaire shall abide by the following:
(a) Applicable Laws and Applicable Permits;
(b) provisions of this Agreement;
(c) relevant Standards/Guidelines contained in nationally accepted codes; and
(d) Good Industry Practice.

3. **Safety measures during Operation and Maintenance Period**

3.1. The Concessionaire shall develop, implement and administer a safety programme for the Project Facilities, which shall include correction of safety violations and deficiencies, and all other actions necessary to provide a safe environment in accordance with this Agreement.

3.2. The Concessionaire shall keep a copy of every FIR recorded by the Police with respect to any accident occurring on or about the Project. In addition, the Concessionaire shall also collect data for all cases of accidents not recorded by the Police. The information so collected shall be summarised and submitted to the Authority and the State Government at the conclusion of every [month/quarter].

3.3. The Concessionaire shall submit to the Authority and the State Government before the [31st (thirty first) March] of each year, an annual report (in 3 (three) copies) containing, without limitation, a detailed listing and analysis of all accidents of the preceding Financial Year and the measures taken by the Concessionaire pursuant to the provisions of Clause 3.1 of this Schedule for averting or minimising such accidents in future.

4. **Costs and expenses**

Costs and expenses incurred in connection with the Safety Requirements set forth herein, including the provisions of Clause 2 of this Schedule, shall be borne by the Concessionaire in accordance with the provisions of Article 5.1.

Annex - I

(Schedule-5)

Safety Guidelines

1. **System integrity**

In the design of the Project Facilities, particular care shall be taken to minimise the likely incidence of failure.

2. **Safety management**

A safety programme shall be prepared by the Concessionaire once every year to bring out clearly the system of management of checks and maintenance tolerances for various elements comprising the Project and compliance thereof. The programme shall also bring out the nature and extent of staff training and awareness in dealing with such checks and tolerances. [2 (two)] copies of the programme shall be sent to the Project Engineer within [15 (fifteen)] days of the close of every year.

3. **Emergency**

A set of emergency procedures shall be formulated to deal with different emergency situations and the operations staff shall be trained to respond appropriately during emergency through periodic simulated exercises as laid down in a manual for management of disasters (the "**Disaster Management Manual"**) to be prepared and published by the Concessionaire prior to [Project COD]. The Concessionaire shall provide 5 (five) copies each of the Disaster Management Manual to the Authority and the State Government and the Project Engineer no later than [30 (thirty)] days prior to Project COD.

4. **Fire safety**

4.1. To prevent fire in the Project, the Concessionaire shall use fire resistant materials in the construction thereof and shall avoid use of materials which are to some extent flammable, or which emit smoke and harmful gases when burning.

4.2. To deal with incidents of fire, the Concessionaire shall provide a hydrant based fire-fighting system in conformity with the Good Industry Practices.

5. **Surveillance and Safety Manual**

The Concessionaire shall, no later than [60 (sixty)] days prior to [Project COD], evolve and adopt a manual for surveillance and safety of the Project, in accordance with Good Industry Practice, and shall comply therewith in respect of the security and safety of the Project, including its gate control, sanitation, fire prevention, environment protection.

6. **Watch and Ward**

The Concessionaire shall, at its own expense and in accordance with Good Industry Practice, provide and maintain all lighting, fencing, watch and ward arrangements for the safety of the Project and all persons affected by it.

SCHEDULE 6
PERFORMANCE SECURITY OR BANK GUARANTEE

[on appropriate stamp paper]
(See Article 9.1)

The [Secretary], [Name of the State] Department of [Urban Development] and the [Municipal Commissioner of Authority]

Address:

WHEREAS:

A. …….. (the "**Concessionaire**"), the [Municipal Corporation/Cluster] (the "**Authority**") and the State Department of [Urban Development] (the "**State Government**") have entered into a Concession Agreement dated ….…….. (the "**Agreement**") whereby the State Government and the Authority have agreed to the Concessionaire undertaking the development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste at municipal dumpsite(s) on hybrid annuity basis at [Location], in the State of [Name of the State]" (the **"Project"**) subject to and in accordance with the provisions of the Concession Agreement.

B. The Agreement requires the Concessionaire to furnish a Performance Security to the State Government and the Authority {of a sum of Rs. [•] (Rupees _____)} (the "**Guarantee Amount**") as security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the Construction Period (as defined in the Agreement).

C. We, ……..through our Branch at ……. (the "**Bank**") have agreed to furnish this Bank Guarantee by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unequivocal, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unequivocal, unconditionally and irrevocably guarantees the due and faithful performance of the Concessionaire's obligations during the [Construction Period], under and in accordance with the Agreement, and agrees and undertakes to pay to the State Government and/or the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Concessionaire, such sum or sums up to an aggregate sum of the Guarantee Amount as the State Government and/or the Authority shall claim, without the State Government or the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the State Government or the Authority, under the hand of an officer not below the rank of [Secretary, Department of Urban Development/Municipal Commissioner], that the Concessionaire has committed default in the due and faithful performance of all or any of its

obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the State Government and the Authority shall be the judges as to whether the Concessionaire is in default in due and faithful performance of its obligations during the [Construction] Period under the Agreement and its decision that the Concessionaire is in default shall be final, and binding on the Bank, notwithstanding any differences between the State Government or the Authority and the Concessionaire, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Concessionaire for any reason whatsoever.

3. In order to give effect to this Guarantee, the State Government and the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Concessionaire and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the State Government or the Authority to proceed against the Concessionaire before presenting to the Bank its demand under this Guarantee.

5. The State Government and the Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Concessionaire contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the State Government and the Authority against the Concessionaire, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the State Government and the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the State Government or the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Concessionaire or any other forbearance, indulgence, act or omission on the part of the State Government or the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the State Government and/or the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Concessionaire under the Agreement.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force until the expiry of the construction period or compliance of the conditions specified in paragraph 8 below and unless a demand or claim in writing is made by the State Government or the Authority on the Bank under this Guarantee, no later than 6 (six) months from the date of

expiry of this Guarantee, all rights of the State Government and the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Performance Security shall cease to be in force and effect when the Concessionaire shall have expended on Project construction an aggregate sum not less than 100% (one hundred per cent) of the Bid Project Cost which is deemed to be Rs. [•] (Rupees [•]) for the purposes of this Guarantee, and provided the Concessionaire is not in breach of this Agreement. Upon request made by the Concessionaire for release of the Performance Security along with the particulars required hereunder, duly certified by a statutory auditor of the Concessionaire, the State Government and/or the Authority shall release the Performance Security forthwith.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the State Government or the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred Branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the State Government or the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect until the expiry of the construction period or until it is released earlier by the State Government and/or the Authority pursuant to the provisions of the Agreement.

Signed and sealed this …….day of …….., 20…… at ……..

SIGNED, SEALED AND DELIVERED
For and on behalf of the BANK by:

(Signature)
(Name) (Designation) (Code Number)
(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the Head Office of the Bank as well as of issuing Branch should be mentioned on the covering letter of issuing Branch.

SCHEDULE 7

FORMAT OF THE MOBILIZATION ADVANCE GUARANTEE

[on appropriate stamp paper]

(See Article 9.10)

Guarantee No. : [●]
Amount of Guarantee : [●]
This Mobilization Advance Guarantee is executed on this [•] day of [•] at [•]

BY

[•] with its registered office at [•] and a branch office at [•] (hereinafter referred to as the **"Bank"**, which expression shall unless repugnant to the context thereof, be deemed to include its successors-in interest and permitted assigns)

IN FAVOUR OF

(1) The State Department of [Urban Development] of [Name of the State] represented by [•], and having its offices at [•] (hereinafter referred to as the "**State Government**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns);

AND

(2) The Authority**,** a statutory body constituted under the [Act under which the Authority is established] with its registered office at [•] (hereinafter referred to as the **"Authority"**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

WHEREAS

A. [Name of the Concessionaire] with its registered office at [insert address], hereinafter referred to as the "**Concessionaire**", which expression shall unless repugnant to the context thereof, be deemed to include its successors-in-interest and permitted assigns) has executed a concession agreement dated [insert date] with the State Government and the Authority ("**Concession Agreement**") in relation to design, construction, operation and maintenance of integrated solid waste management system and reclamation of land through bio-remediation at [Location] by the Concessionaire.

B. In terms of Article 9.10 of the Concession Agreement, the Concessionaire is required to furnish a Mobilization Advance Guarantee to the State Government and the Authority in the form of an unconditional, irrevocable and on demand bank guarantee for securing the Mobilization Advance made to the Concessionaire in accordance with the Concession Agreement ("**Mobilization Advance Guarantee**") for INR [insert amount equal to 110% (one hundred and ten per cent) of the Mobilization Advance] (Rupees [•]) ("**Guaranteed Amount**").

C. At the request of the Concessionaire and for sufficient consideration, the Bank has agreed to issue this guarantee in favor of the State Government and the Authority.

NOW THEREFORE THIS DEED WITNESSETH AS FOLLOWS:

1. Capitalised terms used herein but not defined shall have the meaning ascribed to them in the Concession Agreement.

2. The Bank shall upon a written demand from the State Government or the Authority informing the Bank of the Concessionaire's failure to fulfill its obligations under the

Concession Agreement, pay to the State Government or the Authority, within 5 (five) days of receipt of such written demand from the State Government or the Authority, without further proof or conditions and without contest, recourse, demur or protest and without any enquiry to the State Government or the Authority or the Concessionaire, forthwith and in full amount, without any deductions or set off or counter claims whatsoever, the sum claimed by the State Government or the Authority in such demand not exceeding an amount equivalent to the Guaranteed Amount. The Bank will pay the amount specified in the demand notwithstanding any direction to the contrary given or any dispute raised by the Concessionaire or any other person.

The Bank agrees that this Mobilization Advance Guarantee does not limit the number of claims that may be made by the State Government or the Authority against the Bank provided that such claims taken together shall not exceed the Guaranteed Amount.

Any payment made hereunder shall be made free and clear of and without deduction for, or on account of, any present or future taxes, deductions or withholdings of any nature whatsoever and by whomsoever imposed, and where any withholding on a payment is required by any Applicable Law, the Bank shall comply with such withholding obligations and shall pay such additional amount in respect of such payment such that the State Government or the Authority receives the full amount due hereunder as if no such withholding had occurred.

3. This Mobilization Advance Guarantee shall be a continuing guarantee during its currency and shall remain in force and effect until 21 (twenty one) months from the Compliance Date or until the entire Mobilization Advance has been adjusted against the Construction Payments in accordance with the Concession Agreement, whichever is later, upon which the obligations of the Bank under this Mobilization Advance Guarantee shall stand discharged

4. The obligations of the Bank herein are absolute and unconditional, irrespective of the value, genuineness, validity, regularity or enforceability of the Concession Agreement or the insolvency, bankruptcy, reorganisation, dissolution or liquidation of the Concessionaire or any change in ownership of the Concessionaire or any purported assignment by the Concessionaire or any other circumstance whatsoever which might otherwise constitute a discharge or defence of a guarantor or a surety.

   Further, this Mobilization Advance Guarantee is in no way conditional upon any requirement that the State Government or the Authority first attempts to procure the Guaranteed Amount from the Concessionaire or any other person, or resort to any other means of obtaining payment of the Guaranteed Amount.

5. The Bank hereby agrees that its liability under this Mobilization Advance Guarantee shall not be discharged by virtue of any agreement between the Concessionaire, the State Government and the Authority, whether with or without the Bank's knowledge, or by reason of the State Government or the Authority showing any indulgence or forbearance to the Concessionaire.

6. The Bank's obligations under this Mobilization Advance Guarantee for the Guaranteed Amount is primary, independent and absolute and not by way of surety only.

7. The obligations of the Bank under this Mobilization Advance Guarantee shall not be affected by any act, omission, matter or thing which, but for this provision, would prejudice or diminish the Guaranteed Amount in whole or in part, including (whether or not known to it or the State Government or the Authority):

   (a) any time or waiver granted to, or composition with, the Concessionaire or any other

person;

(b) any incapacity or lack of powers, authority or legal personality of or dissolutions or change in the status of the Concessionaire or any other person;

(c) any variation of the Concession Agreement so that references to the Concession Agreement in this Mobilization Advance Guarantee shall include each variation;

(d) any unenforceability, illegality or invalidity of any obligation of any person under the Concession Agreement or any unenforceability, illegality or invalidity of the obligations of the Bank under this Mobilization Advance Guarantee or the unenforceability, illegality or invalidity of the obligations of any person under any other document or guarantee, to the extent that each obligation under this Mobilization Advance Guarantee shall remain in full force as a separate, continuing and primary obligation, and its obligations be construed accordingly, as if there were no unenforceability, illegality or invalidity;

(e) any extension, waiver, or amendment whatsoever which may release a guarantor or the Bank (other than performance or indefeasible payment of a Guaranteed Amount); or

(f) any part performance of the Concession Agreement by the Concessionaire or by any failure by the State Government or the Authority to timely pay or any failure by the State Government or the Authority to timely perform any of its obligations under the Concession Agreement.

8. So long as any sum remains due from the Concessionaire to the State Government or the Authority, the Bank shall not exercise any right of subrogation or any other rights of a guarantor or enforce any guarantee or other right or claim against the Concessionaire (whether in respect of its liability under this Mobilization Advance Guarantee or otherwise) or claim in the insolvency or liquidation of the Concessionaire or any such other person in competition with the State Government or the Authority. If the Bank receives any payment or benefit in breach of this Clause 8, it shall hold the same in trust for the State Government and the Authority.

9. The Bank represents, warrants and undertakes to the Authority that:

(a) it has the power to execute, deliver and perform the terms and provisions of this Mobilization Advance Guarantee and has taken all necessary action(s) to authorize the execution, delivery and performance by it of this Mobilization Advance Guarantee;

(b) the Bank has duly executed and delivered this Mobilization Advance Guarantee, and this Mobilization Advance Guarantee constitutes its legal, valid and binding obligation enforceable in accordance with its terms except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, moratorium or other similar laws affecting the enforcement of creditors' rights generally and by general equitable principles;

(c) neither the execution, delivery or performance by the Bank of this Mobilization Advance Guarantee, nor compliance by it with the terms and provisions hereof will: (i) contravene any material provision of any law, statute, rule or regulations or any order, writ, injunction or decree of any court or governmental instrumentality; (ii) conflict or be inconsistent with or result in any breach of any of the material terms, covenants, conditions or provisions of, or constitute a default under any agreement,

contract or instrument to which the Bank is a party or by which it or any of its property or assets is bound; or (iii) violate any provision of the Bank's constituent documents;

(d) no order, consent, approval, license, authorization or validation of, or filing, recording or registration with (except as have been obtained or made prior to the date hereof), or exemption by, any governmental or public body or authority, or any subdivision thereof, is required to authorize, or is required in connection with: (i) the execution, delivery and performance of this Mobilization Advance Guarantee; or (ii) the legality, validity, binding effect or enforceability of this Mobilization Advance Guarantee; and

(e) this Mobilization Advance Guarantee will be enforceable when presented for payment to a Scheduled Commercial Bank (as defined by the Reserve Bank of India Act, 1934) at [Location].

10. This Mobilization Advance Guarantee is a continuing one and all liabilities to which it applies or may apply under the terms hereof shall be conclusively presumed to have been created in reliance hereon. No failure or delay on the part of the State Government or the Authority in exercising any right, power or privilege hereunder and no course of dealing between the State Government, the Authority and the Bank, or the Concessionaire, shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, power or privilege.

11. If any one or more of the provisions contained in this Mobilization Advance Guarantee are or become invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby, and the Bank shall enter into good faith negotiations with the State Government and the Authority to replace the invalid, illegal or unenforceable provision.

12. The Bank hereby agrees to execute and deliver all such instruments and take all such actions as may be necessary to make effective fully the purposes of this Mobilization Advance Guarantee.

13. This Mobilization Advance Guarantee may be executed in one or more duplicate counterparts, and when executed and delivered by the Bank and the State Government and the Authority shall constitute a single binding agreement.

14. Any demand, notice, request or other communication to be given or made under this Mobilization Advance Guarantee shall be deemed to have been duly given or served:

(a) Upon, the State Government, [Address of the State Government], marked for the attention of the [Officer-in-Charge];

(b) Upon, the Authority, [Address of the Authority], marked for the attention of the [Officer-in-Charge];

(c) Upon a Scheduled Commercial Bank (as defined by the Reserve Bank of India Act, 1934), at [Location], India.

15. The Bank:

(a) acknowledges that the Lenders will review this Mobilization Advance Guarantee and may require changes thereto as a condition of granting any Financial Assistance and/or providing political risk insurance; and

(b) shall consider any such requirements in good faith.

16. This Mobilization Advance Guarantee shall be governed by, and construed in accordance with, the laws of India. The Bank irrevocably agrees that any legal action, suit or proceeding arising out of or relating to this Mobilization Advance Guarantee may be brought in the courts in [State of Location].

17. The State Government and the Authority may assign or transfer all or any part of its interest herein together with the Concession Agreement to any other person with prior consent of to the Bank. The Bank may not assign or transfer any of its rights or obligations under this Mobilization Advance Guarantee.

IN WITNESS WHEREOF the Bank has set its hands hereunto on the day, month and year first hereinabove written.

Signed and delivered by [insert name of Bank] Bank by hand

SCHEDULE 8
THE SITES
(See Article 10)

Sites of the Project Facilities shall include the land, [buildings and structures].

[Note: Through suitable drawings and description in words, the land comprising the Project Sites shall each be specified briefly but precisely. In the event there are any buildings or structures on the Project Site, the same shall be marked in the drawings and briefly described in words.]

An inventory of each Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Concessionaire.

Additional land required for ancillary buildings, extension/ addition to the Project Facilities or for construction of works due to change of Scope of Work shall be provided by the Authority in accordance with the Article 14.6.1(r) of this Agreement. Upon provision, such land shall form part of the Site and vest in the Authority.

SCHEDULE 9
SUBSTITUTION AGREEMENT
(See Article 12.3)

THIS SUBSTITUTION AGREEMENT is entered into on this the ……..day of ……..
20….

AMONGST

1. The **State Department of [Urban Development]** of [Name of the State] represented by [•], and having its offices at [•] (hereinafter referred to as the "**State Government**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns);

2. The Municipal Corporation of [**], incorporated under the [Act under which Authority has been established], represented by its Municipal Commissioner/Managing Director and having its principal offices at ***, India (hereinafter referred to as the "**Authority**" which expression shall unless repugnant to the context or meaning thereof include its administrators, successors and assigns);

3. ……LIMITED, a company incorporated under the provisions of the Companies Act, 2013 and having its registered office at ……., (hereinafter referred to as the "**Concessionaire**" which expression shall unless repugnant to the context or meaning thereof include its successors and permitted assigns and substitutes);

4. ……..(name and particulars of Lenders' Representative) and having its registered office at ……., acting for and on behalf of the Senior Lenders.....(name) as their duly authorised agent with regard to matters arising out of or in relation to this Agreement (hereinafter referred to as the "**Lenders' Representative**", which expression shall unless repugnant to the context or meaning thereof include its successors and substitutes);

WHEREAS:

(A) The State Government and the Authority has entered into a Concession Agreement dated …… with the Concessionaire (the "**Concession Agreement**") for development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste on hybrid annuity basis at _____, in the State of [Name of the State], and a copy of which is annexed hereto and marked as Annex-A to form part of this Agreement.

(B) Senior Lenders have agreed to finance the Project in accordance with the terms and conditions set forth in the Financing Agreements.

(C) Senior Lenders have requested the State Government and the Authority to enter into this Substitution Agreement for securing their interests through assignment, transfer and substitution of the Concession to a Nominated Company in accordance with the provisions of this Agreement and the Concession Agreement.

(D) In order to enable implementation of the Project including its financing, construction, operation and maintenance, the Authority has agreed and undertaken to transfer and assign the Concession to a Nominated Company in accordance with the terms and conditions set forth in this Agreement and the Concession Agreement.

NOW, **THEREFORE**, in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Substitution Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

"**Agreement**" means this Substitution Agreement and any amendment thereto made in accordance with the provisions contained in this Agreement;

"**Financial Default**" means occurrence of a material breach of the terms and conditions of the Financing Agreements or a continuous default in Debt Service by the Concessionaire for a minimum period of 3 (three)months;

"**Lenders' Representative**" means the person referred to as the Lenders' Representative in the foregoing Recitals;

"**Nominated Company**" means a company, incorporated under the provisions of the Companies Act, 2013, selected by the Lenders' Representative, on behalf of Senior Lenders, and proposed to the State Government and the Authority for assignment/transfer of the Concession as provided in this Agreement;

"**Notice of Financial Default**" shall have the meaning ascribed thereto in Clause 3.2.1; and

"**Parties**" means the parties to this Agreement collectively and "Party" shall mean any of the Parties to this Agreement individually.

1.2 Interpretation

1.2.1 References to Lenders' Representative shall, unless repugnant to the context or meaning thereof, mean references to the Lenders' Representative, acting for and on behalf of Senior Lenders.

1.2.2 References to Clauses are, unless stated otherwise, references to Clauses of this Agreement.

1.2.3 The words and expressions beginning with capital letters and defined in this Agreement shall have the meaning ascribed thereto herein, and the words and expressions used in this Agreement and not defined herein but defined in the Concession Agreement shall, unless repugnant to the

context, have the meaning ascribed thereto in the Concession Agreement.

1.2.4 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Concession Agreement shall apply, *mutatis mutandis*, to this Agreement.

2. ASSIGNMENT

2.1 Assignment of rights and title

The Concessionaire hereby agrees to assign the rights, title and interest in the Concession to, and in favour of, the Lenders' Representative pursuant to and in accordance with the provisions of this Agreement and the Concession Agreement by way of security in respect of financing by the Senior Lenders under the Financing Agreements.

3. SUBSTITUTION OF THECONCESSIONAIRE

3.1 Rights of substitution

3.1.1 Pursuant to the rights, title and interest assigned under Clause 2.1, the Lenders' Representative shall be entitled to substitute the Concessionaire by a Nominated Company under and in accordance with the provisions of this Agreement and the Concession Agreement.

3.1.2 The State Government and the Authority hereby agrees to substitute the Concessionaire by endorsement on the Concession Agreement in favour of the Nominated Company selected by the Lenders' Representative in accordance with this Agreement. (For the avoidance of doubt, the Senior Lenders or the Lenders' Representative shall not be entitled to operate and maintain the Project at _____as Concessionaire either individually or collectively).

3.2 Substitution upon occurrence of Financial Default

3.2.1 Upon occurrence of a Financial Default, the Lenders' Representative may issue a notice to the Concessionaire (the "**Notice of Financial Default**") along with particulars thereof, and send a copy to the State Government and the Authority for its information and record. A Notice of Financial Default under this Clause 3 shall be conclusive evidence of such Financial Default and it shall be final and binding upon the Concessionaire for the purposes of this Agreement.

3.2.2 Upon issue of a Notice of Financial Default hereunder, the Lenders' Representative may, without prejudice to any of its rights or remedies under this Agreement or the Financing Agreements, substitute the Concessionaire by a Nominated Company in accordance with the provisions of this Agreement.

3.2.3 At any time after the Lenders' Representative has issued a Notice of Financial Default, it may by notice require the State Government and the Authority to suspend all the rights of the Concessionaire and undertake the operation and maintenance of the facility in accordance with the provisions of the Concession Agreement, and upon receipt of such notice, the State Government or the Authority shall undertake Suspension under and in accordance with the provisions of the Concession Agreement. The aforesaid Suspension shall be revoked upon

substitution of the Concessionaire by a Nominated Company, and in the event such substitution is not completed within 180 (one hundred and eighty) days from the date of such Suspension, the State Government or the Authority may terminate the Concession Agreement forthwith by issuing a Concession Period Notice in accordance with the provisions of the Concession Agreement; Provided that upon written request from the Lenders' Representative and the Concessionaire, the State Government or the Authority may extend the aforesaid period of 180 (one hundred and eighty) days by a period not exceeding 90 (ninety) days. For the avoidance of doubt, the State Government and the Authority expressly agrees and undertakes to terminate the Concession Agreement forthwith, upon receipt of a written request from the Lenders' Representative at any time after 240 (two hundred and forty) days from the date of Suspension hereunder.

3.3 Substitution upon occurrence of Concessionaire Default

3.3.1 Upon occurrence of a Concessionaire Default, the State Government or the Authority shall by a notice inform the Lenders' Representative of its intention to issue a Concession Period Notice and grant 15 (fifteen) days time to the Lenders' Representative to make a representation, stating the intention to substitute the Concessionaire by a Nominated Company.

3.3.2 In the event that the Lenders' Representative makes a representation to the State Government or the Authority within the period of 15 (fifteen) days specified in Clause 3.3.1, stating that it intends to substitute the Concessionaire by a Nominated Company, the Lenders' Representative shall be entitled to undertake and complete the substitution of the Concessionaire by a Nominated Company in accordance with the provisions of this Agreement within a period of 180 (one hundred and eighty) days from the date of such representation, the State Government or the Authority shall either withhold Concession Period or undertake Suspension for the aforesaid period of 180 (one hundred and eighty) days; Provided that upon written request from the Lenders' Representative and the Concessionaire, the State Government or the Authority shall extend the aforesaid period of 180 (one hundred and eighty) days by a period not exceeding 90 (ninety) days.

3.4 Procedure for substitution

3.4.1 The State Government, the Authority and the Concessionaire hereby agree that on or after the date of Notice of Financial Default or the date of representation to the State Government and the Authority under Clause 3.3.2, as the case may be, the Lenders' Representative may, without prejudice to any of the other rights or remedies of the Senior Lenders, invite, negotiate and procure offers, either by private negotiations or public auction or tenders for the take over and transfer of the facilities including the Concession to the Nominated Company upon such Nominated Company's assumption of the liabilities and obligations of the Concessionaire towards the State Government and the Authority under the Concession Agreement and towards the Senior Lenders under the Financing Agreements.

3.4.2 To be eligible for substitution in place of the Concessionaire, the Nominated Company shall be required to fulfill the eligibility criteria that were laid down by the State Government and the Authority for short listing the bidders for award of the Concession.

3.4.3 Upon selection of a Nominated Company, the Lenders' Representative shall request the State

Government and the Authority to:

(a) accede to transfer to the Nominated Company the right to construct, operate and maintain the Project facilities in accordance with the provisions of the Concession Agreement;

(b) endorse and transfer the Concession to the Nominated Company, on the same terms and conditions, for the residual Concession Period; and

(c) enter into a Substitution Agreement with the Lenders' Representative and the Nominated Company on the same terms as are contained in this Agreement.

3.4.4 If the State Government or the Authority has any objection to the transfer of Concession in favour of the Nominated Company in accordance with this Agreement, it shall within 15 (fifteen) days from the date of proposal made by the Lenders' Representative, give a reasoned order after hearing the Lenders' Representative. If no such objection is raised by the State Government or the Authority, the Nominated Company shall be deemed to have been accepted. The State Government or the Authority thereupon shall transfer and endorse the Concession within 15 (fifteen) days of its acceptance/deemed acceptance of the Nominated Company; Provided that in the event of such objection by the State Government or the Authority, the Lenders' Representative may propose another Nominated Company whereupon the procedure set forth in this Clause 3.4 shall be followed for substitution of such Nominated Company in place of the Concessionaire.

3.5 Selection to be binding

The decision of the Lenders' Representative, the State Government and the Authority in selection of the Nominated Company shall be final and binding on the Concessionaire. The Concessionaire irrevocably agrees and waives any right to challenge the actions of the Lenders' Representative or the Senior Lenders or the State Government or the Authority taken pursuant to this Agreement including the transfer/assignment of the Concession in favour of the Nominated Company. The Concessionaire agrees and confirms that it shall not have any right to seek revaluation of assets of the Project or the Concessionaire's shares. It is hereby acknowledged by the Parties that the rights of the Lenders' Representative are irrevocable and shall not be contested in any proceedings before any court or the State Government or the Authority and the Concessionaire shall have no right or remedy to prevent, obstruct or restrain the State Government or the Authority or the Lenders' Representative from effecting or causing the transfer by substitution and endorsement of the Concession as requested by the Lenders' Representative.

4. PROJECT AGREEMENTS

4.1 Substitution of Nominated Company in Project Agreements

The Concessionaire shall ensure and procure that each Project Agreement contains provisions that entitle the Nominated Company to step into such Project Agreement, in its consent, in place and substitution of the Concessionaire in the event of such Nominated Company's assumption of the liabilities and obligations of the Concessionaire under the Concession Agreement.

5. TERMINATION OF CONCESSION AGREEMENT

5.1 Concession Period upon occurrence of Financial Default

At any time after issue of a Notice of Financial Default, the Lenders' Representative may by a notice in writing require the State Government or the Authority to terminate the Concession Agreement forthwith, and upon receipt of such notice, the State Government or the Authority shall undertake Concession Period under and in accordance with the Agreement.

5.2 Concession Period when no Nominated Company is selected

In the event that no Nominated Company acceptable to the State Government and the Authority is selected and recommended by the Lenders' Representative within the period of 180 (one hundred and eighty) days or any extension thereof as set forth in Clause 3.3.2, the State Government or the Authority may terminate the Concession Agreement forthwith in accordance with the provisions thereof.

5.3 Realisation of Debt Due

The State Government, the Authority and the Concessionaire hereby acknowledge and agree that, without prejudice to their any other right or remedy, the Lenders' Representative is entitled to receive from the Concessionaire, without any further reference to or consent of the Concessionaire, the Debt Due upon Concession Period of the Concession Agreement. For realisation of the Debt Due, the Lenders' Representative shall be entitled to make its claim from the Escrow Account in accordance with the provisions of the Concession Agreement and the Escrow Agreement.

6. DURATION OF THE AGREEMENT

6.1 Duration of the Agreement

This Agreement shall come into force from the date hereof and shall expire at the earliest to occur of the following events:

(a) Concession Period of the Agreement; or

(b) no sum remains to be advanced, or is outstanding to the Senior Lenders, under the Financing Agreements.

7. INDEMNITY

7.1 General indemnity

7.1.1 The Concessionaire will indemnify, defend and hold the State Government, the Authority and the Lenders' Representative harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense of whatever kind and nature arising out of any breach by the Concessionaire of any of its obligations under this Agreement or on account of failure of the Concessionaire to comply with Applicable Laws and Applicable Permits.

7.1.2 The State Government and the Authority will indemnify, defend and hold the Concessionaire

harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of failure of the State Government or the Authority to fulfill any of its obligations under this Agreement, materially and adversely affecting the performance of the Concessionaire's obligations under the Concession Agreement or this Agreement, other than any loss, damage, cost and expense, arising out of acts done in discharge of their lawful functions by the State Government or the Authority, its officers, servants and agents.

7.1.3 The Lenders' Representative will indemnify, defend and hold the Concessionaire harmless against any and all proceedings, actions and third party claims for any loss, damage, cost and expense arising out of failure of the Lenders' Representative to fulfill its obligations under this Agreement, materially and adversely affecting the performance of the Concessionaire's obligations under the Concession Agreement, other than any loss, damage, cost and expense, arising out of acts done in discharge of their lawful functions by the Lenders' Representative, its officers, servants and agents.

7.2 Notice and contest of claims

In the event that any Party hereto receives a claim from a third party in respect of which it is entitled to the benefit of an indemnity under Clause 7.1 or in respect of which it is entitled to reimbursement (the "**Indemnified Party**"), it shall notify the other Party responsible for indemnifying such claim hereunder (the "**Indemnifying Party**") within 15 (fifteen) days of receipt of the claim and shall not settle or pay the claim without the prior approval of the Indemnifying Party, such approval not to be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim, it may conduct the proceedings in the name of the Indemnified Party and shall bear all costs involved in contesting the same. The Indemnified Party shall provide all cooperation and assistance in contesting any claim and shall sign all such writings and documents as the Indemnifying Party may reasonably require.

8. DISPUTERESOLUTION

8.1 Dispute resolution

8.1.1 Any dispute, difference or claim arising out of or in connection with this Agreement which is not resolved amicably shall be decided by reference to arbitration to a Board of Arbitrators comprising one nominee each of the State Government, the Authority, the Concessionaire and the Lenders' Representative. Such arbitration shall be held in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi (the "Rules") or such other rules as may be mutually agreed by the Parties, and shall be subject to provisions of the Arbitration and Conciliation Act,1996.

8.1.2 The Arbitrators shall issue a reasoned award and such award shall be final and binding on the Parties. The venue of arbitration shall be [•] and the language of arbitration shall be English.

9. MISCELLANEOUS PROVISIONS

9.1 Governing law and jurisdiction

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the Courts at [Name of the State of the Project] shall have jurisdiction over all matters arising out of or relating to this Agreement.

9.2 Waiver of immunity

The State Government and the Authority unconditionally and irrevocably:

(a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;

(b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity from such proceedings shall be claimed by or on behalf of the State Government or the Authority with respect to its assets;

(c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and

(d) consents generally in respect of the enforcement of any judgment or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgment that may be made or given in connection therewith).

9.3 Priority of agreements

In the event of any conflict between the Concession Agreement and this Agreement, the provisions contained in the Concession Agreement shall prevail over this Agreement.

9.4 Alteration of terms

All additions, amendments, modifications and variations to this Agreement shall be effectual and binding only if in writing and signed by the duly authorised representatives of the Parties.

9.5 Waiver

9.5.1 Waiver by any Party of a default by another Party in the observance and performance of any provision of or obligations under this Agreement:

(a) shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Agreement;

(b) shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and

(c) shall not affect the validity or enforceability of this Agreement in any manner.

9.5.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation there under nor time or other indulgence granted by a Party to another Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

9.6 No third party beneficiaries

This Agreement is solely for the benefit of the Parties and no other person or entity shall have any rights hereunder.

9.7 Survival

9.7.1 Concession Period of this Agreement:

(a) shall not relieve the Parties of any obligations hereunder which expressly or by implication survive termination hereof; and

(b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, shall not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such termination or arising out of such termination.

9.7.2 All obligations surviving the cancellation, expiration or termination of this Agreement shall only survive for a period of 3 (three) years following the date of such termination or expiry of this Agreement.

9.8 Severability

If for any reason whatever any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to dispute resolution under Clause 8 of this Agreement or otherwise.

9.9 Successors and assigns

This Agreement shall be binding on and shall inure to the benefit of the Parties and their respective successors and permitted assigns.

9.10 Notices

All notices or other communications to be given or made under this Agreement shall be in writing, shall either be delivered personally or sent by courier or registered post with an additional copy to be

sent by facsimile or e-mail. The address for service of each Party, its facsimile number and e-mail address are set out under its name on the signing pages hereto. A notice shall be effective upon actual receipt thereof, save that where it is received after 5.30 (five thirty) p.m. on any day, or on a day that is a public holiday, the notice shall be deemed to be received on the first working day following the date of actual receipt. Without prejudice to the foregoing, a Party giving or making a notice or communication by facsimile or e-mail shall promptly deliver a copy thereof personally, or send it by courier or registered post to the addressee of such notice or communication. It is hereby agreed and acknowledged that any Party may by notice change the address to which such notices and communications to it are to be delivered or mailed. Such change shall be effective when all the Parties have notice of it.

9.11 Language

All notices, certificates, correspondence and proceedings under or in connection with this Agreement shall be in English.

9.12 Authorised representatives

Each of the Parties shall by notice in writing designate their respective authorised representatives through whom only all communications shall be made. A Party hereto shall be entitled to remove and/or substitute or make fresh appointment of such authorised representative by similar notice.

9.13 Original Document

This Agreement may be executed in three counterparts, each of which when executed and delivered shall constitute an original of this Agreement.

IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

THE COMMON SEAL OFCONCESSIONAIRE has been affixed pursuant to the resolution passed by the Board of Directors of the Concessionaire at its meeting held on the …… day of 20…… hereunto affixed in the presence of…….., Director, who has signed these presents in token thereof and ……., Company Secretary / Authorised Officer who has countersigned the same in token thereof [$]:

SIGNED, SEALED AND DELIVERED

For and on behalf of

NAME OF THE STATE GOVERNMENT by:

(Signature) (Name) (Designation) (Address) (Fax No.)
(E-mail address)

SIGNED, SEALED AND DELIVERED

For and on behalf of

NAME OF THE AUTHORITY by:

(Signature) (Name) (Designation) (Address) (Fax No.)
(E-mail address)

SIGNED, SEALED AND DELIVERED

For and on behalf of

SENIOR LENDERS by the Lenders' Representative:

(Signature)
(Name)
(Designation)
(Address)
(Fax)
(E-mail address)

In the presence of:

1. 2.

[$] To be affixed in accordance with the articles of association of the Concessionaire.

SCHEDULE 10

SCOPE OF WORK OF PROJECT ENGINEER

(See Article 13)

1. The Project Engineer shall assist the State Government and the Authority in supervising the construction, development, operation and maintenance of the Project Facilities and shall work closely with the State Government and the Authority to monitor compliance with the KPIs. The detailed scope of work of the Project Engineer, to be read in conjunction with the provisions of the Concession Agreement, is outlined below:

1.1. The Project Engineer shall review the Designs and Drawings to be provided by the Concessionaire. These will include, inter-alia, the site layout plan, process design, drawings, structural calculations, mechanical, electrical and instrumentation works, quality plans, implementation schedules, and the environment, health & safety plans for all Project Facilities. On the basis of its review, the Project Engineer shall provide its recommendations to the State Government and the Authority.

1.2. During relevant Construction Periods, the Project Engineer shall inspect the relevant Project Facilities at least once a month and prepare an inspection report, setting out the progress of the construction of the relevant Project Facilities, defects or deficiencies, if any, and status of compliance with the Construction Plan, Technical Specifications and Designs and Drawings and the Guaranteed Interim Availability.

1.3. The Project Engineer shall be responsible to monitor the implementation of the approved environment, health & safety plan by the Concessionaire. The Project Engineer shall also verify the material safety data sheets of hazardous chemicals, if any.

1.4. The Project Engineer shall review the construction progress of the Project as per the Project Milestones proposed by the Concessionaire and provide necessary recommendations to the State Government and the Authority for the purpose of issuance of Project Milestone Certificates.

1.5. At the end of the Construction Period for different Project Facilities, the Project Engineer shall review the relevant Project Facilities and provide necessary recommendations to the State Government and the Authority with regards to the issuance of the respective Construction Completion Certificates to the Concessionaire to certify completion of construction of such Project Facilities, and the satisfaction of all other conditions required to be fulfilled by the Concessionaire.

1.6. The Project Engineer shall monitor the Trial Operations of different Project Facilities during their respective Trial Periods and provide necessary recommendations to the State Government and the Authority for the purpose of the issuance of the respective COD Certificates to the Concessionaire. The review shall be based on the Trial Operations Procedures outlined in the Concession Agreement and include the following:

(a) Verify quality of installations, operation of equipment and workmanship;

(b) [Verify the Standards/quality of the By-Products;]

(c) [Verify the consumption of electricity and generation of power, if any, vis-à-vis the Guaranteed Energy Consumption.]

1.7. The Project Engineer shall review the O&M Manual and the Scheduled Maintenance Program submitted by the Concessionaire and provide its recommendations to the State Government and the Authority.

1.8. During the O&M Period, the Project Engineer shall inspect all the Project Facilities at least once a month and prepare an inspection report, setting out the defects or deficiencies, if any, and status of compliance with the relevant KPIs and Standards.

1.9. The Project Engineer shall inspect laboratories where tests are conducted on samples to ensure conformance and compliance with laboratory procedures and requirements.

1.10. The Project Engineer shall review the reports generated form the Online Monitoring Systems of different Project Facilities to assess adherence to their relevant KPIs and submit the monthly KPI Adherence Reports to the State Government and the Authority.

1.11. The Project Engineer shall assist the State Government and the Authority in estimating the interim Availability Liquidated Damages and Delay Liquidated Damages, as applicable.

1.12. The Project Engineer shall assist Authority in estimating the Liquidated Damages, as applicable.

1.13. During the Concession Period, and as requested by the State Government or the Authority, the Project Engineer shall provide its opinion and assessment on the implications of the events related to Emergency, Change in Law, Force Majeure, Fundamental Change in Law, Minor Casualty, Total Casualty, Variation and Unforeseen Site Conditions.

1.14. The Project Engineer shall participate in the survey to determine the Hand-back Conditions as per the Hand-back Requirements. It shall review the survey report of the Hand-back Conditions submitted by the Concessionaire and provide its recommendations to the State Government and the Authority on the compliance with the Hand-back Requirements.

SCHEDULE 11
DRAWINGS
(See Article 14)

Drawings

In compliance with the obligations set forth in Article 14 of this Agreement, the Concessionaire shall furnish to the Authority/Project Engineer, free of cost, all Drawings listed below:

[Note: The Authority shall list and describe in this Schedule all the Drawings that the Concessionaire is required to furnish under Article 14.]

Additional Drawings

If the Authority/Project Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed hereinabove, it may by notice require the Concessionaire to furnish such drawings forthwith. Upon receiving a requisition to this effect, the Concessionaire shall promptly prepare and furnish such drawings to the Authority/Project Engineer as if such drawings formed part of this Schedule 11.

SCHEDULE 12
CONSTRUCTION COMPLETION SCHEDULE
(See Article 14)

1. **Construction Completion Schedule**

During Construction Period, the Concessionaire shall comply with the requirements set forth in this Schedule for each of the Project milestones and Scheduled Construction Completion Date (the "**Project Completion Schedule"**). Within [15 (fifteen)] days of the date of each Project Milestone, the Concessionaire shall notify the Authority of such compliance along with necessary particulars thereof.

2. **Project Milestone-I**

Project Milestone-I shall occur on the date falling on the [60th (sixtieth) day] from the Executed Date (the "**Project Milestone-I**"). Prior to the occurrence of Project Milestone-I, the Concessionaire shall have commenced [soil testing, groundwater testing of Municipal Dumpsite(s)], development of Project Facilities and incurred an expenditure of not less than [5% (five per cent)] of the Bid Project Cost.

2. **Project Milestone-II**

Project Milestone-II shall occur on the date falling on the [120th (one hundred and twentieth) day] from the Executed Date (the **Project Milestone-II**). Prior to the occurrence of Project Milestone-II, the Concessionaire shall have commenced construction of the Project Facilities and expended not less than [30% (thirty per cent)] of the Bid Project Cost set forth in the Bid Project Cost and conveyed to the Authority/Project Engineer, the nature and extent of physical progress comprising such expenditure so as to enable the Authority/Project Engineer to determine that the physical progress is reasonably commensurate with the expenditure incurred.

3. **Scheduled Construction Completion Date**

The Scheduled Completion Date shall occur on the [4th (fourth) anniversary of the Executed Date]. On or before the Scheduled Construction Completion Date, the Concessionaire shall have completed the Project Facilities in accordance with this Agreement.

4. **Extension of period**

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Construction Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

SCHEDULE 13
ENVIRONMENT, HEALTH & SAFETY
(See Article 14)

1. Link to the Environment and Social Management Framework (ESMF) to be followed for Projects

Environmental and Social Management Framework of -------- Project:
http://----------

2. Requirements for preparation of ESHS Management Strategies and Implementation Plans (ESHS-MSIP)

The Concessionaire shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP). These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the Concessionaire, and its subcontractors.

In developing these strategies and plans, the Concessionaire shall have regard to the ESHS provisions of the Concession Agreement including those as may be more fully described in the following:

a. Works Requirements described in Concession Agreement;

b. Environmental and Social Impact Assessment (ESIA);

c. Environmental and Social Management Plan (ESMP);

d. Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

……

Metrics for Progress Reports

The following Metrics should be used for regular reporting:

a. environmental incidents or non-compliances with Concession Agreement requirements, including contamination, pollution or damage to ground or water supplies;

b. health and safety incidents, accidents, injuries and all fatalities that require treatment;

c. interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);

d. status of all permits and agreements:

i. work permits: number required, number received, actions taken for those not received;

ii. status of permits and consents:

- *list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);*
- *list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);*
- *identify major activities undertaken in each area this month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);*
- *for quarries: status of relocation and compensation (completed, or details of monthly activities and current status).*

e. health and safety supervision:

i. safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;

ii. number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);

f. worker accommodations:

iii. number of expats housed in accommodations, number of locals;

iv. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;

v. actions taken to recommend/require improved conditions, or to improve conditions.

g. HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);

h. gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);.

i. training:

vi. number of new workers, number receiving induction training, dates of induction training;

vii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;

viii. *number and dates of HIV/AIDS sensitization training, no. workers receiving training (this month and in the past); same questions for gender sensitization, flaglady/flagman training.*

j. *environmental and social supervision:*

ix. *environmentalist: days worked, areas inspected and numbers of inspections of each part of the Facilities created, highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;*

x. *sociologist: days worked, number of partial and full site inspections of each part of the Facilities created, highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and*

xi. *community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.*

k. *Grievances: list this month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up (Cross-reference other sections as needed):*

xii. *Worker grievances;*

xiii. *Community grievances*

l. *Traffic and vehicles/equipment:*

xiv. *traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;*

xv. *accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;*

xvi. *overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).*

m. *Environmental mitigations and issues (what has been done):*

xvii. *dust: number of working bowsers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust*

control (covers, sprays, operational status); % of rock/muram/spoil lorries with covers, actions taken for uncovered vehicles;

xviii. erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;

xix. quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken this month at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;

xx. blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);

xxi. spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination);

xxii. waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;

xxiii. details of tree plantings and other mitigations required undertaken this month;

xxiv. details of water and swamp protection mitigations required undertaken this month.

n. compliance:

xxv. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;

xxvi. compliance status of ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance

xxvii. *other unresolved issues from previous months related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.*

3. Requirements for the preparation of the Code of Conduct

The Concessionaire shall submit the Code of Conduct that will apply to the Concessionaire's employees and subcontractors. The Code of Conduct shall ensure compliance with the ESHS provisions of the Concession Agreement, including those as may be more fully described in the following:

a. Works Requirements described in Concession Agreement;

b. Environmental and Social Impact Assessment (ESIA);

c. Environmental Management Plan (EMP);

d. Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

MINIMUM REQUIREMENTS FOR THE CODE OF CONDUCT

A minimum requirement for the Code of Conduct should be set out, taking into consideration the issues, impacts, and mitigation measures identified in:

- project reports e.g. ESIA/ESMP
- consent/permit conditions
- required standards including World Bank Group EHS Guidelines and Performance Standards
- national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines and PS)
- relevant standards e.g. Workers' Accommodation: Process and Standards (Indian Standards, and in the absence of such Indian Standards those of IFC and EBRD)
- relevant sector standards e.g. workers accommodation
- grievances redress mechanisms.

The types of issues identified could include risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining a safe environment etc.

A satisfactory code of conduct will contain obligations on all project staff (including sub-contractors and day workers) that are suitable to address the following issues, as a minimum.
Compliance with applicable laws, rules, and regulations of the jurisdiction

1. Compliance with applicable health and safety requirements (including wearing prescribed personal protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
2. The use of illegal substances
3. Non-Discrimination (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction)
4. Interactions with community members (for example to convey an attitude of respect and non-discrimination)

5. Sexual harassment (for example to prohibit use of language or behavior, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
6. Violence or exploitation (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior)
7. Protection of children (including prohibitions against abuse, defilement, or otherwise unacceptable behavior with children, limiting interactions with children, and ensuring their safety in project areas)
8. Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
9. Avoidance of conflicts of interest (such that benefits, Concession Agreement, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
10. Respecting reasonable work instructions (including regarding environmental and social norms)
11. Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
12. Duty to report violations of this Code
13. Non retaliation against workers who report violations of the Code, if that report is made in good faith.

The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:

- received a copy of the code;
- had the code explained to them;
- acknowledged that adherence to this Code of Conduct is a condition of employment; and
- understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.

4. Guidelines for staffing of a Core team of 3 people for implementation of the Concessionaire's ESHS obligations

S.No	Key Position	Minimum Qualifying Requirement		
		Total Work Experience (years)	**Experience in Similar Works (years)**	**Minimum Education Qualification**
1.	Health Expert & Safety Specialist*	10	5	B.E. /B. Tech or Equivalent with Specialization / additional qualification in EHS related field.
2.	Environmental Specialist *	10	5	B.E./B. Tech or Equivalent with Specialization / additional qualification in Environment related field

S.No	Key Position	Minimum Qualifying Requirement		
		Total Work Experience (years)	**Experience in Similar Works (years)**	**Minimum Education Qualification**
3.	Social Specialist*	10	5	Master's degree in Social Work or equivalent

* He/she should have worked as a sole expert for Urban Infrastructure projects. Experience in environment / safety / Social Risk Assessment, resettlement and rehabilitation and Management plans related to similar project would be preferred.

5. Minimum Requirements and Guidelines for the preparation of the Screening Report

The extent of assessment required to identify and mitigate the impacts largely depends upon the complexities of project activities. The scrutiny and screening will be based on a detailed Environment and Social Screening exercise, summarized in the following Format:

Environment and Social information format for screening			
	Project Title: Implementing agency: Project cost: Project components: Project location (Area/ district)		
	Screening Criteria	**Assessment of category (High/ low)**	**Explanatory note for categorisation**
1	Is the project in an eco-sensitive area or adjoining an eco-sensitive area? (Yes/No) If Yes, which is the area? Elaborate impact accordingly.		
2	Will the project create significant/ limited/ no social impacts? • Involuntary land taking resulting in loss of income from agricultural land, plantation or other existing land-use. • Involuntary land taking resulting in relocation of title holder or non-titleholder households. • Any reduction of access to traditional and river dependent communities (to river and areas where they earn for their primary or substantial livelihood). • Any displacement or adverse impact on tribal settlement(s). • Any specific gender issues.		
3	Will the project create significant / limited / no environmental impacts during the construction stage? (Significant / limited / no impacts) • Clearance of vegetation/ tree-cover		

	• Direct discharge of construction run-off, improper storage and disposal of excavation spoils, wastes and other construction materials adversely affecting water quality and flow regimes. • Flooding of adjacent areas • Improper storage and handling of substances leading to contamination of soil and water • Elevated noise and dust emission • Disruption to traffic movements • Damage to existing infrastructure, public utilities, amenities etc. • Failure to restore temporary construction sites • Possible conflicts with and/or disruption to local community • Health risks due to unhygienic conditions at workers' camps • Safety hazards during construction		
4	Will the project create significant / limited / no environmental impacts during the operational stage? (Significant / limited / no impacts) • Flooding of adjacent areas • Impacts to water quality due to effluent discharge • Gas emissions • Safety hazards		
5	Do projects of this nature / type require prior environmental clearance either from the MOEF&CC or from a relevant state Government department? (MOEF&CC/ relevant State Government department/ No clearance at all)		
6	Does the project involve any prior clearance from the MOEF&CC or State Forest department for either the conversion of forest land or for tree-cutting? (Yes/ No). If yes, which?		
7	Please attach photographs and location maps along with this completed Environmental Information Format For Screening.		
Overall assessment			

*Detailed explanation/ justification for arriving at specific category (high/ low) to be provided in the specified column

(Designation) (Designation)

(Address) (Address)

SCHEDULE 14

TESTS

(See Article 14)

1. **Schedule for Tests**

1.1. The Concessionaire shall, no later than [30 (thirty)] days prior to the likely completion of the Construction Period, notify the Authority/Project Engineer of its intent to subject the Project Facilities to Tests, and no later than [7 (seven)] days prior to the actual date of Tests, furnish to the Authority/Project Engineer detailed inventory and particulars of all works and equipment forming part of the Project Facilities.

1.2. The Concessionaire shall notify the Authority/Project Engineer of its readiness to subject the Project Facilities to Tests at any time after [7 (seven)] days from the date of such notice, and upon receipt of such notice, the Authority/Project Engineer shall, in consultation with the Concessionaire, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority/Project Engineer shall thereupon conduct, or cause to be conducted, any of the following Tests in accordance with Article 14 and this Schedule.

2. **Tests**

2.1. In pursuance of the provisions of Article 14.12.2 of this Agreement, the Authority/Project Engineer shall conduct, or cause to be conducted, the Tests specified in this Paragraph 2.

2.2. Visual and Physical Test

The Authority/Project Engineer shall conduct a visual and physical check of the Project Facilities, to determine that all works and equipment forming part thereof conform to the provisions of this Agreement.

2.3. Trial run

The Authority/Project Engineer shall require the Concessionaire to carry out or cause to be carried out a trial run of all equipment, facilities and systems to determine that the Project Facilities are in conformity with the provisions of this Agreement.

2.4. Tests for equipment

The Authority/Project Engineer shall conduct or cause to be conducted Tests, in accordance with Good Industry Practice, for determining the compliance of all systems and equipment comprising the Project Facilities.

1.5. Environmental audit:

The Authority/Project Engineer shall carry out a check to determine conformity of the Project with the environmental requirements set forth in Applicable Laws and Applicable Permits.

1.6. Safety review:

The Authority/Project Engineer shall carry out a safety audit of the Project to determine its compliance with the provisions of this Schedule and this Agreement.

3. **Agency for Conducting Tests**

All Tests set forth in this Schedule shall be conducted by the Authority/Project Engineer or such other agency or person as it may specify in consultation with the Authority.

4. **Inspection by the Authority/Project Engineer**

Upon successful completion of Tests, the Project Engineer shall submit an Inspection Report in accordance with the provisions of Article 14.

SCHEDULE 15
FORMAT FOR [MILESTONE] COMPLETION CERTIFICATE
(See Article 14)

To whom it may concern

In consideration of the requirements of conditions of the Agreement and the Concessionaire's application for a Completion Certificate, the Authority hereby grants the Completion Certificate.

This Completion Certificate is issued on the understanding that the conditions of the Agreement have been met except for minor outstanding work that does not affect the use and safety of the [Reclaimed Land/Project Facilities] and their intended use as certified by Authority through its letter dated [•].

Completion Certificate does not relieve the Concessionaire of any requirements or obligations within the Agreement.

Signed this …….. day of ……..., 20 …… at …….……....

AGREED, ACCEPTED AND SIGNED

SIGNED, SEALED AND DELIVERED

For and on behalf of	For and on behalf of
Concessionaire by:	Authority by:
(Signature)	(Signature)
(Name)	(Name)

SCHEDULE 16
FORMAT FOR DAILY WEIGHT SHEET
(See Article 18)

Weighbridge details	
Location	
Capacity	
Date	
Time in	
Time out	
Truck no.	
Tier weight (tons)	
Full weight (tons)	
Waste quantity (Full weight – tier weight)	

SCHEDULE 17

ESCROW AGREEMENT

(See Article 19)

THIS ESCROW AGREEMENT is entered into on this the……..day of ..... 20….

AMONGST

(3) The **State Department of [Urban Development]** of [Name of the State] represented by [•], and having its offices at [•] (hereinafter referred to as the "**State Government**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns);

AND

(4) The [Name of the Authority], incorporated under the [Name of the Act under which incorporated], represented by its [Municipal Commissioner] and having its principal offices at ***, India (hereinafter referred to as the "**Authority**" which expression shall unless repugnant to the context or meaning thereof include its administrators, successors and assigns);

AND

(5) [Name of the Concessionaire], a company organized, incorporated, registered and existing under the Companies Act, with its registered office at [•] acting through [•], [Name of the authorised signatory and his/her designation] duly authorized by resolution dated [Date of the Board Resolution] (hereinafter referred to as the "**Concessionaire"**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns)

AND

(4) [Name of Escrow Bank], a bank duly constituted in accordance with Applicable Laws and carrying on the business of banking in India as a Scheduled Commercial Bank, with its registered office at [•] and acting for the purposes of this Escrow Agreement through its branch office at [•] (hereinafter referred to as the "**Escrow Bank"**, which expression shall unless repugnant to the context or meaning thereof includes its successors and permitted assigns).

The Authority, the Concessionaire and the Escrow Bank are collectively referred to as **Parties** and individually as **Party**.

WHEREAS:

A. The State Government and the Authority, have decided to undertake the development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste on a PPP basis, through a hybrid annuity model.

B. For this purpose, the State Government and the Authority have entered into a Concession Agreement dated ……..with the Concessionaire (the "**Concession Agreement**") for development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste on hybrid annuity basis at _____, in the State of [Name of the State], and a copy of which is annexed hereto and marked as Annex-A to form part of this Agreement.

C. In consideration of the Concessionaire designing, engineering, part-financing, procuring, constructing, installing, commissioning, operating and maintaining the Project on the Site(s) for the Concession Period, the State Government and the Authority is required to pay the Concessionaire: (i) during the Construction Period, the Construction Payments upon satisfactory completion of works corresponding to Payment Milestones; and (ii) during the O&M Period, O&M Payments comprising the Capex Annuity (along with interest), the O&M Charges and the Power Charges for the Project Facilities at actuals (subject to a cap based on the Guaranteed Energy Consumption).

D. As per the provisions of the Concession Agreement, the Authority, the State Government, the Concessionaire are required to enter into an escrow agreement with an escrow bank and is required to open an escrow account with such escrow bank and maintain the Minimum Escrow Balance for the payment of the Construction Payments and the O&M Payments.

E. The escrow account shall be funded by the State Government and the Authority in accordance with the terms of this Escrow Agreement and such account shall serve to secure the State Government and the Authority payment obligations towards the Concessionaire under the Concession Agreement.

F. The Escrow Bank is willing to serve as an escrow bank in accordance with the terms and conditions of this Escrow Agreement.

NOW, THEREFORE, the Parties hereto agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1. Capitalized terms used but not defined in this Escrow Agreement shall have the meaning given to them in the Concession Agreement.

1.2. In this Escrow Agreement, unless the context otherwise requires:

(a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.

(b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.

(c) Headings in this Escrow Agreement are for convenience of reference only.

(d) The references to the word 'include' or 'including' or to the phrase 'in particular', shall be construed without limitation.

(e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.

(f) The references to any agreement or deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.

(g) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing. Where any notice, consent or approval is to be given by either of the Parties, the notice, consent or approval shall be given on their behalf only by any authorized persons.

(h) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.

(i) The provisions of the clauses of this Escrow Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the clauses.

(j) In the event of any ambiguities or discrepancies between two clauses of this Escrow Agreement, the provisions of the specific clause relevant to the issue under consideration shall prevail over those in other clauses.

(k) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Escrow Agreement.

2. ESCROW ACCOUNT

2.1. Appointment

(a) The State Government, the Authority and the Concessionaire hereby appoint the Escrow Bank to serve as the escrow bank for the purposes of this Escrow Agreement and the Escrow Bank hereby accepts this appointment.

(b) The State Government and the Authority hereby settle in trust with the Escrow Bank a sum of INR 1,000 (Rupees one thousand). The Escrow Bank has accepted the above amount of INR 1,000 (Rupees one thousand) in trust declared and, subject to the terms and conditions in this Escrow Agreement, agreed to act as trustee for the benefit of the Concessionaire and the Authority.

(c) The Escrow Bank shall hold and safeguard the Escrow Account and any monies held therein, during the term of this Escrow Agreement and shall treat the amount in the Escrow Account as monies deposited by the State Government and the Authority with the Escrow Bank in trust in accordance with the provisions of this Escrow Agreement.

In performing its functions and duties under this Escrow Agreement, the Escrow Bank shall act as an agent of the Authority and the Concessionaire.

2.2. Escrow Account

(a) The State Government has established a bank account in the name of **[●]** (*name of account and account number*), with **[●]** (*name of the bank*), which shall be an interest bearing, no lien account, denominated in Indian Rupees for the benefit of the Concessionaire (the "**Escrow Account"**).

(b) The Escrow Bank shall provide details of the Escrow Account in writing to the Concessionaire and the Authority, including the date of opening of the Escrow Account.

(c) The Parties agree and acknowledge that:

(i) the Escrow Account shall be opened pursuant to, and specifically for the purposes of, this Escrow Agreement and shall be used and operated only for the purposes and in the manner provided in this Escrow Agreement and for no other use or purposes and in no other manner;

(ii) the Escrow Bank shall maintain the Escrow Account in accordance with the terms of this Escrow Agreement and its usual practices and applicable regulations;

(iii) the Escrow Bank and the Concessionaire, after consultation with the State Government and the Authority shall agree on the detailed mandates, terms and conditions and operating procedures for the Escrow Account but in the event of any inconsistency between this Escrow Agreement and such mandates, terms and conditions or procedures in this Escrow Agreement shall prevail; and

(iv) no instruction shall be given to the Escrow Bank which is not contemplated by or which is contrary to or inconsistent with this Escrow Agreement. In the event any such inconsistent or contrary instruction is given, the same shall be null and void and the Escrow Bank shall not be obliged to act upon, and shall ignore, such instructions and continue to comply with the provisions of this Escrow Agreement.

2.3. Deposits into Escrow Account

(a) Minimum Escrow Balance

At all times, to maintain the minimum balance in the Escrow Account (the **"Minimum Escrow Balance"**):

(i) State Government or the Authority shall deposit in the Escrow Account an amount equivalent to the first [2 (two)] Payment Milestones prior to the Compliance Date. From the Compliance Date and during the Construction Period,

the State Government and the Authority shall ensure that the Escrow Account is funded with an amount equivalent to the next [2 (two)] Payment Milestones until the Project Facilities COD; and

(ii) on and from the COD and during the O&M Period, the State Government or the Authority shall deposit the O&M Payments in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuities (along with interest), and the amount equivalent to next [3 (three)] O&M Payments for the Project Facilities, in accordance with Article 19.2(c) of the Agreement,

(b) The State Government and the Authority shall ensure that the minimum balance in the Escrow Account at all times during the Concession Period is not less than the Minimum Escrow Balance.

If at any time during the Construction Period or the O&M Period, the balance in the Escrow Account falls below the Minimum Escrow Balance, the State Government or the Authority shall promptly, and in any event, no later than 90 (ninety) days, fund the Escrow Account such that the Minimum Escrow Balance is maintained.

The Parties agree that a failure to maintain the Minimum Escrow Balance for 90 (ninety) days would be treated as an Authority Event of Default or State Government Event of Default and in such case, the consequences set out in the Concession Agreement shall apply.

(c) It is clarified that any interest earned on the amounts deposited by Authority in the Escrow Account will be counted towards the Minimum Escrow Balance.

2.4. Withdrawals from Escrow Account during the Construction Period

(a) Upon successful completion and verification of a Payment Milestone as per the Concession Agreement, the Authority is required to approve the Invoice raised by the Concessionaire within 10 (ten) days of receipt of the Invoice and issue a Payment Certificate to the Escrow Bank. The Payment Certificate shall convey the Authority's approval for the release of the amount specified in the Invoice for the relevant Payment Milestone, less any necessary deductions or adjustments in accordance with the Concession Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws).

(b) If, within 10 (ten) days from the date of receipt of an Invoice, the Authority does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the Authority, and the Concessionaire may issue instructions to the Escrow Bank (with a copy to the Authority) to release the amounts specified in the Invoice, upon the expiry of the 10 (ten) day period. Any such instruction issued by the Concessionaire to the Escrow Bank shall be accompanied with the Invoice raised by the Concessionaire for the relevant Payment Milestone.

(c) Immediately upon receipt of a Payment Certificate from the Authority in accordance with clause 2.4(a) above or upon receipt of instructions from the Concessionaire in

accordance with clause 2.4(b), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice to the bank account of the Concessionaire mentioned below:
Bank:
Account number: BIC (SWIFT):
Address of Bank:
[**Insert bank account details**]

The Concessionaire may change the above bank account details by giving a 5 (five) day prior written notice to the Escrow Bank, the State Government and the Authority.

(d) Upon any termination of the Concession Agreement during the Construction Period of the Project Facilities, the State Government or the Authority shall issue instructions to the Escrow Bank requesting it to release and transfer any amounts due and payable to the Concessionaire, including termination payments, if any, as certified by the Authority and the State Government in a statement and any remaining amounts standing to the credit of the Escrow Account shall be transferred to the following account of the Authority/State Government:
Bank:
Account number: BIC (SWIFT):
Address of Bank:
[**Insert bank account details**]

The State Government and the Authority may change the above bank account details by giving 5 (five) day prior written notice to the all the Parties to this Escrow Agreement.

2.5. Withdrawals from Escrow Account during the O&M Period

(a) For O&M Payments in each [month/quarter], the Authority is required to approve the Invoice raised by the Concessionaire within 10 (ten) days of receipt of the Invoice and issue a Payment Certificate to the Escrow Bank. The Payment Certificate shall convey the Authority's approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with the Concession Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws).

(b) If, within 10 (ten) days from the date of receipt of an Invoice, the Authority does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the Authority, and the Concessionaire may issue instructions to the Escrow Bank (with a copy to the Authority to release the amounts specified in the Invoice, upon the expiry of the 10 (ten) day period. Any such instruction issued by the Concessionaire to the Escrow Bank shall be accompanied with the Invoice raised by the Concessionaire.

(c) Immediately upon receipt of a Payment Certificate from the Authority in accordance with clause 2.5(a) above or upon receipt of instructions from the Concessionaire in

accordance with clause 2.5(b), the Escrow Bank shall release the amount specified in the Payment Certificate, or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice to the bank account of the Concessionaire mentioned below:
Bank:
Account number:
BIC (SWIFT):
Address of Bank:
[Insert bank account details]

The Concessionaire may change the above bank account details by giving a 5 (five) day prior written notice to the Escrow Bank, the State Government and the Authority.

(d) Upon any termination of the Concession Agreement during the O&M Period, Authority shall issue instructions to the Escrow Bank requesting it to release and transfer any amounts due and payable to the Concessionaire, including termination payments, if any, as certified by Authority in a statement and any remaining amounts standing to the credit of the Escrow Account shall be transferred to the following account of Authority:
Bank:
Account number:
BIC (SWIFT):
Address of Bank:
[Insert bank account details]

The State Government and the Authority may change the above bank account details by giving 5 (five) day prior written notice to the all the Parties to this Escrow Agreement.

2.6. The State Government and the Authority shall have the right, and the Concessionaire hereby expressly grants to the State Government and the Authority the right, to recover the costs and Damages directly from the Escrow Account, and for that purpose, the Concessionaire hereby agrees to give irrevocable instructions to the Escrow Bank to make payment from the Escrow Account in accordance with the instructions of the State Government or the Authority. Any demand from the State Government or the Authority stating that a specified amount is payable shall be final, binding and conclusive on the Concessionaire and Escrow Bank and Escrow Bank shall pay and Concessionaire shall cause the Escrow Bank to pay such amount without any demur, delay, cavil or protest on receiving a demand for such costs and Damages.

2.7. Identification and Separation

The Escrow Bank shall clearly identify in its records the Escrow Account as an escrow account and shall keep the funds standing to the credit of the Escrow Account separated and segregated from the Escrow Bank's own funds or funds of any of its other customers or third parties.

2.8. Fees

The State Government shall pay [Rs. [•] per annum] as fees to the Escrow Bank for the

establishment and management of the Escrow Account. The State Government shall pay such fees to the Escrow Bank within 10 (ten) days of receipt of an invoice from the Escrow Bank.

2.9. Escrow Account Statements

The Escrow Bank shall provide monthly statements regarding the Escrow Account to the State Government, the Authority and the Concessionaire.

3. ESCROW AMOUNT

3.1. Promptly upon the State Government or the Authority transferring any amount to the Escrow Account, the Escrow Bank shall send a notice to the Concessionaire, the State Government and the Authority notice informing them of the transfer.

3.2. The Escrow Bank shall hold all amounts in the Escrow for the benefit of both the Concessionaire, the State Government and the Authority. Subject to clause 2.4(d) and clause 2.5(d) of this Escrow Agreement, the Escrow Bank shall not release any amount in the Escrow Account to any person other than the Concessionaire.

3.3. The Escrow Bank shall not apply any right of set-off against the amount in the Escrow Account, grant any lien over such amount, or apply any fee or deduction in relation to such amount.

4. RIGHTS, DUTIES AND OBLIGATIONS OF THE ESCROW BANK

4.1. The Escrow Bank

(a) may, in the absence of bad faith, fraud, willful default or gross negligence on its part, rely as to any matters of fact which might reasonably be expected to be within the knowledge of the State Government and the Authority, as the case may be, upon a certificate signed by or on behalf of the State Government and the Authority, as the case may be;

(b) may, in the absence of bad faith, fraud, willful default or gross negligence on its part, rely upon the authenticity of any communication or documents believed by it to be authentic;

(c) shall, within 5 (five) days after receipt, deliver a copy to the State Government and the Authority of any notice or document received by the Escrow Bank from the Concessionaire or any other Person hereunder or in connection herewith;

(d) shall, within 5 (five) days after receipt, deliver a copy to the Concessionaire of any notice or document received by the Escrow Bank from the State Government or the Authority in connection herewith; and

(e) shall maintain all records of deposits and withdrawals from the Escrow Account for the term of this Escrow Agreement.

4.2. The duties of the Escrow Bank are only as herein specifically provided, and are purely administrative in nature. The Escrow Bank shall neither be liable for, nor chargeable with knowledge of, the terms and conditions of any other agreement, instrument or document in

connection herewith, including, without limitation, the Concession Agreement, and shall be required to act in respect of the amounts in the Escrow Account only as provided in this Escrow Agreement. This Escrow Agreement sets out all the obligations of the Escrow Bank with respect to any and all matters pertinent to the Escrow Account contemplated hereunder and no additional obligations of the Escrow Bank shall be implied from the terms of any other agreement. The Escrow Bank shall incur no liability in connection with the discharge of its obligations under this Escrow Agreement or in connection therewith, except such liability as may arise from the Escrow Bank's negligence, willful misconduct or otherwise from any breach of this Escrow Agreement. Such liability, however, shall not exceed the amount in the Escrow Account at the date of the said breach by the Escrow Bank.

4.3. The Escrow Bank shall not be required to perform any act which will violate any Applicable Laws.

4.4. In the event of any bankruptcy proceedings or enforcement proceedings against any of the Parties pursuant to Applicable Laws, the Escrow Bank shall, notwithstanding the provisions of this Escrow Agreement, act and perform in accordance with Applicable Laws.

5. ESCROW AGREEMENT DEFAULTS

5.1. The following events shall constitute an event of default by the Concessionaire (an **Escrow Default**), unless such event of default has occurred as a result of any act or omission of the State Government or the Authority:

(a) in case the Concessionaire diverts funds drawn from the Escrow Account for a project/activity/usage other than the Project, and fails to cure such breach by not depositing an equal amount in the Escrow Account within 5 (five) days; or

(b) in the case of any other breach, by failing to remedy the breach within 5 (five) days to the satisfaction of the State Government and the Authority.

5.2. The Parties agree that an Escrow Default in terms of this Escrow Agreement shall be treated as a Concessionaire Event of Default under the Concession Agreement, and the consequences of an Escrow Default shall be dealt with in accordance with the Concession Agreement.

5.3. Upon the occurrence of an Escrow Default, the Concessionaire agrees that the State Government and the Authority shall have the right to direct the Escrow Bank to suspend withdrawals from the Escrow Account until further notice from the State Government or the Authority.

6. MISCELLANEOUS

6.1. Representations and Warranties

Each Party represents and warrants that:

(a) it has the authority to enter into this Escrow Agreement;

(b) this Escrow Agreement constitutes a legally valid and binding obligation, enforceable against it in accordance with its terms;

(c) its entry into and/or performance under this Escrow Agreement will not be in breach of any express or implied terms of any contract with or other obligation to any third party; and

(d) it is solvent and able to perform all of its obligations under this Escrow Agreement.

6.2. Notices

Any notice or other communication to be given or made under this Escrow Agreement to the Parties shall be in writing. Except as otherwise provided in this Escrow Agreement, such notice, request or other communication shall be delivered by registered mail or facsimile to the Party(ies) at the following addresses:

[State Department of Urban Development]:

Attention: ----------
Tel:
Fax:
Address:

Email:

[Name of the Authority]:

Attention: ----------
Tel:
Fax:
Address:
Email:

[Concessionaire]:

Attention: ----------
Tel:
Fax:
Address:
Email:

[Escrow Bank]:

Attention: ----------
Tel:
Fax:
Address:
Email:

6.3. Entire Agreement

This Escrow Agreement and the Concession Agreement constitutes the entire agreement and understanding between the Parties with respect to its subject matter (i.e., escrow arrangement), and replaces and supersedes all prior agreements, arrangements, undertakings or statements regarding such subject matter.

6.4. Amendments

No variation of or amendment to this Escrow Agreement shall be effective unless made in writing and executed by all the Parties hereto.

6.5. Harmonious Construction

For the purpose of giving full and proper effect to this Escrow Agreement, the Concession Agreement and this Escrow Agreement shall be read together and construed harmoniously. The terms of the Concession Agreement shall prevail in the event of any inconsistencies with this Escrow Agreement.

6.6. Assignment

Neither this Escrow Agreement nor any of the rights or obligations hereunder may be assigned by a Party without the prior written consent of the other Parties, provided that the Concessionaire shall be entitled, to the extent permitted by Applicable Law and as may be required under any Financing Documents entered into by the Concessionaire, to assign or create liens over its rights and interests under or pursuant to this Escrow Agreement.

6.7. Severability

Whenever possible, each provision of this Escrow Agreement shall be interpreted in such a way as to be effective and valid under Applicable Law, but if any provision of this Escrow Agreement is unenforceable or invalid under Applicable Law, such provision shall be ineffective only to the extent of such unenforceability or invalidity, and the remaining provisions of this Escrow Agreement shall continue to be binding and in full force and effect.

6.8. Confidentiality

The Parties, their employees, representatives and agents shall keep the provisions of this Escrow Agreement strictly confidential and, except as may be required by Applicable Laws, shall make no disclosure thereof to any Person, except the Parties' respective legal counsels and professional advisers, without the prior written consent of the other Parties.

6.9. Termination

This Escrow Agreement shall be automatically terminated upon the expiry of the Concession Period or termination of the Concession Agreement and after disbursement of all amounts due and payable to the Concessionaire under the Concession Agreement, including Termination Compensation, if any, and any remaining amounts to the State Government or the Authority in accordance with clause 2.4(d) and clause 2.5(d) of this Escrow Agreement.

6.10. Dispute Resolution Mechanism

(a) If any dispute arises out of or in connection with this Escrow Agreement, this dispute shall not affect the Parties' duty to continue the performance of all of their undisputed obligations.

(b) If any dispute arises, a Party shall give notice to the other Parties of the same, whereupon the Parties shall meet promptly and in good faith to attempt to reach an amicable settlement.

(c) All disputes not settled amicably pursuant to (b) above shall be heard by the competent courts of [State of Project].

6.11. Governing Law

This Escrow Agreement shall be governed by and construed in accordance with the laws of India.

IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

THE COMMON SEAL OF THE CONCESSIONAIRE has been affixed pursuant to the resolution passed by the Board of Directors of the Concessionaire at its meeting held on the …… day of 20…… hereunto affixed in the presence of……., Director, who has signed these presents in token thereof and ……., Company Secretary / Authorised Officer who has countersigned the same in token thereof [33:]

SIGNED, SEALED AND DELIVERED
For and on behalf of STATE GOVERNMENT by the
State Government Representative:

(Signature) (Name) (Designation) (Address) (Fax No.)
(E-mail address)

SIGNED, SEALED AND DELIVERED
For and on behalf of AUTHORITY by the
State Government Representative:

[33]To be affixed in accordance with the articles of association of the Concessionaire.

(Signature) (Name) (Designation) (Address) (Fax No.)
(E-mail address)

SIGNED, SEALED AND DELIVERED
For and on behalf of ESCROW BANK by the
State Government Representative:

(Signature) (Name) (Designation) (Address) (Fax No.)
(E-mail address)

In the presence of:

1. 2.

SCHEDULE 18
TERMINATION COMPENSATION
(See Article 24)

In case of termination of the Agreement for a Concessionaire Event of Default, the Capex Annuity payable as termination compensation under Articles 24.1.2, 24.2.2 and 24.3.2 will be in accordance with the table below:

Termination in Year post relevant COD	% of Capex Annuity

SCHEDULE 19
CRITERIA FOR PREPARING THE LIST OF CHARTERED ACCOUNTANT FIRMS
(See Article 30.2)

The Firm of Chartered Accountants (FCA):

1. Should be in operation for the past 10 (ten)years
2. Should not have been barred or blacklisted by any entity like Central, State Government Body or Public Sector Undertaking PSU (Central/State) or any other Statutory Body.
3. Should have a branch in [Name of the State]
4. Should have at least 3 (three) qualified Chartered Accountants out of whom at least 1 (one) should be FCA.

Selection of Concessionaire

for

Primary and Secondary Collection and Transportation, and Processing and Disposal of Municipal Solid Waste for [Project Area] including Bio-Remediation of Legacy Waste, and setting up of Sanitary Landfill and Processing Facility(ies) at [Site(s) identified],

under

Hybrid Annuity Model

of

Public-Private Partnership

Request for Proposals

[Name of the State] Department of [Urban Development]

[Name of the Authority]

[Month, 20]**

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DISCLAIMER

The information contained in this Request for Proposals document ("RFPs") or subsequently provided to Applicants, whether verbally or in documentary or any other form by or on behalf of the State Government and the Authority or any of their employees or advisers, is provided to Applicants on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

This RFP is not an agreement and is neither an offer nor invitation by the State Government and the Authority to the prospective Applicants or any other person. The purpose of this RFP is to provide interested parties with information that may be useful to them in the formulation of their Proposals pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the State Government and the Authority in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Applicant may require. This RFP may not be appropriate for all persons, and it is not possible for the State Government and the Authority, their employees or advisers to consider the objectives, technical expertise and particular needs of each party who reads or uses this RFP. The assumptions, assessments, statements and information contained in this RFP, may not be complete, accurate, adequate or correct. Each Applicant should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments and information contained in this RFP and obtain independent advice from appropriate sources.

Information provided in this RFP to the Applicants is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The State Government and the Authority accept no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.

The State Government and the Authority, their employees and advisers make no representation or warranty and shall have no liability to any person including any Applicant under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way in this Selection Process.

The State Government and the Authority also accept no liability of any nature whether resulting from negligence or otherwise, howsoever caused, arising from reliance of any Applicant upon the statements contained in this RFP.

The State Government and the Authority may in their absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumption contained in this RFP.

The issue of this RFP does not imply that the State Government and the Authority are bound to select an Applicant or to appoint the Selected Bidder, as the case may be, for the Project and the State Government and the Authority reserve the right to reject all or any of the Proposals without assigning any reasons whatsoever.

The Applicant shall bear all its costs associated with or relating to the preparation and submission of its Proposal including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the State Government or the Authority or any other costs incurred in connection with or relating to its Proposal. All such costs and expenses will remain with the Applicant and the State Government or the Authority shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by an Applicant in preparation or submission of the Proposal, regardless of the conduct or outcome of the Selection Process.

GLOSSARY

Applicant	As defined in Clause 2.1.1
Associate	As defined in Clause 2.3.3
Authorised Representative	As defined in Clause 2.13.2
Authority	As defined in Clause 1.1.1
Base Energy Tariff Rate	As provided in Clause 3.3.1
Bid Price	As provided in Clause 3.3.1
Bid Price Sheet	As provided in Form-2 of Appendix-II
Bid Security	As defined in Clause 2.20.1
Coercive Practice	As defined in Clause 4.3
Concession Agreement	As defined in Clause 1.1.2
Concessionaire	As defined in Clause 1.1.2
Conditions of Eligibility	As defined in Clause 2.2.1
Conflict of Interest	As defined in Clause 2.3.1
Corrupt Practice	As defined in Clause 4.3
CV	Curriculum Vitae
DBFOT	Design, Build, Finance, Operate and Transfer
Documents	As defined in Clause 2.12
Eligible Assignments	As defined in Clause 3.1.4
Financial Proposal	As defined in Clause 2.15.1
Fraudulent Practice	As defined in Clause 4.3
HAM	Hybrid Annuity Model
INR, Re, Rs.	Indian Rupee(s)
Joint Bidding Agreement	As defined in Clause 2.16.8
Joint Venture/Consortium	As defined in Clause 2.1.1
Key Personnel	As defined in Clause 2.1.4
Lead Member	As defined in Clause 2.16.8
LOA	Letter of Award as defined in Clause 2.28

Member	As defined in Clause 2.3.3
Net Worth	As provided in Clause 2.16.4
Official Website	As defined in Clause 1.11.2
PPP	Public Private Partnership
Professional Personnel	As defined in Clause 2.14.6
Prohibited Practices	As defined in Clause 4.1
Project	As defined in Clause 1.1.1
Project Area	As defined in Clause 1.1.1
Proposal	As defined in Clause 1.2
Proposal Due Date or PDD	As defined in Clauses 1.8 and 2.17
RFP	As defined in Disclaimer
Selected Bidder	As defined in Clause 1.6
Selection Process	As defined in Clause 1.6
Site(s)	As defined in Clause 1.1.1
Statutory Auditor	An Auditor appointed under Applicable Laws
Subject Person	As defined in Clause 2.3.3
Support Personnel	As defined in Clause 2.14.6
Taxes	means all taxes, levies, imposts, cesses, duties and other forms of taxation, including (but without limitation) income tax, goods and services tax, corporation profits tax, advance corporation tax, capital gains tax, residential and property tax, customs and other import and export duties, stamp duty or capital duty, and any interest, surcharge, penalty or fine in connection therewith which may be payable by the Concessionaire.
Technical Proposal	As defined in Clause 2.14.1
Total Evaluated Bid Price	As provided in Clause 3.3.1
Undesirable Practice	As defined in Clause 4.3
US$	United States Dollar

The words and expressions beginning with capital letters and defined in this document shall, unless repugnant to the context, have the meaning ascribed thereto herein.

Invitation for Proposals

1. INTRODUCTION

1.1. Background

1.1.1. The State Department of [Urban Development] of [Name of the State] acting through **** and represented by *** (the "**State Government**") and the [Municipal Corporation of ***/Cluster of ***[1]] acting through **** and represented by *** (the "**Authority**") are engaged in the development of integrated solid waste management projects and bio-remediation of legacy waste and as part of this endeavour, the State Government and the Authority have decided to undertake development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste (the "**Project**") by seeking private sector participation on Public Private Partnership ("**PPP**") mode by inviting Proposals for the Project within the [jurisdiction of the Authority] (the **"Project Area"**) and on the site(s) identified by the Authority for the implementation of the Project (the "**Site(s)**") on Hybrid Annuity Model (the **"HAM"**) through PPP on Design, Build, Finance, Operate and Transfer (the "**DBFOT**") basis. The indicative cost of the Project is [Rs. **** Cr. (Rupees **** Crore)].

1.1.2. The Project may be awarded on DBFOT basis to a private entity (the "**Concessionaire**") selected through a competitive bidding process. The Project would be implemented in accordance with the terms and conditions stated in the concession agreement to be entered into between the State Government and the Authority and the Concessionaire (the "**Concession Agreement**").

1.1.3. In pursuance of the above, the Authority has decided to carry out the process for selection of a Concessionaire for implementation of the Project in accordance with the Concession Agreement.

1.2. Request for Proposals

The State Government and the Authority invite proposals (the "**Proposals**") for implementation of the Project in conformity with the Concession Agreement. The State Government and the Authority intend to select the Concessionaire through an open competitive bidding process in accordance with the procedure set out herein.

1.3. Due diligence by Applicants

Applicants are encouraged to inform themselves fully about the assignment and the local conditions before submitting the Proposal by paying a visit to the Authority and the Project Site(s), sending

[1] In case the Project is to be developed for a cluster of municipalities, one representative Municipality to be the Authority. The Municipal Corporation may also enter into inter-LSGI (Local Self Government Institution) agreements and represent other Participating Local Bodies (PLBs) as the Authority in a cluster-based approach.

written queries to the Authority, and attending a Pre-Proposal Conference on the date and time specified in Clause 1.10.

1.4. Obtaining RFP Document

RFP document can be downloaded from the Official Website and the [Name of the State of the Project] Public Procurement Portal [URL of the Public Procurement Portal] from [insert date].

1.5. Validity of the Proposal

The Proposal shall be valid for a period of not less than 90 (ninety) days from the Proposal Due Date (the "**PDD**").

1.6. Brief description of the Selection Process

The State Government and the Authority have adopted a single-stage two envelope selection process (collectively the "**Selection Process**") for evaluating the Proposals comprising technical and financial bids to be submitted in two separate sealed envelopes. In the first stage, a technical evaluation will be carried out as specified in Clause 3.1. Based on this technical evaluation, a list of short-listed applicants shall be prepared as specified in Clause 3.2. In the second stage, a financial evaluation will be carried out as specified in Clause 3.3. Proposals will finally be ranked according to their combined technical and financial scores as specified in Clause 3.4. The first ranked Applicant shall be selected for negotiation (the "**Selected Bidder**") while the second ranked Applicant will be kept in reserve.

1.7. Currency conversion rate and payment

1.7.1. For the purposes of technical evaluation of Applicants, the conversion rate of the currencies shall be the State Bank of India Telegraphic Transfer Buy rates published by the State Bank of India prevalent on the Proposal Due Date, and the amount so derived in US$ shall be converted into INR at the aforesaid rate.

1.7.2. All payments to the selected Concessionaire shall be made in INR in accordance with the provisions of this RFP. The Concessionaire may convert INR into any foreign currency as per applicable laws and the exchange risk, if any, shall be borne by the Concessionaire.

1.8. Schedule of Selection Process

The State Government and the Authority would endeavour to adhere to the following schedule:

	Event Description	Date
1.	Last date for receiving queries/clarifications	
2.	Pre-Proposal Conference	
3.	Authority's/State Government's response to queries	
4.	Proposal Due Date or PDD	
5.	Opening of Proposals	
6.	Letter of Award (LOA)	Within 15 days of PDD
7.	Signing of Concession Agreement	Within 7 days of LOA
8.	Validity of Proposals	90 days of PDD

1.9. Pre-Proposal visit to the Site and inspection of data

Prospective Applicants may visit the Site(s) and review the available data at any time prior to PDD. For this purpose, they will provide at least [two] days' notice to the nodal officer specified below:

*****

*****

Phone: *****

Mobile: *****

Email: *****

[However, for the convenience of the Applicants, a pre-Proposal visit to the Site(s) has been arranged on *****, at *** hrs. The Applicants who desire to avail this facility may visit ***** on the date and time mentioned above.]

1.10. Pre-Proposal Conference

The date, time and venue of Pre-Proposal Conference shall be:

Date: *****

Time: ** hours

Venue: *****

1.11. Communications

1.11.1. All communications relating to the submission of Proposal should be addressed to:

*****

Address: *****

Phone: *****

Email: *****

1.11.2. The **Official Website** of the Authority is:

http://www.

Note: Please open the page '*****' and then page '*****' to access all the posted and uploaded documents related to this RFP.

This RFP is also available at the [Name of the State] Public Procurement Portal – "*****" under the RFP titled "*****"

2. INSTRUCTIONS TO APPLICANTS

A. GENERAL

2.1. Scope of Proposal

2.1.1. Detailed description of the objectives, scope of services, deliverables and other requirements relating to this Project are specified in this RFP. For determining the eligibility of Applicants for their technical-qualification hereunder, the following shall apply:

(a) The term applicant (the "**Applicant**") means a single entity or a group of entities (the "**Joint Venture**"/ "**Consortium**"), as the case may be, coming together to implement the Project. However, no Applicant applying individually or as a member of a Joint Venture/Consortium, as the case may be, can be a member of another Joint Venture/Consortium. The term Applicant used herein would apply to both a single entity and a Joint Venture/Consortium.

(b) An Applicant should either be a company within the meaning of Companies Act, 2013 or duly incorporated under the relevant laws of its country of origin, or a registered partnership firm under Indian Partnership Act, 1932, or a limited liability partnership under Limited Liability Partnership Act, 2008, or a partnership firm registered under the relevant laws of its country of origin, or any combination of them with a formal intent to enter into a Joint Bidding Agreement or under an existing agreement to form a Joint Venture/ Consortium. A Joint Venture/Consortium shall be eligible for consideration subject to the conditions set out in this RFP.

2.1.2. Applicants are advised that the selection of Concessionaire shall be on the basis of an evaluation by the State Government and the Authority through the Selection Process specified in this RFP. Applicants shall be deemed to have understood and agreed that no explanation or justification for any aspect of the Selection Process will be given and that the State Government's and the Authority's decisions are without any right of appeal whatsoever.

2.1.3. The manner in which the Proposal is required to be submitted, evaluated and accepted is explained in this RFP. The Applicant shall submit its Proposal in the form and manner specified in this Part-2 of the RFP. The technical proposal shall be submitted in the form at Appendix-I and the financial proposal shall be submitted in the form at Appendix-II. Upon selection, the Applicant shall be required to enter into the Concession Agreement with the State Government and the Authority in the form at Schedule-I.

2.1.4. **Key Personnel**

The Applicant shall offer and make available all key personnel meeting the requirements and for discharging the responsibilities specified below (the "**Key Personnel**").[2]

Key Personnel	Responsibilities
[Team Leader]	[He will lead, co-ordinate and supervise the multidisciplinary team for implementation of the Project. He shall spend at least [30 (thirty) days per quarter] at the Site(s).]
[Safety Expert]	[He will be responsible to ensure compliance of the Project with the safety standards under applicable laws and good industry practice. He shall spend at least [10 (ten) days per month] at the Site(s).]
[Financial Analyst]	[He will be responsible for financial analysis and modeling of the proposed Project. He shall spend at least [2 (two) per month] days at the Site(s).]
[Environmental Expert]	[He will be responsible for Environmental Impact Assessment of the Project. He shall spend at least [7 (seven) days per month] at the Site(s).]

2.2. Conditions of Eligibility of Applicants

2.2.1. Applicants must read carefully the minimum conditions of eligibility (the "**Conditions of Eligibility**") provided herein. Proposals of only those Applicants who satisfy the Conditions of Eligibility will be considered for evaluation.

2.2.2. To be eligible for evaluation of its Proposal, the Applicant shall fulfil the following:

(A) **Technical Capacity**: The Applicant shall have, over the past [10 (ten) years] preceding the PDD, undertaken a minimum of [5 (five)] Eligible Assignments as specified in Clause 3.1.4.

(B) **Financial Capacity**: The Applicant shall have the Financial Capacity as specified in Clause 3.1.5.

(C) **Availability of Key Personnel:** The Applicant shall offer and make available all Key Personnel meeting the requirements specified in sub-clause (D) below. The said Key Personnel will continue to be available during the Concession Period as agreed under the Concession Agreement. In the event of any such Key Personnel leaving the Applicant selected under this RFP during the Concession Period, he/she shall be replaced by a person with equivalent qualification and experience.

[2] The key personnel, their number and responsibilities are subject to modification.

(D) **Conditions of Eligibility for Key Personnel:** EacSch of the Key Personnel must fulfill the Conditions of Eligibility specified below[3]:

Key Personnel	Educational Qualification	Length of Professional Experience	Experience on Eligible Assignments
[Team Leader]	[Post-Graduate in any discipline]	[10 years]	[He should have led the Project implementation teams for [2 (two)] Eligible Assignments.]
[Safety Expert]		[7 years]	[He should have led the safety compliance teams or worked as a sole expert for [2 (two)] Eligible Assignments.]
[Financial Analyst]	[Post Graduate in Commerce/ Chartered Accountant or equivalent]	[7 years]	[He should have undertaken financial analysis and modelling for [2 (two)] Eligible Assignments]
[Environmental Expert]	[Masters/ Bachelor in Environmental Science or equivalent]	[7 years]	[He should have led the environmental impact assessment teams or worked as a sole expert for [2 (two)] Eligible Assignments.]

2.2.3. The Applicant shall enclose with its Proposal, certificate(s) from its statutory auditors[$] stating its Financial Capacity. In case the Applicant is a Joint Venture/Consortium, the Proposal must be accompanied with the details of each Member and Associate of the Joint Venture/Consortium whose Financial Capacity is considered for evaluation as provided in Clause 3.1.5. In the event that the Applicant does not have a statutory auditor, it shall provide the requisite certificate(s) from the firm of chartered accountants that ordinarily audits the annual accounts of the Applicant.

2.2.4. The Applicant should submit a power of attorney as per the format at Form-4 of Appendix-I.

2.2.5. Any entity which has been barred by the Central Government, any State Government, a statutory authority or a public sector undertaking, as the case may be, from participating in any project and the bar subsists as on the date of Proposal, would not be eligible to submit a Proposal either by itself or through its associate.

2.2.6. An Applicant or its associate should have, during the last three years, neither failed to perform on any agreement, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial

[3] The conditions of eligibility of key personnel are subject to modification.
[$] No separate annual financial statements should be submitted.

pronouncement or arbitration award against the Applicant or its associate, nor been expelled from any project or agreement nor have had any agreement terminated for breach by such Applicant or its associate.

2.2.7. While submitting a Proposal, the Applicant should attach clearly marked and referenced continuation sheets in the event that the space provided in the specified forms in the Appendices is insufficient. Alternatively, Applicants may format the specified forms making due provision for incorporation of the requested information.

2.3. Conflict of Interest

2.3.1. An Applicant shall not have a conflict of interest that may affect the Selection Process or the Project (the "**Conflict of Interest**"). Any Applicant found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the Authority or the State Government shall forfeit and appropriate the Bid Security as mutually agreed genuine pre-estimated compensation and damages payable to the Authority or the State Government for, *inter alia*, the time, cost and effort of the Authority and the State Government including consideration of such Applicant's Proposal, without prejudice to any other right or remedy that may be available to the Authority and the State Government hereunder or otherwise.

2.3.2. The State Government and the Authority require that the Concessionaire provides professional, objective, and impartial advice and at all times hold the State Government's and the Authority's interests paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The Concessionaire shall not accept or engage in any assignment that would be in conflict with its prior or current obligations to other clients, or that may place it in a position of not being able to carry out the assignment in the best interests of the State Government and the Authority.

2.3.3. Some guiding principles for identifying and addressing Conflicts of Interest have been illustrated in the Guidance Note at Schedule-3. Without limiting the generality of the above, an Applicant shall be deemed to have a Conflict of Interest affecting the Selection Process, if:

(a) the Applicant, its Joint Venture/Consortium member (the "**Member**") or Associate (or any constituent thereof) and any other Applicant, its consortium member or Associate (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding or ownership interest of an Applicant, its Member or Associate (or any shareholder thereof having a shareholding of more than 5% (five per cent) of the paid up and subscribed share capital of such Applicant, Member or Associate, as the case may be) in the other Applicant, its consortium

member or Associate is less than 5% (five per cent) of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in sub-section (72) of section 2 of the Companies Act, 2013. For the purposes of this Clause 2.3.3(a), indirect shareholding held through one or more intermediate persons shall be computed as follows: (aa) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the "**Subject Person**") shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and (bb) subject always to sub-clause (aa) above, where a person does not exercise control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under this sub-clause (bb) if the shareholding of such person in the intermediary is less than 26% (twenty six per cent) of the subscribed and paid up equity shareholding of such intermediary; or

(b) a constituent of such Applicant is also a constituent of another Applicant; or

(c) such Applicant or its Associate receives or has received any direct or indirect subsidy or grant from any other Applicant or its Associate; or

(d) such Applicant has the same legal representative for purposes of this Proposal as any other Applicant;

(e) or such Applicant has a relationship with another Applicant, directly or through common third parties, that puts them in a position to have access to each other's information about, or to influence the Proposal of either or each of the other Applicant; or

(f) there is a conflict among this and other ongoing Projects of the Applicant (including its personnel of the proposed team) and any subsidiaries or entities controlled by such Applicant or having common controlling shareholders. The duties of the Concessionaire will depend on the circumstances of each case. During the implementation of this Project, the Concessionaire shall not take up any Project that by its nature will result in conflict with the present Project; or

(g) the Applicant, its Member or Associate (or any constituent thereof) for the Project, its contractor(s) or sub-contractor(s) (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding or ownership interest of an Applicant, its Member or Associate (or any shareholder thereof having a shareholding of more than 5% (five per cent) of the paid up and subscribed share capital of such Applicant, Member or Associate, as the case may be,) in the Applicant, or its contractor(s) or sub-contractor(s) is less than 5% (five per cent) of the paid up and subscribed share capital of such Concessionaire or its contractor(s) or sub-contractor(s); provided further that this disqualification shall not apply to ownership by a bank, insurance company, pension fund or a Public Financial Institution referred to in sub-section (72)

of section 2 of the Companies Act, 2013. For the purposes of this sub-clause (h), indirect shareholding shall be computed in accordance with the provisions of sub-clause (a) above.

For purposes of this RFP, Associate means, in relation to the Applicant, a person who controls, is controlled by, or is under the common control with such Applicant (the "**Associate**"). As used in this definition, the expression "control" means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person by operation of law or by contract. For the avoidance of doubt, an entity affiliated with the Concessionaire shall include a partner in the Concessionaire's firm or a person who holds more than 5% (five per cent) of the subscribed and paid up share capital of the Concessionaire, as the case may be, and any Associate thereof.

2.4. Number of Proposals

No Applicant or its Associate shall submit more than one Proposal for the Project. An Applicant applying individually or as an Associate shall not be entitled to submit another application either individually or as a member of any Joint Venture/Consortium, as the case may be.

2.5. Cost of Proposal

The Applicants shall be responsible for all of the costs associated with the preparation of their Proposals and their participation in the Selection Process including subsequent negotiation, visits to the Authority, Site(s) etc. The State Government or the Authority will not be responsible or in any way liable for such costs, regardless of the conduct or outcome of the Selection Process.

2.6. Site(s) visit and verification of information

Applicants are encouraged to submit their respective Proposals after visiting the Site(s) and ascertaining for themselves the Site(s) conditions, traffic, location, surroundings, climate, access to the Site(s), availability of drawings and other data with the State Government and the Authority, Applicable Laws and regulations or any other matter considered relevant by them. [Visits shall be organised for the benefit of prospective Applicants on dates, time and venue as specified in Clause 1.9.]

2.7. Acknowledgement by Applicant

2.7.1. It shall be deemed that by submitting the Proposal, the Applicant has:

(a) made a complete and careful examination of the RFP;

(b) received all relevant information requested from the State Government and the Authority;

(c) acknowledged and accepted the risk of inadequacy, error or mistake in the information provided in the RFP or furnished by or on behalf of the State Government or the Authority or relating to any of the matters referred to in Clause 2.6 above;

(d) satisfied itself about all matters, things and information, including matters referred to in Clause 2.6 herein above, necessary and required for submitting an informed Proposal and performance of all of its obligations thereunder;

(e) acknowledged that it does not have a Conflict of Interest; and

(f) agreed to be bound by the undertaking provided by it under and in terms hereof.

2.7.2. The State Government or the Authority shall not be liable for any omission, mistake or error on the part of the Applicant in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to RFP or the Selection Process, including any error or mistake therein or in any information or data given by the State Government or the Authority.

2.8. Right to reject any or all Proposals

2.8.1. Notwithstanding anything contained in this RFP, the State Government and the Authority reserve the right to accept or reject any Proposal and to annul the Selection Process and reject all Proposals, at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons thereof.

2.8.2. Without prejudice to the generality of Clause 2.8.1, the State Government and the Authority reserve the right to reject any Proposal if:

(a) at any time, a material misrepresentation is made or discovered, or

(b) the Applicant does not provide, within the time specified by the State Government and the Authority, the supplemental information sought by the State Government and the Authority for evaluation of the Proposal.

Misrepresentation/ improper response by the Applicant may lead to the disqualification of the Applicant. If the Applicant is a Joint Venture/Consortium, then the entire Joint Venture/Consortium may be disqualified / rejected. If such disqualification / rejection occurs after the Proposals have been opened and the highest ranking Applicant gets disqualified / rejected, then the State Government and the Authority reserve the right to consider the next best Applicant, or take any other measure as may

be deemed fit in the discretion of the State Government and the Authority, including annulment of the Selection Process.

B. DOCUMENTS

2.9. Contents of the RFP

2.9.1. This RFP comprises the Disclaimer set forth hereinabove, the contents as listed below and will additionally include any Addendum / Amendment issued in accordance with Clause 2.11:

Request for Proposal

1.	Introduction
2.	Instructions to Applicants
3.	Criteria for Evaluation
4.	Fraud and Corrupt Practices
5.	Pre-Proposal Conference
6.	Miscellaneous
A.	**Appendices**
	Appendix-I: Technical Proposal
1	Form-1: Letter of Proposal
2	Form-2: Particulars of the Applicant
3	Form-3: Statement of Legal Capacity
4	Form-4A: Power of Attorney for signing of Proposal Form-4B: Power of Attorney for Lead Member of Joint Venture/Consortium
5	Form-5: Financial Capacity of the Applicant
6	Form-6: Particulars of Key Personnel
7	Form-7: Proposed Methodology, Technology and Work Plan
8	Form-8: Proforma of Bank Guarantee for Bid Security

9	Form-9: Format for Joint Bidding Agreement
10	Form-10: Abstract of Eligible Assignments of the Applicant
11	Form-11: Abstract of Eligible Assignments of Key Personnel
12	Form-12: Eligible Assignments of the Applicant
13	Form-13: Eligible Assignments of Key Personnel
14	Form-14: Curriculum Vitae (CV) of Key Personnel and Professional Personnel
15	Form-15: Deployment of Personnel
16	Form–16: Survey and Field Investigations
17	Form-17: Format of Self-Attested Certificate regarding Associate
18	Form-18: Format of Information on Litigation
	Appendix–II: Financial Proposal
1	Form 1: Covering Letter
2	Form 2: Format for Bid Price Sheet
3	Form 3: Letter of Declaration
4	Form 4: Declaration Format

2.10. Submission of queries by the Applicants

2.10.1. Applicants requiring any clarification on the RFP may send their queries to the State Government and the Authority in writing via e-mail before the date mentioned in the Schedule of Selection Process at Clause 1.8, under the e-mail subject:

"Queries concerning RFP for ..... [Name of the Project and RFP No.]"

The State Government and the Authority shall endeavour to respond to the queries within the period specified therein but not later than 7 (seven) days prior to the Proposal Due Date. The responses will be sent by e-mail. The State Government and the Authority will post the reply to all such queries on the Official Website of the Authority as provided in Clause 1.11.2 and copies thereof will also be

circulated to all Applicants who have sent the queries to the RFP document without identifying the source of queries.

2.10.2. For the purposes of determining the cut-off time for submission of queries and Proposals, the central server time displayed on the clock on the [Name of the State] Public Procurement Portal will be followed by the Applicants, the State Government and the Authority.

2.10.3. The State Government and the Authority reserve the right not to respond to any questions or provide any clarifications, in its sole discretion, and nothing in this Clause 2.10 shall be construed as obliging the State Government or the Authority to respond to any question or to provide any clarification.

2.11. Amendment of RFP

2.11.1. At any time prior to the deadline for submission of Proposal, the State Government and the Authority may, for any reason, whether at their own initiative or in response to clarifications requested by an Applicant, modify the RFP document by the issuance of Addendum/ Amendment and posting it on the Official Website of the Authority and by conveying the same to the prospective Applicants (who have sent queries in respect of the RFP document) by e-mail.

2.11.2. The amendments will also be posted on the Official Website of the Authority along with the revised RFP containing the amendments and will be binding on all Applicants.

2.11.3. In order to afford the Applicants a reasonable time for taking an amendment into account, or for any other reason, the State Government and the Authority may, at their discretion, extend the Proposal Due Date[$].

C. PREPARATION AND SUBMISSION OF PROPOSAL

2.12. Language

The Proposal with all accompanying documents (the "**Documents**") and all communications in relation to or concerning the Selection Process shall be in English language and strictly on the forms provided in this RFP. No supporting document or printed literature shall be submitted with the Proposal unless specifically asked for and in case any of these Documents is in another language, it must be accompanied by an accurate translation of the relevant passages in English, in which case, for all purposes of interpretation of the Proposal, the translation in English shall prevail.

[$] While extending the Proposal Due Date on account of an addendum, the Authority shall have due regard for the time required by Applicants to address the amendments specified therein. In the case of significant amendments, at least 15 (fifteen) days shall be provided between the date of amendment and the Proposal Due Date, and in the case of minor amendments, at least 7 (seven) days shall be provided.

2.13. Format and signing of Proposal

2.13.1. The Applicant shall provide all the information sought under this RFP. The State Government and the Authority would evaluate only those Proposals that are received in the specified forms and complete in all respects.

2.13.2. The Proposal shall be typed and all supporting documents (submitted online or in hard-copy) shall be signed by the authorised representative (the "**Authorised Representative**") of the Applicant who shall initial each page, in blue ink. For the purposes of this RFP, the Authorised Representative shall be:

(a) a partner, in case of a partnership firm and/or a limited liability partnership; or
(b) a duly authorised person holding the Power of Attorney, in case of a limited company or a corporation; or
(c) the authorised representative of the Joint Venture/Consortium.

A copy of the Power of Attorney certified under the hands of a partner or director of the Applicant and notarised by a notary public in the form specified in Appendix-I (Form-4) shall be annexed to the Proposal.

2.13.3. Applicants should note the Proposal Due Date, as specified in Clause 1.8, for submission of Proposals. Except as specifically provided in this RFP, no supplementary material will be entertained by the State Government or the Authority, and that evaluation will be carried out only on the basis of Documents received by the closing time of Proposal Due Date as specified in Clause 2.17.1. Applicants will ordinarily not be asked to provide additional material information or documents subsequent to the date of submission, and unsolicited material if submitted will be summarily rejected. For the avoidance of doubt, the State Government and the Authority reserve the right to seek clarifications under and in accordance with the provisions of Clause 2.24.

2.14. Technical Proposal

2.14.1. Applicants shall submit the technical proposal in the formats at Appendix-I (the "**Technical Proposal**").

2.14.2. While submitting the Technical Proposal, the Applicant shall, in particular, ensure that:

(a) The Bid Security is provided;

(b) All forms are submitted in the prescribed formats and signed by the prescribed signatories;

(c) Power of Attorney, if applicable, is executed as per Applicable Laws;

(d) CVs of all Professional Personnel have been included;

(e) Key Personnel have been proposed only if they meet the Conditions of Eligibility laid down at Clause 2.2.2 (D) of the RFP;

(f) No alternative proposal for any Key Personnel is being made and only one CV for each position has been furnished;

(g) The CVs have been recently signed and dated in blue ink by the respective Personnel and countersigned by the Applicant. Unsigned / countersigned CVs shall be rejected;

(h) The CVs shall contain an undertaking from the respective Key Personnel about his/her availability for the duration specified in the RFP;

(i) Professional Personnel proposed have good working knowledge of English language;

(j) Key Personnel would be available for the entire Concession Period;

(k) No Key Personnel should have attained the age of 75 (seventy five) years at the time of submitting the proposal; and

(l) The proposal is responsive in terms of Clause 2.22.3.

2.14.3. Failure to comply with the requirements spelt out in this Clause 2.14 shall make the Proposal liable to be rejected.

2.14.4. If an individual Key Personnel makes a false averment regarding his qualification, experience or other particulars, or his commitment regarding availability for the Project is not fulfilled at any stage after signing of the Concession Agreement, he shall be liable to be debarred for any future assignment of the State Government and the Authority for a period of 5 (five) years. The award of the Project to the Applicant may also be liable to cancellation in such an event.

2.14.5. The Technical Proposal shall not include any financial information relating to the Financial Proposal.

2.14.6. The proposed team shall be composed of experts and specialists (the "**Professional Personnel**") in their respective areas of expertise and managerial/support staff (the "**Support Personnel**") such that the Concessionaire should be able to complete the Project within the specified time schedule. The Key Personnel specified in Clause 2.1.4 shall be included in the proposed team of Professional Personnel. Other competent and experienced Professional Personnel in the relevant areas of expertise must be added as required for successful completion of this Project. The CV of each such Professional Personnel, if any, should also be submitted in the format at Form-12 of Appendix-I.

2.14.7. The State Government and the Authority reserve the right to verify all statements, information and documents, submitted by the Applicant in response to the RFP. Any such verification or the lack of such verification by the State Government or the Authority to undertake such verification shall not

relieve the Applicant of its obligations or liabilities hereunder nor will it affect any rights of the State Government or the Authority thereunder.

2.14.8. In case it is found during the evaluation or at any time before signing of the Concession Agreement or after its execution and during the period of subsistence thereof, that one or more of the eligibility conditions have not been met by the Applicant or the Applicant has made material misrepresentation or has given any materially incorrect or false information, the Applicant shall be disqualified forthwith if not yet appointed as the Concessionaire either by issue of the Letter of Award or entering into of the Concession Agreement, and if the Selected Bidder has already been issued the Letter of Award or has entered into the Concession Agreement, as the case may be, the same shall, notwithstanding anything to the contrary contained therein or in this RFP, be liable to be terminated, by a communication in writing by the State Government and the Authority without the State Government or the Authority being liable in any manner whatsoever to the Applicant or Concessionaire, as the case may be.

In such an event, the State Government and the Authority shall forfeit and appropriate the Bid Security as mutually agreed pre-estimated compensation and damages payable to the State Government and/or the Authority for, *inter alia*, time, cost and effort of the State Government and the Authority, without prejudice to any other right or remedy that may be available to the State Government and the Authority.

2.15. Financial Proposal

2.15.1. Applicants shall submit the financial proposal in the formats at Appendix-II (the "**Financial Proposal**") clearly indicating the details of the cost of the Project in both figures and words, in Indian Rupees, and signed by the Applicant's Authorised Representative. In the event of any difference between figures and words, the amount indicated in words shall prevail. In the event of a difference between the arithmetic total and the total shown in the Financial Proposal, the lower of the two shall prevail.

(a) The Financial Proposal submitted by the Applicant shall comprise the Financial Proposal provided in Appendix – II of this RFP.

(b) The Applicants shall quote in the Bid Price Sheet, for the Project, the: (a) capital cost (including all Taxes); (b) O&M Charges for the first month after COD (including all Taxes); (c) Guaranteed Energy Consumption for the O&M Period; and (d) land requirement. Based on these components quoted by an Applicant, the Bid Price will be calculated by the system using the formula set out in the Bid Price Sheet.

(c) The Applicant shall quote only one figure for any of the components of the Bid Price after all discounts the Applicant wishes to offer on any or all of the components of the Bid Price.

(d) If the Applicant: (a) quotes more than one figure for any of the components of the Bid Price;

(b) offers a discount on any or all of the components of the Bid Price; then the Financial Proposal of such Applicant will be deemed to be non-responsive.

2.15.2. While submitting the Financial Proposal, the Applicant shall ensure the following:

(a) All the costs associated with the assignment shall be included in the Financial Proposal. These shall normally cover remuneration for all the Personnel (Expatriate and Resident, in the field, office, etc.), accommodation, air fare, equipment, printing of documents, surveys, geo-technical investigations, etc. The total amount indicated in the Financial Proposal shall be without any condition attached or subject to any assumption, and shall be final and binding. In case any assumption or condition is indicated in the Financial Proposal, it shall be considered non-responsive and liable to be rejected.

(b) The Financial Proposal shall take into account all expenses and tax liabilities. For the avoidance of doubt, it is clarified that all taxes shall be deemed to be included in the costs shown under different items of the Financial Proposal. Further, all payments shall be subject to deduction of taxes at source as per Applicable Laws.

(c) Costs (including break down of costs) shall be expressed in INR.

In case the annual accounts for the last financial year are not audited and therefore the Applicant cannot make it available, the Applicant shall give an undertaking to this effect, certified by the Statutory Auditor/ Chartered Accountant. In such a case, the Applicant shall provide the audited annual reports for the financial year preceding the latest financial year for which the audited annual report is not being provided.

2.15.3. Applicants may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under loans/credits obtained under external assistance. They are solely responsible for obtaining such benefits which they have considered in their Proposal and in case of failure to receive such benefits for reasons whatsoever, the State Government and the Authority will not compensate the Applicant. The Applicant shall furnish along with his Proposal a declaration to this effect in the Declaration Format provided in Form-4 of Appendix-II of this RFP.

2.15.4. Where the Applicant has quoted taking into account such benefits, it must give all information required for issue of certificates in terms of the Government of India Central Excise Notification and Customs Notification as stipulated in Form-4 of Appendix-II of this RFP. In case the Applicant has not provided the required information or has indicated to be furnished later on in the Declaration Format, the same shall be construed that the goods/equipment for which certificate is required is Nil.

2.15.5. To the extent the State Government and the Authority determine the quantities indicated therein are reasonable keeping in view the proposed methodology and work plan, the certificates will be issued,

and no subsequent changes will be permitted. The certificate will be issued within [60 (sixty)] days of signing of the Concession Agreement for material, equipment and machinery.

2.15.6. If the Applicant has considered the customs/excise duty exemption for materials/construction equipment to be bought for the work, the Applicant shall confirm and certify that the State Government and the Authority will not be required to undertake any responsibilities of the Schemes of Government of India or the said exemptions being available during the contract execution, except issuing the required certificate.

2.15.7. The Proposals which do not conform to the above provisions or any condition by the Applicant which makes the Proposal subject to availability of customs duty/Tax exemption for materials/construction equipment or compensation on withdrawal of any variations to the said exemptions will be treated as non-responsive and rejected.

2.15.8. Any delay in procurement of the construction equipment /machinery/goods as a result of the above shall not be entertained as a reason for granting any extension of time.

2.16. Submission of Proposal

2.16.1. E-Tendering Process

(a) The Selection Process will be conducted by way of e-tendering. In order to participate in the Selection Process, an Applicant must procure a digital signature certificate (class II or III) and register on the [Name of the State] Public Procurement Portal using its digital signature. A digital signature certificate may be procured from a registered certifying authority as stipulated by Controller of Certifying Authorities, Government of India.

(b) In case of a Consortium, the Applicant must register with the [Name of the State] Public Procurement Portal in the name of the Authorized Representative as provided in Clause 2.13.2, using the digital signature certificate issued in the name of the authorized signatory of the Authorized Representative.

(c) The Applicants are encouraged to visit the e-Procurement Portal to acquaint themselves with the process of submitting their Proposals online.

(d) The Applicants shall upload the soft copy/scanned copy of the completed Proposal on or before the specified time on the Proposal Due Date on the [Name of the State] Public Procurement Portal. Proposals submitted by any other means including by post, fax, telex, telegram or e-mail shall not be entertained.

(e) Proposal shall contain an index of submissions. Each page of the submission shall be initialled by the Authorized Representative of the Applicant as per the terms of the RFP. In case the Proposal is submitted on the document downloaded from the Official Website, the Applicant

shall be responsible for its accuracy and correctness as per the version uploaded by the State Government and the Authority and shall ensure that there are no changes caused in the content of the downloaded document. In case of any discrepancy between the downloaded or photocopied version of the RFP and the original RFP issued by the State Government and the Authority, the latter shall prevail. In case of any discrepancy between the RFP documents uploaded on the [Name of the State] Public Procurement Portal and the Official Website of the Authority, the former shall prevail.

(f) While uploading the Proposal on the [Name of the State] Public Procurement Portal, the Applicant must ensure that files containing the Proposal and scanned copies of the Bid Security are uploaded separately under the relevant heads in a PDF format. The Applicant shall be required to fill all mandatory forms and fields indicated in the [Name of the State] Public Procurement Portal at the time of uploading its Proposal.

(g) Upon submitting the Technical Proposals and the Financial Proposals on the [Name of the State] Public Procurement Portal, the Applicants must affix their digital signature to the Technical Proposal and the Financial Proposal.

(h) The Applicants should ensure the legibility of the documents uploaded to the [Name of the State] Public Procurement Portal.

(i) The Applicant shall upload the Proposal sufficiently before the specified time on the Proposal Due Date to avoid any technical issues or malfunction in the network caused by heavy traffic of Applicants on the Proposal Due Date. The State Government and the Authority will not be responsible for any failure, malfunction or breakdown of the electronic system of the [Name of the State] Public Procurement Portal during the uploading process.

(j) The Applicant should check the system generated summary of its Proposal submission to confirm successful uploading of its Proposal.

(k) All Proposals uploaded to the [Name of the State] Public Procurement Portal will be encrypted and the encrypted Proposals can only be opened by the authorised representatives of the State Government and the Authority at or after the specified time for opening of the Proposals.

(l) Each Applicant shall also submit a hard copy of the original Bid Security, Power of Attorney, Joint Bidding Agreement, Sub-contractor Undertaking (if applicable) to the Authority, before the Proposal Due Date.

(m) It is clarified that the Applicant will not be required to submit a hard copy of its Financial Proposal, and if a hard copy of the Financial Proposal is submitted, then the Proposal submitted by such Applicant shall be rejected as being non-responsive.

(n) The Applicant will contain no alterations, omissions or additions, unless such alterations,

omissions or additions are signed by the authorized signatory of the Applicant/Lead Member. Any interlineations, erasures, or overwriting will be valid only if they are signed by the authorized signatory of the Applicant/Lead Member.

(o) The hard copy of the Bid Security, Power of Attorney, Joint Bidding Agreement, Sub-contractor Undertaking (if applicable), etc. will be duly sealed in an envelope, which will be super-scribed as:

"PPP PROJECT FOR DEVELOPMENT AND OPERATION OF INTEGRATED SOLID WASTE MANAGEMENT AND RECLAMATION OF LAND THROUGH BIO-REMEDIATION OF LEGACY WASTE
TECHNICAL PROPOSAL
DO NOT OPEN BEFORE SPECIFIED TIME FOR OPENING OF PROPOSALS"

(p) The sealed envelope containing the Bid Security, Power of Attorney, Joint Bidding Agreement, etc., will clearly indicate the name, address and contact details of the Applicant. If the envelope is not sealed, marked and submitted as instructed in Clause 2.16.1, The State Government or the Authority assumes no responsibility for the misplacement or premature opening of the contents of the envelope and consequent losses, if any, suffered by the Applicant.

(q) The hard copy of the Bid Security, Power of Attorney, Joint Bidding Agreement, etc. will either be hand delivered or sent by registered post acknowledgement due or courier to the address provided in Clause 1.11.

(r) The State Government or the Authority will not be responsible for any delays, loss or non-receipt of Proposals.

2.16.2. The Technical Proposal shall contain:

(a) Application in the prescribed format provided in Appendix-I and supporting Documents;
(b) Bid Security as specified in Clause 2.20.1;
(c) Incorporation certificate of the company / proof of company registration document / memorandum of association;
(d) Copy of Agreement and letter of award/work order of the client for which technical capacity is claimed;
(e) Certificate(s) (completion or currently operating, as the case may be) from its concerned client(s) in support of "the Technical Capacity" clearly stating the capacity of project (or quantity processed till date in case of currently running project) including performance of the Applicant for the work completed during the contract period of the project in respect of the projects whose experience is claimed:
    (i) Performance certificate should be issued from the concerned client(s) (certificate issued by the commissioner or equivalent officer) shall only be considered; and

(ii) In case a particular work/contract has been jointly executed by the Applicant (as part of a Joint Venture/Consortium), it should further support its claim for the share in work done for that particular work/contract.

2.16.3. The Financial Proposal shall contain the financial proposal in the prescribed format (Forms 1, 2 & 3 of Appendix-II). It shall be supplemented with:

(a) Certificate(s) specifying the net worth of the Applicant at the close of the preceding financial year from the PDD and specifying the methodology adopted for calculating such net worth.
(b) Copy of the latest GST Return filed/ Copy of PAN Card. Not applicable for foreign Applicant.
(c) GSTIN number; not applicable for foreign Applicant.

For the purposes of this RFP, 'Net Worth' shall mean:

(i) **In case of a company**: the aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write-back of depreciation and amalgamation; and

(ii) **In case of any other entity/body corporate**: the aggregate value of the paid-up capital and reserves of such entity, after deducting the aggregate value of the intangible assets.

2.16.4. The Proposal shall be made in the Forms specified in this RFP. Any attachment to such Forms must be provided on separate sheets of paper and only information that is directly relevant should be provided. This may include photocopies of the relevant pages of printed documents. No separate documents like printed annual statements, company brochures, copy of contracts, etc., will be entertained.

2.16.5. The rates quoted shall be firm throughout the period of performance of the Project up to discharge of all obligations of the Concessionaire under the Concession Agreement.

2.16.6. Copy of Technical Proposal including original Bid Security, Power of Attorney, Joint Bidding Agreement and other documents that cannot be submitted online, should be put in separate sealed envelopes and the sealed envelopes together with the documents listed in Technical Proposal shall be sealed in another cover and delivered to the address provided in Clause 1.11 before the date and time provided in Clauses 1.8 and 2.17.

2.16.7. Additional information for submission of Proposal by Joint Venture/Consortium:

(a) There is no ceiling on the number of members of Joint Venture/ Consortium;

(b) Proposal should contain the information required for each Member of the Joint Venture/Consortium:

(i) "Members of the Joint Venture/ Consortium shall nominate one member as the lead member (the "**Lead Member**"), who shall have [majority or 51%] equity stake/voting rights in the Joint Venture/ Consortium. The nomination of the Lead Member shall be supported by a Power of Attorney, as per the format set forth in Form-IV of Appendix-I, signed by all the other members of the Joint Venture/Consortium. The Members of the Joint Venture/Consortium shall cumulatively/ collectively fulfill all the Conditions of Eligibility;

(ii) In the event, the Joint Venture/Consortium has been declared as the Selected Bidder and issued Letter of Award, all Members of the Joint Venture/Consortium shall sign the Concession Agreement with the State Government and the Authority. In this regard, it is clarified that all the Members of the Joint Venture/ Consortium shall be jointly and severally liable towards the State Government and the Authority to execute the Project during the Concession Period and irrespective of the failure of any particular Member of the Joint Venture/Consortium, the State Government and the Authority shall be entitled to call upon the Lead Member or other Member(s) of the Joint Venture/Consortium to discharge the obligations of the Joint Venture/Consortium;

(iii) The Proposal should include a brief description of the roles and responsibilities of each Member of the Joint Venture/Consortium, particularly with reference to financial and technical obligations under the Concession Agreement; and

(iv) Members of the Joint Venture/Consortium shall enter into a binding Joint Bidding Agreement (the "**Joint Bidding Agreement**") for the purpose of submitting the Proposal. The Joint Bidding Agreement shall (as provided in Form - 9 of Appendix-I), *inter alia*:

a. in case the Joint Venture/Consortium is declared as the Selected Bidder, ensure that its shareholding/ownership equity commitments are clearly set out, and state that the Joint Venture/Consortium shall act through the Lead Member in accordance with this RFP, and subsequently carry out all the responsibilities as Concessionaire in terms of the Concession Agreement;
b. clearly outline the proposed roles and responsibilities of each Member at each stage;
c. commit the minimum equity shares to be held by each Member in the special purpose vehicle; and include a statement to the effect that all Members of the Joint Venture/Consortium shall during the Concession Period, subject to the provisions of the Concession Agreement, be liable jointly and severally for all obligations of the Concessionaire in relation to the Project.

(c) Except as provided under the bidding documents including the RFP, there shall not be any amendment to the Joint Bidding Agreement without the prior written consent of the State Government and the Authority.

(d) Joint Bidding Agreement should be submitted along with the Proposal. The Joint Bidding Agreement entered into between the members of the Joint Venture/Consortium should be specific to the Project and should fulfill the above requirements, failing which the Proposal shall be considered non-responsive.

(e) No change in the composition of the Joint Venture/Consortium will allowed subsequent to the submission of the Proposal during the Selection Process.

(f) By submitting the Proposal, the Applicant shall be deemed to have acknowledged and agreed that in the event of a change in control or management of a Member or an Associate whose Technical Capacity and/or Financial Capacity was taken into consideration for the purposes of technical qualification under and in accordance with the RFP which adversely impacts the Project, the Applicant shall inform the State Government and the Authority forthwith along with all relevant particulars about the same and the State Government and the Authority may, at their discretion, disqualify the Applicant or withdraw the Letter of Award from the Selected Bidder, as the case may be. In such an event, notwithstanding anything to the contrary contained in the Concession Agreement, the State Government and the Authority shall forfeit and appropriate the Bid Security or Performance Security, as the case may be, as compensation and damages payable to the State Government or the Authority for, *inter alia*, time, cost and effort of the State Government and the Authority, without prejudice to any other right or remedy that may be available to the State Government or the Authority hereunder or otherwise.

2.17. Proposal Due Date

2.17.1. Proposal should be uploaded on the [Name of the State of the Project] Public Procurement Portal on or before **** hrs on the Proposal Due Date specified in Clause 1.8 through "online bidder enrolment" on the said portal, and submission against the RFP titled "****" and in the manner and form as detailed in this RFP.

2.17.2. For the purposes of determining the cut-off time for submission of Proposals, the central server time displayed on the clock on the [Name of the State] Public Procurement Portal will be followed by the Applicants, the State Government and the Authority.

2.17.3. The State Government and the Authority may, at their discretion, extend the Proposal Due Date by issuing an Addendum in accordance with Clause 2.11 uniformly for all Applicants.

2.18. Late Proposals

Proposals received by the State Government and the Authority after the specified time on Proposal Due Date shall not be eligible for consideration and shall be summarily rejected.

2.19. Modification/ substitution/ withdrawal of Proposals

2.19.1. There shall be no alterations, omissions, additions, or any other amendments made to the Proposal once submitted, except to the extent provided in Clause 2.11.

2.19.2. Any alteration / modification in the Proposal or additional information or material supplied subsequent to the Proposal Due Date, unless the same has been expressly sought for by the State Government or the Authority, shall be disregarded.

2.20. Bid Security

2.20.1. The Applicant shall furnish as part of its Proposal, a bid security of [Rs. *** (Rupees ***)][4] through online payment mode as provided on the Official Website of the Authority (the "**Bid Security**"), or in the form of Bank Guarantee, returnable not later than 30 (thirty) days from PDD except in case of the two highest ranked Applicants as required in Clause 2.25.1. In the event that the first ranked Applicant commences the assignment as required in Clause 2.30, the second ranked Applicant, who has been kept in reserve, shall be returned its Bid Security forthwith, but in no case not later than 120 (one hundred and twenty) days from PDD. The Selected Bidder's Bid Security shall be returned, upon the Applicant signing the Concession Agreement in accordance with the provisions thereof.

2.20.2. Any Proposal not accompanied by the Bid Security shall be rejected by the State Government and the Authority as non-responsive.

2.20.3. The State Government or the Authority shall not be liable to pay any interest on the Bid Security and the same shall be interest free.

2.20.4. The Applicant, by submitting its Application pursuant to this RFP, shall be deemed to have acknowledged that without prejudice to the State Government's or the Authority's any other right or remedy hereunder or in law or otherwise, the Bid Security shall be forfeited and appropriated by the State Government and the Authority as the mutually agreed pre-estimated compensation and damage

[4] May be fixed @ Rs. 25,000 (twenty five thousand) for every Rs. 100 (one hundred) crore of the indicative cost of the Project, subject to a minimum of Rs. 25,000 (twenty five thousand) and a maximum of Rs. 2,00,000 (two Lakh).

payable to the State Government and/or the Authority for, *inter alia*, the time, cost and effort of the State Government and the Authority in regard to the RFP including the consideration and evaluation of the Proposal under the following conditions:

(a) If an Applicant submits a non-responsive Proposal;

(b) If an Applicant engages in any of the Prohibited Practices specified in Section 4 of this RFP;

(c) If an Applicant withdraws its Proposal during the period of its validity as specified in this RFP and as extended by the Applicant from time to time;

(d) In the case of the Selected Bidder, if the Applicant fails to reconfirm its commitments during negotiations as required vide Clause 2.25.1;

(e) In the case of a Selected Bidder, if the Applicant fails to sign the Concession Agreement or commence the assignment as specified in Clauses 2.29 and 2.30 respectively; or

(f) If the Applicant is found to have a Conflict of Interest as specified in Clause 2.3.

2.21. Performance Security, ESHS Performance Security and O&M Security

2.21.1. The Applicant, by submitting its Application pursuant to this RFP, shall be deemed to have acknowledged that without prejudice to the State Government's or the Authority's any other right or remedy hereunder or in law or otherwise, its Performance Security, ESHS Performance Security or O&M Security shall be forfeited and appropriated by the State Government or the Authority as the mutually agreed pre-estimated compensation and damages payable to the State Government or the Authority for, *inter alia*, the time, cost and effort of the State Government and the Authority in regard to the RFP, including the consideration and evaluation of the Proposal, under the following conditions:

(a) If an Applicant engages in any of the Prohibited Practices specified in Clause 4.1 of this RFP;

(b) if the Applicant is found to have a Conflict of Interest as specified in Clause 2.3; and

(c) if the Selected Bidder commits a breach of the Concession Agreement.

2.21.2. An amount as specified in the Article 9 of the Concession Agreement shall be deemed to be the Performance Security, ESHS Performance Security and O&M Security for the purposes of this Clause 2.21, which may be forfeited and appropriated in accordance with the provisions of the Concession Agreement.

D. EVALUATION PROCESS

2.22. Evaluation of Proposals

2.22.1. The State Government and the Authority shall open the Proposals at *** hours on the Proposal Due Date, at the place specified in Clause 1.11.1 and in the presence of the Applicants who choose to attend. The Technical Proposals shall be opened first.

2.22.2. Prior to evaluation of Proposals, the State Government and the Authority will determine whether each Proposal is responsive to the requirements of the RFP. The State Government and the Authority may, at their discretion, reject any Proposal that is not responsive hereunder. A Proposal shall be considered responsive only if:

(a) the Technical Proposal is received in the form specified at Appendix-I;

(b) it is received by the Proposal Due Date including any extension thereof pursuant to Clause 2.17;

(c) it is accompanied by the Bid Security as specified in Clause 2.20.1.

(d) it is signed by the Authorised Representative of the Applicant as stipulated in Clauses 2.13;

(e) it is accompanied by the Power of Attorney as specified in Clause 2.2.4;

(f) it contains all the information (complete in all respects) as requested in the RFP;

(g) it does not contain any condition or qualification; and

(h) it is not non-responsive in terms hereof.

2.22.3. The State Government and the Authority reserve the right to reject any Proposal which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by the State Government or the Authority in respect of such Proposals.

2.22.4. The State Government and the Authority shall subsequently examine and evaluate Proposals in accordance with the Selection Process specified at Clause 1.6 and the criteria set out in Section 3 of this RFP.

2.22.5. After the technical evaluation, the State Government and the Authority shall prepare a list of pre-qualified and shortlisted Applicants in terms of Clause 3.2 for opening of their Financial Proposals. A date, time and venue will be notified to all Applicants for announcing the result of evaluation and opening of Financial Proposals. Before opening of the Financial Proposals, the list of pre-qualified and shortlisted Applicants along with their Technical Score will be read out. The opening of Financial Proposals shall be done in presence of respective representatives of Applicants who choose to be present. The financial evaluation and final ranking of the Proposals shall be carried out in terms of Clauses 3.3 and 3.4.

2.22.6. Any information contained in the Proposal shall not in any way be construed as binding on the State Government or the Authority, their agents, successors or assigns, but shall be binding against the Applicant if the Project is subsequently awarded to it.

2.23. Confidentiality

Information relating to the examination, clarification, evaluation, and recommendation for the selection of Applicants shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional adviser advising the State Government and the Authority in relation to matters arising out of, or concerning the Selection Process. The State Government and the Authority shall treat all information, submitted as part of the Proposal, in confidence and shall require all those who have access to such material to treat the same in confidence. The State Government and the Authority may not divulge any such information unless it is directed to do so by any statutory entity that has the power under law to require its disclosure or is to enforce or assert any right or privilege of the statutory entity and/or the State Government or the Authority or as may be required by law or in connection with any legal process.

2.24. Clarifications sought by the State Government or the Authority

2.24.1. To facilitate evaluation of Proposals, the State Government and the Authority may, at their discretion, seek clarifications from any Applicant regarding its Proposal. Such clarification(s) shall be provided within the time specified by the State Government and the Authority for this purpose. Any request for clarification(s) and all clarification(s) in response thereto shall be in writing.

2.24.2. If an Applicant does not provide clarifications sought under Clause 2.24.1 above within the specified time, its Proposal shall be liable to be rejected. In case the Proposal is not rejected, the State Government and the Authority may proceed to evaluate the Proposal by construing the particulars requiring clarification to the best of its understanding, and the Applicant shall be barred from subsequently questioning such interpretation of the State Government and the Authority.

E. APPOINTMENT OF CONCESSIONAIRE

2.25. Negotiations

2.25.1. The Selected Bidder may, if necessary, be invited for negotiations. The negotiations shall generally not be for reducing the price of the Proposal, but will be for re-confirming the obligations of the Applicant under this RFP. Issues such as deployment of Key Personnel, understanding of the RFP, proposed methodology, technology and work plan shall be discussed during negotiations. A Key Personnel who did not score [60% (sixty per cent)] marks as required under Clause 3.1.2 shall be replaced by the Applicant with a better candidate to the satisfaction of the State Government and the Authority. In case the Selected Bidder fails to reconfirm its commitment, the State Government and the Authority reserve the right to designate the next ranked Applicant as the Selected Bidder and invite it for negotiations.

2.25.2. The State Government and the Authority will examine the CVs of all other Professional Personnel and those not found suitable shall be replaced by the Applicant to the satisfaction of the State Government and the Authority.

2.26. Substitution of Key Personnel

2.26.1. The State Government and the Authority will not normally consider any request of the Selected Bidder for substitution of Key Personnel as the ranking of the Applicant is based on the evaluation of Key Personnel and any change therein may upset the ranking. Substitution will, however, be permitted if the Key Personnel is not available for reasons of any incapacity or due to health, subject to equally or better qualified and experienced personnel being provided to the satisfaction of the State Government and the Authority.

2.26.2. The State Government and the Authority expect all the Key Personnel to be available during implementation of the Agreement. The State Government and the Authority will not consider substitution of Key Personnel except for reasons of any incapacity or due to health. Such substitution shall ordinarily be limited to one Key Personnel subject to equally or better qualified and experienced personnel being provided to the satisfaction of the State Government and the Authority. As a condition to such substitution, a sum equal to 20% (twenty per cent) of the remuneration specified for the original Key Personnel shall be deducted from the payments due to the Applicant. In the case of a second substitution hereunder, such deduction shall be 50% (fifty per cent) of the remuneration specified for the original Key Personnel. Any further substitution may lead to disqualification of the Applicant or termination of the Agreement.

2.26.3. Substitution of the Team Leader will not normally be considered and may lead to disqualification of the Applicant or termination of the Agreement.

2.27. Indemnity

The Applicant shall, subject to the provisions of the Agreement, indemnify the State Government and/or the Authority for an amount not exceeding 3 (three) times the value of the Agreement for any direct loss or damage that is caused due to any deficiency in services.

2.28. Award of Project

2.28.1. After selection, a Letter of Award (the "**LOA**") shall be issued, in duplicate, by the State Government and the Authority to the Selected Bidder:

(a) declaring it as the Selected Bidder;

(b) accepting its Technical and Financial Proposal;

(c) requesting it to sign and return, as acknowledgement, a copy of the LOA within 7 (seven) days of receipt of the LOA;

(d) requesting it to submit the Performance Securities and O&M Security in accordance with Clause 2.21; and

(e) requesting it to incorporate the Special Purpose Vehicle, which will act as the Concessionaire.

2.28.2. If the Selected Bidder fails to return a duly signed copy of the LOA to the State Government and the Authority within 7 (seven) days of receipt of the LOA, then the State Government and the Authority may, unless they consent to an extension, without prejudice to any of its rights under the RFP or law, disqualify the Selected Bidder, revoke the LOA, and forfeit the Bid Security. If the State Government and the Authority elect to disqualify such Selected Bidder and revoke the LOA, then the procedure set out in Clause 2.29.6 shall follow.

2.28.3. After notification of award in accordance with Clause 2.28.1, the State Government and the Authority may also notify all other Applicants of the results of the Selection Process, and shall publish on the Official Website of the Authority and the [Name of the State] Public Procurement Portal, results of the Selection Process and the following information:

(i) name of each Applicant who submitted a Proposal;

(ii) results of evaluation of Technical Proposals;

(iii) names of Applicants whose Technical Proposals were rejected and the reasons for their rejection;

(iv) Bid Prices as read out at opening of Financial Proposals;

(v) name and evaluated Bid Prices of each Financial Proposal that was evaluated;

(vi) names of Applicants whose Financial Proposals were rejected and the reasons for their rejection; and

(vii) name of the Selected Bidder, the Bid Price it offered, and summary scope of the contract awarded.

30.4 The Authority shall promptly respond in writing to any unsuccessful Applicant who, after notification of award in accordance with Clause 2.28, requests in writing the grounds on which its Proposal was not selected.

2.29. Execution of the Concession Agreement

2.29.1. After acknowledgement of the LOA as aforesaid by the Selected Bidder, the Special Purpose Vehicle incorporated by the Selected Bidder shall execute the Concession Agreement within the period prescribed in Clause 1.8.

2.29.2. If the Special Purpose Vehicle fails to execute the Concession Agreement on or before the date specified in Clause 1.8, the State Government and the Authority may, unless they consent to an extension, without prejudice to any of their rights under the RFP or law, disqualify the Selected Bidder, revoke the LOA and forfeit the Bid Security. If State Government and the Authority elect to disqualify such Selected Bidder and revoke the LOA, then the procedure set out in Clause 2.29.6 shall follow.

2.29.3. The Selected Bidder shall not be entitled to seek any deviation in the Concession Agreement except the amendments to reflect facts or to correct minor errors.

2.29.4. If the Selected Bidder seeks to materially negotiate or seeks any material deviations from the final execution draft of the Concession Agreement, the State Government and the Authority may elect to disqualify the Selected Bidder and revoke the LOA issued to the Selected Bidder. If the State Government and the Authority elect to disqualify such Selected Bidder and revoke the LOA, then the procedure set out in Clause 2.29.6 shall follow.

2.29.5. If the State Government and the Authority elect to disqualify such Selected Bidder and revoke the LOA, the State Government and the Authority will not be liable in any manner whatsoever to the Selected Bidder. Additionally, the State Government and the Authority will have the right to forfeit and appropriate the Bid Security or, as the case may be, appropriate an equivalent amount from the Performance Security if the Concession Agreement has been executed, as a mutually agreed genuine pre-estimate of the loss suffered by the State Government and the Authority for, amongst others, the State Government's and the Authority's time, cost and efforts in conducting the Selection Process. Such forfeiture will be without prejudice to any other right or remedy that the State Government and the Authority may have under the RFP, the Concession Agreement or Applicable Laws.

2.29.6. If the State Government and the Authority elect to disqualify such Selected Bidder and revoke the LOA the State Government and the Authority reserve the right to:

(a) select the next highest ranking Applicant as the Selected Bidder for the Project; or

(b) take any such measure as may be deemed fit in the discretion of State Government and the Authority, including inviting fresh Financial Proposals from the technically qualified Applicants or annulling the entire Selection Process.

2.30. Commencement of Project

The Applicant shall commence the implementation of the Project at the Site(s) within [7 (seven)] days of the execution date of the Concession Agreement, or such other date as may be mutually agreed. If the Applicant fails to either sign the Concession Agreement as specified in Clause 2.29 or commence the Project as specified herein, the State Government and the Authority may invite the second ranked Applicant for negotiations. In such an event, the Bid Security of the first ranked Applicant shall be forfeited and appropriated in accordance with the provisions of Clause 2.20.4.

2.31. Proprietary data

Subject to the provisions of Clause 2.23, all documents and other information provided by the State Government and the Authority or submitted by an Applicant to the State Government and the Authority shall remain or become the property of the State Government and the Authority. Applicants and the Applicant, as the case may be, are to treat all information as strictly confidential. The State Government or the Authority will not return any Proposal or any information related thereto. All information collected, analysed, processed or in whatever manner provided by the Applicant to the State Government and the Authority in relation to the Project shall be the property of the State Government and the Authority.

3. CRITERIA FOR EVALUATION

3.1. Evaluation of Technical Proposals

3.1.1. In the first stage, the Technical Proposal will be evaluated on the basis of Applicant's experience, its understanding of scope of work and scope of services as set out in the Concession Agreement, proposed methodology, technology and work plan, and the experience of Key Personnel. Only those Applicants whose Technical Proposals get a score of [60 (sixty) marks] or more out of 100 (one hundred) shall qualify for further consideration, and shall be ranked from highest to the lowest on the basis of their technical score (S_T).

3.1.2. Each Key Personnel must score a minimum of [60% (sixty per cent)] marks except as provided herein. A Proposal shall be rejected if the Team Leader scores less than [60% (sixty per cent)] marks or any two of the remaining Key Personnel score less than [60% (sixty per cent)] marks. In case the Selected Bidder has one Key Personnel, other than the Team Leader, who scores less than [60% (sixty per cent)] marks, he would have to be replaced during negotiations, with a better candidate who, in the opinion of the State Government and the Authority, would score [60% (sixty per cent)] or above.

3.1.3. The scoring criteria to be used for evaluation shall be as follows:[5]

	Parameter	**Maximum Marks**	**Criteria**
1.	**[Relevant Experience of the Applicant]**	**[40]**	[30% of the maximum marks shall be awarded for the number of Eligible Assignments undertaken by the Applicant. The remaining 70% shall be awarded for: (i) the comparative size and quality of Eligible Assignments; (ii) other relevant assignments or similar work; and (iii) overall experience of the Applicant.]
2.	**[Proposed Methodology, Technology and Work Plan]**	**[30]**	[Evaluation will be based on the quality of submissions.]
3.	**[Relevant Experience of the Key Personnel]**[6]	**[30]**	[30% of the maximum marks for each Key Personnel shall be awarded for the number of Eligible Assignments the respective Key Personnel has worked on. The remaining 70% shall be awarded for: (i) the comparative size and quality of Eligible Assignments; and (ii) other relevant assignments or similar work.]
3(a)	[Team Leader]		
3(b)	[Safety Expert]		

[5] The scoring criteria is subject to modification.
[6] The Key Personnel and their respective maximum marks may be suitably modified to address project-specific requirements.

3(c)	[Financial Analyst]		
3(d)	[Environmental Expert]		
Grand Total		**100**	

While awarding marks for the number of Eligible Projects, the Applicant or Key Personnel, as the case may be, that has undertaken the highest number of Eligible Assignments shall be entitled to the maximum score for the respective category and all other competing Applicants or respective Key Personnel, as the case may be, shall be entitled to a proportionate score. No score will be awarded to an Applicant/ Key Personnel for fulfilling the eligibility criteria of a minimum number of Eligible Assignments and only projects exceeding the eligibility criteria shall qualify for scoring. For the avoidance of doubt and by way of illustration, if the minimum number of Eligible Projects for meeting the eligibility criteria is say, 3 (three), then an equivalent number will be ignored for each Applicant/Key Personnel and only the balance remaining will be considered for awarding scores relating to the number of Eligible Assignments on a proportionate basis. However, for assigning scores in respect of the size and quality of Eligible Assignments, all Eligible Assignments of the Applicant/Key Personnel shall be considered.

3.1.4. Eligible Assignments

For the purposes of determining Conditions of Eligibility and for evaluating the Proposals under this RFP, the following projects shall be deemed as eligible assignments (the "**Eligible Assignments**"):

(a) [Setting up of Sanitary Land filling (SLF) facility, construction of waste processing facility and material recovery facility in India or abroad of the capacity of *** Tonnes Per Day (TPD) in the period of past ten years from the PDD];

(b) [Operations in collection, transportation, processing and disposal of municipal solid waste of ** TPD capacity for three years or more in India or abroad in the period of past ten years from the PDD];

(c) [One project of 40% of the total estimated capacity for Bio-remediation/reclamation i.e. ** lakh cubic metres of legacy waste OR Two projects of 30% of the total estimated capacity for Bio-remediation/reclamation i.e. ** lakh cubic metres of legacy waste in the period of past ten years from the PDD].

[Provided that where the Key Personnel is claiming credit for an Eligible Assignment, she/he should have completed the relevant assignment prior to PDD.]

3.1.5. Financial Capacity

To demonstrate its financial capacity to undertake the Project (**Financial Capacity**), the Applicant must meet each of the financial qualification criteria specified in this Clause 3.1.5.

(a) Net worth

(i) In each of the Financial Years [Mention the 5 Financial Years preceding the Proposal Due Date], the Applicant's Net Worth (as per the audited annual financial statements) shall be at least INR [25% to 33% of the Bid Project Cost].

(ii) If the Applicant is a Consortium, then the Net Worth, as required in Clause 3.1.5 (a)(i) above shall be demonstrated cumulatively, i.e., the Consortium as a whole should meet the requirement. Provided further that if the Applicant is subsequently declared the Selected Bidder for the Project, then any Member of the Consortium whose Net Worth was assessed for the purposes of demonstrating that the Consortium has the Financial Capacity to undertake the Project, shall hold at least 26% (twenty six per cent) shareholding in the paid up and subscribed equity of the concessionaire/SPV until expiry of 3 (three) years from COD.

(iii) An Applicant or a Member of a Consortium may rely on the Net Worth of its Associate(s) for demonstrating its Financial Capacity. In such a case, the Applicant or a Member of a Consortium shall submit an undertaking from the Associate(s) stating that the necessary proportionate equity for the project will be provided for successful implementation of the project. In addition to this, during Financial Closure, necessary board resolution from the Associate(s) has to be submitted to the extent of equity contribution.

(b) The Applicant (and in case of a Consortium, any Member) and its Associate(s) (in case the Net Worth of the Associate is being claimed) is not affected by and has not been affected by any of the following events, conditions or circumstances in the [5 (five)] Financial Years immediately preceding the Proposal Due Date, as certified by the statutory auditor of the Applicant (and in case of a Consortium, the statutory auditor of a Member) and its Associate(s) (if applicable):

(i) the Applicant (and the Associate(s), if applicable) having been categorized as a wilful defaulter in accordance with Applicable Laws or laws of the country of its incorporation;

(ii) the Applicant (and the Associate(s), if applicable) being subject to proceedings for declaration of or being declared bankrupt, being wound up, or having its affairs administered or conducted by any court, administrator, receiver; or

(iii) the Applicant (and the Associate(s), if applicable) having been declared by a court or other competent authority as being unable to pay its debts, or having made any composition or arrangements with creditors or having had the repayment of its debts suspended.

(c) The Applicant (and in case of a Consortium, any Member) and its Associate(s) (if applicable) has not been convicted or otherwise being found responsible (or having any of its directors, partners, trustees, officers or managers convicted or being found responsible) by any court, tribunal, regulatory, public or other competent authority for a breach of any laws or regulations which:

(i) related to any act of fraud or dishonesty for which a fine, penalty, damages, compensation or other payment was levied against the Applicant (and the Associate(s), if applicable) or any of its directors, partners, trustees, officers or managers; or

(ii) resulted in the permanent or temporary suspension of the rights of the Applicant (and the Associate(s), if applicable) to provide any service or carry on any type of business or operations.

3.2. Short-listing of Applicants

The Applicants scoring equal to or above [60 (sixty)] points after the evaluation of the Technical Proposals, will be pre-qualified and short-listed for financial evaluation. However, if the number of such pre-qualified Applicants is less than two, the State Government and the Authority may, at their discretion, pre-qualify the Applicant(s) whose technical score is less than [60 (sixty)] points even if such Applicant(s) do(es) not qualify in terms of Clause 3.1.2.

3.3. Evaluation of Financial Proposal

3.3.1. In the second stage, the financial evaluation will be carried out as per this Clause 3.3. Each Financial Proposal will be assigned a financial score (S_F).

(a) Financial Proposals, which are responsive, shall be evaluated for the quoted Bid Price as under (on the basis of net present value):

(i) Capital cost including all taxes & GST;

(ii) O&M prices for the Project 20 years = O&M Charges including all taxes & GST for first month after COD) * 240

(iii) Cost of energy consumption for the Project during 20 years of O&M Period = [Average Guaranteed Energy Consumption per tonne * Base Energy Tariff Rate * design capacity of Project Facilities * Number of days of the O&M period]

For the purpose of this calculation of energy cost:

[Average Guaranteed Energy Consumption per tonne = Average of different Guaranteed Energy Consumption figures in KWh quoted in Bid Price Sheet for processing and recycling various kinds of solid waste];

Base Energy Tariff Rate = INR [Rate]/KWh; and

Number of days of the O&M period = 7300

(iv) Cost of land required for the Project = land requirement in metre square (sq.m.) as quoted by the Applicant (including land requirement for decentralized units) * land price per sq.m. determined as per the circle rate

For the purpose of evaluation, land price = INR [Price] per sq.m.

Total Evaluated Bid Price = (i) + (ii) + (iii) + (iv)

(b) The State Government and the Authority shall compare the Total Evaluated Bid Price of all responsive Financial Proposals to determine the lowest Financial Proposal.

3.3.2. The State Government and the Authority will determine whether the Financial Proposals are complete, unqualified and unconditional. Omissions, if any, in costing any item shall not entitle the Applicant to be compensated and the liability to fulfill its obligations as per the Concession Agreement within the Bid Price shall be that of the Applicant. The lowest Financial Proposal (FM) will be given a financial score (S_F) of 100 points. The financial scores of other proposals will be computed as follows:

$S_F = 100 \times F_M/F$

(F = amount of Financial Proposal)

3.4. Combined and final evaluation

3.4.1. Proposals will finally be ranked according to their combined technical (S_T) and financial (S_F) scores as follows:

$$S = S_T \times T_w + S_F \times F_w$$

Where S is the combined score, and T_w and F_w are weights assigned to Technical Proposal and Financial Proposal, which shall be [0.70 and 0.30] respectively.

3.4.2. The Selected Bidder shall be the first ranked Applicant (having the highest combined score). The second ranked Applicant shall be kept in reserve and may be invited for negotiations in case the first ranked Applicant withdraws, or fails to comply with the requirements specified in Clauses 2.25, 2.29 and 2.30, as the case may be.

4. FRAUD AND CORRUPT PRACTICES

4.1. The Applicants and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this RFP, the State Government and the Authority shall reject a Proposal without being liable in any manner whatsoever to the Applicant, if it determines that the Applicant has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the "**Prohibited Practices**") in the Selection Process. In such an event, the State Government or the Authority shall, without prejudice to its any other rights or remedies, forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the State Government and/or the Authority for, *inter alia*, time, cost and effort of the State Government and the Authority, in regard to the RFP, including consideration and evaluation of such Applicant's Proposal.

4.2. Without prejudice to the rights of the State Government and the Authority under Clause 4.1 hereinabove and the rights and remedies which the State Government and the Authority may have under the LOA or the Agreement, if an Applicant or Applicant, as the case may be, is found by the State Government or the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the LOA or the execution of the Agreement, such Applicant or Applicant shall not be eligible to participate in any tender or RFP issued by the State Government and the Authority during a period of 2 (two) years from the date such Applicant or Applicant, as the case may be, is found by the State Government or the Authority to have directly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

4.3. For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:

(a) "**corrupt practice**" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of the State Government or the Authority who is or has been associated in any manner, directly or indirectly with the Selection Process or the LOA or has dealt with matters concerning the Agreement or arising therefrom, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the State Government or the Authority, as the case may be, shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or (ii) save as provided herein, engaging in any manner

whatsoever, whether during the Selection Process or after the issue of the LOA or after the execution of the Agreement, as the case may be, any person in respect of any matter relating to the Project or the LOA or the Agreement, who at any time has been or is a legal, financial or technical consultant/ adviser of the State Government or the Authority in relation to any matter concerning the Project;

(b) "**fraudulent practice**" means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process;

(c) "**coercive practice**" means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person's participation or action in the Selection Process;

(d) "**undesirable practice**" means (i) establishing contact with any person connected with or employed or engaged by the State Government or the Authority with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or (ii) having a Conflict of Interest; and

(e) "**restrictive practice**" means forming a cartel or arriving at any understanding or arrangement among Applicants with the objective of restricting or manipulating a full and fair competition in the Selection Process.

5. PRE-PROPOSAL CONFERENCE

5.1. Pre-Proposal Conference of the Applicants shall be convened at the designated date, time and place. A maximum of two representatives of each Applicant shall be allowed to participate on production of an authority letter from the Applicant.

5.2. During the course of Pre-Proposal Conference, the Applicants will be free to seek clarifications and make suggestions for consideration of the State Government and the Authority. The State Government and the Authority shall endeavour to provide clarifications and such further information as it may, in its sole discretion, consider appropriate for facilitating a fair, transparent and competitive Selection Process.

6. MISCELLANEOUS

6.1. The Selection Process shall be governed by, and construed in accordance with, the laws of India and the Courts in the [Name of the State of the Project] shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the Selection Process.

6.2. The State Government and the Authority, at their discretion and without incurring any obligation or liability, reserves the right, at any time, to:

(a) suspend and/or cancel the Selection Process and/or amend and/or supplement the Selection Process or modify the dates or other terms and conditions relating thereto;

(b) consult with any Applicant in order to receive clarification or further information;

(c) retain any information and/or evidence submitted to the State Government or the Authority by, on behalf of and/or in relation to any Applicant; and/or

(d) independently verify, disqualify, reject and/or accept any and all submissions or other information and/or evidence submitted by or on behalf of any Applicant.

6.3. It shall be deemed that by submitting the Proposal, the Applicant agrees and releases the State Government and the Authority, their employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/or performance of any obligations hereunder, pursuant hereto and/or in connection herewith and waives any and all rights and/or claims it may have in this respect, whether actual or contingent, whether present or future.

6.4. All documents and other information supplied by the State Government or the Authority or submitted by an Applicant shall remain or become, as the case may be, the property of the State Government and the Authority. The State Government and the Authority will not return any submissions made hereunder. Applicants are required to treat all such documents and information as strictly confidential.

6.5. The State Government and the Authority reserve the right to make inquiries with any of the clients listed by the Applicants in their previous experience record.

APPENDIX - I

TECHNICAL PROPOSAL

APPENDIX-I

Form-1

Letter of Proposal
(On Applicant's letter head)

(Date and Reference)

To,

…….

…….

…….

Subject: Appointment of Concessionaire for development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste

Dear Madam/Sir,

With reference to your RFP Document dated ……..…….., I/we, having examined all relevant documents and understood their contents, hereby submit our Proposal for selection as Concessionaire for the development and operation of integrated solid waste management system and reclamation of land through bio-remediation of legacy waste (the "**Project**"). The proposal is unconditional and unqualified.

2. All information provided in the Proposal and in the Appendices is true and correct and all documents accompanying such Proposal are true copies of their respective originals.

3. This statement is made for the express purpose of appointment as the Concessionaire for the aforesaid Project.

4. I/We shall make available to the State Government and the Authority any additional information it may deem necessary or require for supplementing or authenticating the Proposal.

5. I/We acknowledge the right of the State Government and the Authority to reject our application without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.

6. I/We certify that in the last five years, we or any of our Associates have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Applicant, nor been expelled from any project or contract by any public authority nor have had any contract terminated by any public authority for breach on our part.

7. I/We declare that:

(a) I/We have examined and have no reservations to the RFP Documents, including any Addendum issued by the State Government and the Authority;

(b) I/We do not have any conflict of interest in accordance with Clause 2.3 of the RFP Document;

(c) I/We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in Clause 4.3 of the RFP document, in respect of any tender or request for proposal issued by or any agreement entered into with the State Government and the Authority or any other public sector enterprise or any government, Central or State; and

(d) I/We hereby certify that we have taken steps to ensure that in conformity with the provisions of Section 4 of the RFP, no person acting for us or on our behalf will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

8. I/We understand that you may cancel the Selection Process at any time and that you are neither bound to accept any Proposal that you may receive nor to select the Concessionaire, without incurring any liability to the Applicants in accordance with Clause 2.8 of the RFP document.

9. I/We declare that we/any member of the Joint Venture/Consortium, are/is not a Member of any other Joint Venture/Consortium applying for selection as a Concessionaire.

10. I/We certify that in regard to matters other than security and integrity of the country, we or any of our Associates have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory authority which would cast a doubt on our ability to undertake the Project or which relates to a grave offence that outrages the moral sense of the community.

11. I/We further certify that in regard to matters relating to security and integrity of the country, we have not been charge-sheeted by any agency of the Government or convicted by a Court of Law for any offence committed by us or by any of our Associates.

12. I/We further certify that no investigation by a regulatory authority is pending either against us or against our Associates or against our CEO or any of our Directors/Managers/employees.[$]

13. I/We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by the State Government and the Authority [and/ or the Government of India] in connection with the selection of Concessionaire or in connection with the Selection Process itself in respect of the above mentioned Project.

[$] In case the Applicant is unable to provide the certification specified in Paragraph 12, it may precede the Paragraph by the words viz. "Except as specified in Schedule ……..... hereto". The exceptions to the certification or any disclosures relating thereto may be clearly stated in a Schedule to be attached to the Application. The Authority will consider the contents of such Schedule and determine whether or not the exceptions/disclosures are material to the suitability of the Applicant for pre-qualification hereunder.

14. The Bid Security of Rs. …… (Rupees ……) has been submitted through online mode of payment as provided in the RFP document.

15. I/We agree and understand that the proposal is subject to the provisions of the RFP document. In no case, shall I/we have any claim or right of whatsoever nature if the Project is not awarded to me/us or our proposal is not opened or rejected.

16. I/We agree to keep this offer valid for 90 (ninety) days from the Proposal Due Date specified in the RFP.

17. A Power of Attorney in favour of the authorised signatory to sign and submit this Proposal and documents is attached herewith in Form-4 of Appendix-I.

18. In the event of my/our firm/ Joint Venture/Consortium being selected as the Concessionaire, I/we agree to enter into the Concession Agreement in accordance with the Schedule-I of the RFP. We agree not to seek any changes in the aforesaid form and agree to abide by the same.

19. I/We have studied RFP and all other documents carefully and also surveyed the Site(s). We understand that except to the extent as expressly set forth in the Concession Agreement, we shall have no claim, right or title arising out of any documents or information provided to us by the State Government or the Authority or in respect of any matter arising out of or concerning or relating to the Selection Process including the award of Project.

20. The Financial Proposal is being submitted separately. This Technical Proposal read with the Financial Proposal shall constitute the Application which shall be binding on us.

21. I/We agree and undertake to abide by all the terms and conditions of the RFP Document. In witness thereof, I/we submit this Proposal under and in accordance with the terms of the RFP Document.

Yours faithfully,

(Signature, name and designation of the authorised signatory)

(Name and seal of the Applicant / Lead Member)

APPENDIX-I

Form-2

Particulars of the Applicant

1. Details of Applicant

(a) Name:

(b) Country of incorporation and MOA/PAN:

(c) Address of the corporate headquarters and its branch office(s), if any, in India:

(d) Date of incorporation and/ or commencement of business and GST certificate details:

2. Brief description of the Company including details of its main lines of business and proposed role and responsibilities in this Project:

3. Details of individual(s) who will serve as the point of contact/ communication for the State Government:

(a) Name:

(b) Designation:

(c) Company:

(d) Address:

(e) Telephone Number:

(f) E-Mail Address:

4. Details of individual(s) who will serve as the point of contact/ communication for the Authority:

(g) Name:

(h) Designation:

(i) Company:

(j) Address:

(k) Telephone Number:

(l) E-Mail Address:

5. Particulars of the Authorized Signatory of the Applicant:

(a) Name:

(b) Designation:

(c) Address:

(d) Phone Number:

6. In case of a Joint Venture/Consortium:

(a) The information above (1-4) should be provided for all the Members of the Joint Venture/Consortium.

(b) A copy of the Joint Bidding Agreement should be attached to the Proposal

(c) Information regarding the role of each Member should be provided as per table below:

S. No.	Name of Member	Role	Percentage of equity in the Joint Venture/Consortium
1.			
2.			
3.			
4.			

(d) The following information shall also be provided for each Member of the Joint Venture/ Consortium:

Name of Applicant/Member of Joint Venture or Consortium

	Criteria	Yes	No
(1)	Has the Applicant constituent of the Joint Venture/Consortium been barred by the [Central/ State] Government, or any entity controlled by it from participating in any project (BOT or otherwise)?		
(2)	If the answer to (1) is yes, does the bar subsist as on the Proposal Due Date?		

(3)	Has the Applicant/Joint Venture/Consortium paid liquidated damages of more than 5% (five per cent) of the contract value in a contract due to delay or has been penalized due to any other reason in relation to execution of a contract, in the last three years?		

7. A statement by the Applicant and each of the Members of its Joint Venture/Consortium (where applicable) or any of their Associates disclosing material non-performance or contractual non-compliance in past projects, contractual disputes and litigation/ arbitration in the recent past is given below (Attach extra sheets, if necessary)

APPENDIX-I

Form-3

Statement of Legal Capacity
(To be forwarded on the letter head of the Applicant)

Ref. Date:

To,

……

……

……

Dear Madam/Sir,

Subject: RFP for Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste

I/We hereby confirm that we, the Applicant (along with other Members in case of Joint Venture/Consortium, the constitution of which has been described in the Proposal[$]), satisfy the terms and conditions laid down in the RFP document.

I/We have agreed that ……..…….. (insert Applicant's name) will act as the Lead Member of our Joint Venture/Consortium.

I/We have agreed that …….. (insert individual's name) will act as our Authorised Representative/ will act as the Authorised Representative of the Joint Venture/Consortium on our behalf and has been duly authorized to submit our Proposal. Further, the authorised signatory is vested with requisite powers to furnish such proposal and all other documents, information or communication and authenticate the same.

Yours faithfully,

(Signature, name and designation of the authorised signatory)

For and on behalf of ……

[$] Please strike out whichever is not applicable

APPENDIX-I

Form-4A

Power of Attorney for signing of Proposal

Know all men by these presents, we, …….. (name of Company and address of the registered office) do hereby constitute, nominate, appoint and authorise Ms. / Mr. ……. daughter/wife/son and presently residing at ……**,** who is presently employed with us and holding the position of ……. as our true and lawful attorney (hereinafter referred to as the "**Authorised Representative**") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Proposal for selection as the Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste (the "**Project**"), proposed to be developed by the …….. (the "**State Government**") and the …… (the "**Authority**") including but not limited to signing and submission of all applications, proposals and other documents and writings, participating in pre-Proposal and other conferences and providing information/ responses to the State Government and the Authority, representing us in all matters before the State Government and the Authority, signing and execution of all contracts and undertakings consequent to acceptance of our Proposal and generally dealing with the State Government and the Authority in all matters in connection with or relating to or arising out of our Proposal for the said Project and/or upon award thereof to us till the entering into of the Concession Agreement with the SPV/ the State Government / the Authority and the Selected Bidder as confirming party.

AND, we do hereby agree to ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Authorised Representative pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Authorised Representative in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, …….. THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS …….. DAY OF ……., 20…….

For …….

(Signature, name, designation and address)

Witnesses:

1.

2.

Notarised

Accepted

…….

(Signature, name, designation and address of the Attorney)

Notes:

1. The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure. The Power of Attorney should be executed on a non-judicial stamp paper of Rs. 100 (hundred) and duly notarised by a notary public.

2. Wherever required, the Applicant should submit for verification the extract of the charter documents and other documents such as a resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Applicant.

3. For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, Applicants from countries that have signed the Hague Legislation Convention 1961 need not get their Power of Attorney legalised by the Indian Embassy if it carries a conforming Appostille certificate.

4. Power of Attorney executed abroad should conform to the provisions of Notaries Act, 1952 and Indian Stamp Act, 1899.

APPENDIX-I

Form-4B

Power of Attorney for Lead Member of Joint Venture/Consortium

Whereas the State Government and the Authority has invited applications from interested parties for the **Proposal for Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste**.

Whereas, ……..……..., ……..……..., ……..…….. and (collectively the "**Joint Venture/Consortium**") being Members of the Joint Venture/Consortium are interested in bidding for the Project in accordance with the terms and conditions of the Request for Proposal (RFP) and other connected documents in respect of the Project, and

Whereas, it is necessary for the Members of the Joint Venture/Consortium to designate one of them as the Lead Member with all necessary power and the authority to do for and on behalf of the Joint Venture/Consortium, all acts, deeds and things as may be necessary in connection with the Joint Venture/Consortium's Proposal for the Project and its execution.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS

We, ….……..……. Having our registered office at…….. ,

M/s, ……..……..…….. Having its registered office at…….. ,

M/s, ……..……..…….. Having its registered office at…….. ,

(herein after collectively referred to as the "**Principals**") do hereby irrevocably designate, nominate, constitute, appoint and authorize M/s. …….…….. Having our registered office at ……..……., being one of the Members of the Joint Venture/Consortium, as the Lead Member and true lawful attorney (with power to sub delegate) to conduct all business for and on behalf of the Joint Venture/Consortium and any one of us during the Selection Process and; in the event the Joint Venture/Consortium is awarded the concession/contract, during the execution of the Project and in this regard, to do on our behalf and on behalf of the Joint Venture/Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the pre-qualification of the Joint Venture/Consortium and submission of its Proposal for the Project, including but not limited to signing and submission of all applications, Proposals and other documents and writings, participate in Applicants and other conferences, respond to queries, submit information/documents, sign and execute contracts and undertakings consequent to acceptance of the Proposal of the Joint Venture/Consortium and generally to represent the Joint Venture/Consortium in all its dealings with the State Government and the Authority, and/ or any other Government Agency or any person, in all matters in connection with or relating or arising out of the Joint Venture/Consortium's Proposal for the Project and/or upon award thereof till the Concession Agreement is entered into with SPV/ the State Government / the Authority and the Selected Bidder as confirming party.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/ Joint Venture/Consortium.

IN WITNESS WHEREOF WE, …… THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS …….. DAY OF ……., 20……

For ……..……...

(Signature)

……..…….. (Name & Title)

For ……..……...

(Signature)

……..…….. (Name & Title)

For ……..……...

(Signature)

……..…….. (Name & Title)

Witnesses:

1.

2.

……..……..……

(Executants)

(To be executed by all the Members of the Joint Venture/Consortium)

Notes:

1. The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure. The Power of Attorney should be executed on a non-judicial stamp paper of Rs. 100 (hundred) and duly notarised by a notary public.

2. Wherever required, the Applicant should submit for verification the extract of the charter documents and other documents such as a resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Applicant.

3. For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, Applicants from countries that have signed the Hague Legislation Convention 1961 need not get their Power of Attorney legalised by the Indian Embassy if it carries a conforming Appostille certificate.

4. Power of Attorney executed abroad should conform to the provisions of Notaries Act, 1952 and Indian Stamp Act, 1899.

APPENDIX-I

Form-5

Financial Capacity of the Applicant

(*See Clause 2.2.2 (B)*)

Applicant Type	Member Code	Net Worth (Avg. for Past 5 Years) (in Crores)	Net worth (in Crores) (5 Years)				
			Year 1	Year 2	Year 3	Year 4	Year 5
Single entity Applicant							
Joint Venture / Consortium Member 1							
Joint Venture / Consortium Member 2							
Joint Venture / Consortium Member 3*							
TOTAL							

* More rows may be added as per requirement

Instructions:

1. The Applicant/ its constituent Joint Venture/Consortium Members shall attach copies of the balance sheets, financial statements and annual reports for 5 years preceding the Proposal Due Date. The financial statements shall:
   (a) Reflect the financial situation of the Applicant or Consortium Members and its/ their Associates where the Applicant is relying on its Associate's financials;
   (b) Be audited by a statutory auditor;
   (c) Be complete, including all notes to the financial statements; and
   (d) Correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).
2. For the purposes of this RFP "Net Worth" shall be computed as per the formulation provided in Clause 2.16.4 of this RFP.
3. The Applicant shall provide Statutory Auditor's certificate/Chartered Accountant certificate specifying the Net Worth and also specifying the methodology adopted for calculating such net worth.

APPENDIX-I

Form-6

Particulars of Key Personnel

S. No.	Designation of Key Personnel	Name	Educational Qualification	Length of Professional Experience	Present Employment		No. of Eligible Assignments[$]
					Name of Company/Firm	Employed Since	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Team Leader						
2.	Safety Expert						
3.	Financial Analyst						
4.	Environmental Expert						

[$]Refer Form 9 of Appendix-I (Experience of Key Personnel)

APPENDIX-I

Form-7

Proposed Methodology, Technology and Work Plan

The proposed methodology, technology and work plan shall be described as follows:

1. **Understanding of terms and conditions of the Concession Agreement** (not more than two pages)

   The Applicant shall clearly state its understanding of the terms and conditions of the Concession Agreement and also highlight its important aspects.

2. **Methodology and Work Plan** (not more than three pages)

   The Applicant will submit its methodology for carrying out the Project, outlining its approach toward achieving the key performance indicators laid down in the Concession Agreement. The Applicant will submit a brief write up on its proposed team and organisation of personnel explaining how different areas of expertise needed for the Project have been fully covered by its Proposal. In case the Applicant is a Joint Venture/Consortium, it should specify how the expertise of each Member is proposed to be utilised for the Project. The Applicant should specify the sequence and locations of important activities, and provide a quality assurance plan for carrying out the Project.

3. **Proposed Technology** (detailed note)

   The Applicant will submit its proposed technology for carrying out the Project, including the details of technology/combination of technologies proposed for processing of waste, sources of technologies and technology tie-up. Details regarding bio-remediation of legacy waste to be provides in accordance with sub-clause 5 of this Form-7 of Appendix –I.

4. **Other details to be included in the Technical Proposal** (detailed notes)

   (a) Equipment, vehicles/e-vehicles, storage bins, etc., requirement for primary and secondary collection and transportation of segregated waste along with plan for 100% segregated transportation of waste into organic/inorganic components.
   (b) Area requirement for processing and sanitary landfill facility
   (c) Key assumptions in development of processing facility and basis of proposed capacity.
   (d) Key assumptions in development of sanitary landfill facility and basis of designed capacity, area requirement.

(e) Processing products along with their quantity (Ton/day. etc.)

(f) Market tie-up for sale of processing products

(g) Project plan including schedule for equipment replacements and capacity additions at regular intervals.

(h) Organization and staffing/manpower details (collection, transportation, processing, & disposal)

(i) Environment management plan

(j) Assessment of risk and mitigation plan

(k) Key approvals and clearances

(l) Total investment proposed and funding / financing plan, project financial aspects – capital cost, operation and maintenance cost, revenues, etc.

(m) Project timelines

Applicants would be required to submit information on key assumptions for the Project (the "**Key Assumptions**") based on their estimates of various parameters pertaining to the Project. Key Assumptions must include (but not limited to) information on the following:

(a) Project cost estimates

(b) Details of preliminary expenses

(c) Base construction cost

(d) Contingencies

(e) Details of pre-operative expenses

(f) Operation & Maintenance cost

(g) Processing product quantities in [Ton/days or Mega Watts] and estimated revenues

5. Proposed approach, methodology, technology, work plan for bio-remediation of legacy waste and reclamation of land of the dumpsite (detailed note)

1. Previous experiences of the proposed technology/methodology/business model and issues faced therein
2. Project understanding – understanding of the project with respect to the project area and scope
3. Detailed description of the proposed technology or methodology with process flow chart for Project operations.
4. Method proposed for processing of legacy waste and utilization plan for components recovered:
   - Organic fraction
   - Combustible fraction

- Inert fraction
- Recyclables
- Hazardous waste

5. Procurement plan, manpower deployment plan and installation & commissioning plan to achieve COD (the procurement plan shall include the details of Project asset to be deployed including asset type, capacity, specifications and manufacturer. the manpower deployment plan shall include details on type of manpower (skilled/unskilled/driver), number of manpower and the source. The Applicant shall provide procurement and deployment schedule in gantt chart inclusive of replacement of Project assets during the entire Concession Period. The Applicant shall also detail out the installation & commissioning schedule in proper format.
6. Detailed Implementation Plan of the dumpsite along with a Programme Evaluation Review Technique (PERT) chart
7. Proposed solution for management of leachate and landfill gas
8. Disaster management plan
9. Detailed description of the proposed business model – SWOT analysis, industry analysis, market demand analysis, sales strategy and marketing plan, financial plan
10. Space required for processing equipment
11. Estimated time to be taken for complete remediation
12. Percentage of land reclaimable
13. Activities that can be taken up on remediated land and technical feasibility
14. Identified risks – technical, operational and environmental
15. Compliance with environmental norms, Waste Management Rules, 2016, Legacy Waste Guidelines, 2019, and other Applicable Laws

Note: All of the above details should be provided as elaborately as feasible and supported with engineering drawings (if applicable), manpower requirement, fuel, power requirement and explanation of time required for recovery and utilization of components. Based on the above work requirement, the Applicant will provide details of plant, machinery and equipment proposed to be deployed in the works and their status (new or old). The Applicant shall also provide a list of key personnel proposed to be deployed for the work with their curriculum vitae.

Note 2: The Applicant may be invited to make a presentation on approach, methodology, proposed technologies and project plan to judge their understanding of the Project.

Note 3: Marks will be deducted for writing lengthy and out of context responses.

APPENDIX-I

Form-8

Proforma of Bank Guarantee for Bid Security

[(to be executed on Rs. 100/- non judicial stamp paper)]

[Bank's Name and Address of Issuing Branch or Office]

Beneficiary: [State Department of Urban Development], having its registered office at …… AND [Name of the Authority], having its registered office at ……

Account No.:

Bank name, branch and IFSC Code :

B.G. No.

Dated: [•]

1. We have been informed that **[•]** [insert name of the Applicant] (hereinafter called the "**Applicant**") intends to submits its Proposal (hereinafter called the "**Proposal**") for Selection of Concessionaire for **Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste**, under Request for Proposal bearing RFP Reference No. **[•]** dated **[•]** (hereinafter called the "**RFP**").

2. Furthermore, we understand that, according to your conditions, the Proposal must be supported by a Bid Security.

3. At the request of the Applicant, we, **[•]** [insert name of the Bank], having our branch at ……. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Rs. *** (Rupees *** only) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Applicant is in breach of its obligation(s) under the terms and conditions of the RFP, without any demur, reservation, recourse, contest or protest and without reference to the Applicant, which may include the following :-

   (a) If the Applicant withdraws its Proposal during the validity period of the Proposal;

   (b) if a Applicant submits a non-responsive Proposal as per the RFP;

   (c) if a Applicant has a conflict of interest as specified in the RFP

   (d) If the Applicant engages in a corrupt, fraudulent, coercive, collusive or restrictive practice as specified in Section 4 of the RFP;

(e) If the Applicant upon being declared as the Selected Bidder fails to:
(i) to sign and return the duplicate copy of Letter of Award;

(ii) to sign the Concession Agreement;

(iii) furnish a Performance Security in within the period prescribed in the Concession Agreement;

(f) If the Selected Bidder, having signed the Concession Agreement, commits any breach thereof prior to furnishing the Performance Security.

(g) If the Applicant is otherwise in breach of the terms of the RFP.

4. Any such written demand made by the State Government or the Authority stating that the Applicant is in default of the due and faithful fulfillment and compliance with the terms and conditions contained in the RFP shall be final, conclusive and binding on the Bank.

5. This guarantee will expire: (a) if the Applicant is the Selected Bidder, upon receipt of the Performance Security by you, and (b) if the Applicant is not the Selected Bidder, (i) return of the Bank Guarantee by you as per the terms of the RFP, or (ii) upon expiry of 120 days from the date hereof.

6. This Guarantee will not be discharged due to the change in the constitution of the Bank or the Applicant.

7. This Guarantee will neither be cancelled nor revoked by the Bank without the written authorization of the State Government and the Authority.

8. Consequently, any demand for payment under this Guarantee must be received by us at the office on or before that date.

Signed and Delivered by _____ Bank

By the hand of Mr./Ms. [•], its [•] and authorized official.

(Signature of the Authorized Signatory) (Official Seal)

APPENDIX-I

Form-9

Format for Joint Bidding Agreement
(*See Clause 2.16.8.(b)(iv)*)

(To be executed on Stamp paper of appropriate value)

THIS JOINT BIDDING AGREEMENT is entered into on this the …..…… day of.....20…

AMONGST

1. …… Limited, a company/partnership/LLP/proprietorship incorporated/registered under [***] and having its registered office at ….…… (hereinafter referred to as the "**First Part**" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2. …… Limited, a company/partnership/LLP/proprietorship incorporated/registered under [***] and having its registered office at …….. (hereinafter referred to as the "**Second Part**" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

3. …… Limited, a company/partnership/LLP/proprietorship incorporated/registered under [***] and having its registered office at ……..… (hereinafter referred to as the "**Third Part**" which expression shall, unless repugnant to the context include its successors and permitted assigns)

The above-mentioned parties of the FIRST, SECOND and THIRD PART are collectively referred to as the "**Parties**" and each is individually referred to as a "**Party**".

WHEREAS,

(A) **[Name of the State Department of Urban Development],** having its principal office at ……..…

including its administrators, successors and assigns) and the **[Name of the Authority],** having its principal office at …… including its administrators, successors and assigns) have invited Proposals (the "**Proposals"**) by its Request for Proposal No. ……..…… dated …… (the **"RFP"**) for **Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste** (the **"Project"**) through public private partnership**.**

(B) The Parties are interested in jointly bidding for the Project as members of a Joint Venture/Consortium and in accordance with the terms and conditions of the RFP document and other bid documents in respect of the Project, and

(C) It is a necessary condition under the RFP document that the members of the Joint Venture/Consortium shall enter into a Joint Bidding Agreement and furnish a copy thereof with the Proposal.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and Interpretations

In this Agreement, the capitalized terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2. Joint Venture/Consortium

The Parties do hereby irrevocably constitute a joint venture/consortium (the "**Joint Venture/Consortium**") for the purposes of jointly participating in the Selection Process for the Project.

The Parties hereby undertake to participate in the Selection Process only through this Joint Venture/Consortium and not individually and/ or through any other Joint Venture/Consortium constituted for this Project, either directly or indirectly or through any of their Associates.

3. Covenants

The Parties hereby undertake that in the event the Joint Venture/Consortium is declared the Selected Bidder and awarded the Project, it shall incorporate a special purpose vehicle (the "**SPV**") under the Indian Companies Act, 2013 for entering into a Concession Agreement with the State Government and the

Authority for performing all its obligations as the Concessionaire in terms of the Concession Agreement for the Project.

4. Role of the Parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

(a) Party of the First Part shall be the Lead Member of the Joint Venture/Consortium (the shareholding of the Lead Member should be [at least 51% or majority shareholder]) and shall have the Power of Attorney from all Parties for conducting all business for and on behalf of the Joint Venture/Consortium during the duration of the Project;

(b) Party of the Second Part shall be responsible for*[insert role]*

(c) Party of the Third Part shall be responsible for*[insert role]*

5. Joint and Several Liability

The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to the Project and in accordance with the terms of the RFP and the Concession Agreement, till the expiry of the Concession Agreement.

6. Shareholding in the SPV

The Parties agree that the proportion of shareholding among the Parties in the SPV shall be as follows:

First Party:

Second Party:

Third Party:

The Parties shall ensure that the Parties shall: (i) collectively hold at least 51% (fifty one percent) shareholding in the paid up and subscribed equity of the concessionaire/SPV until expiry of 3 (three) years from COD; and (ii) each of the Parties whose Technical Capacity and Financial Capacity was taken into consideration shall each hold 26% (twenty six percent) shareholding in the paid up and subscribed equity of the concessionaire/SPV until expiry of 3 years from COD.

The Parties undertake that they shall comply with all equity lock-in requirements set forth in the Concession Agreement.

7. Representation of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

(a) Such Party is duly organized, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;

(b) The execution, delivery and performance by such Party of this Agreement has been authorized by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney in favor of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Joint Venture/Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:

(i) require any consent or approval not already obtained;

(ii) violate any Applicable Law presently in effect and having applicability to it;

(iii) violate the memorandum and articles of association, by-laws or other applicable organizational documents thereof;

(iv) violate any clearance, permit, concession, grant, license or other governmental authorization, approval, judgement, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or

(v) create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;

(c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its

terms against it; and

(d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Associates is a party that presently affects, or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfillment of its obligations under this Agreement.

8. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until the completion of the Project is achieved under and in accordance with the Concession Agreement. However, in case the Joint Venture/Consortium is either not pre-qualified for the Project or does not get selected for award of the Project, the Agreement will stand terminated in case the Applicant is not pre-qualified or upon return of the Bid Security by the State Government and the Authority to the Applicant, as the case may be.

9. Miscellaneous

This Joint Bidding Agreement shall be governed by laws of India. The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the State Government and the Authority.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED For and on behalf of **LEAD MEMBER** by: (Signature) (Name) (Designation) (Address)	SIGNED, SEALED AND DELIVERED For and on behalf of **SECOND PART** (Signature) (Name) (Designation) (Address)

SIGNED, SEALED AND DELIVERED For and on behalf of **THIRD PART** (Signature) (Name) (Designation) (Address)	

Notes:

1. The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

2. Each Joint Bidding Agreement should attach a copy of the extract of the charter documents and documents such as resolution / Power of Attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Joint Venture/Consortium Member.

3. For a Joint Bidding Agreement executed and issued overseas, the document shall be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney has been executed.

APPENDIX-I

Form-10

Abstract of Eligible Assignments of the Applicant
(See Clause 3.1.4)

S. No.	Name of Project	Name of Client	Date of Commencement	Date of Commissioning	Project Capacity	Location of the Project	Project Cost (in Rs. crore/ US$ million)	Whether credit is being taken for the eligible Experience of an Associate (Yes/ No)
(1)[£]	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1								
2								

[£] The names and chronology of Eligible Projects included here should conform to the project-wise details submitted in Form-12 of Appendix-I.

Note 1: Exchange rate for conversion of US $ shall be as per Clause 1.7.1.

Note 2: Experience for any activity relating to an Eligible Project shall not be claimed by two or more Members of the Joint Venture/Consortium. In other words, no double counting by a Joint Venture/Consortium in respect of the same experience shall be permitted in any manner whatsoever.

APPENDIX-I

Form-11

Abstract of Eligible Assignments of Key Personnel[$]
(See Clause 3.1.4)

Name of Key Personnel: Designation:

S. No.	Name of Project[$]	Name of Client	Date of Commencement of work by the Key Personnel	Date of Completion of work by the Key Personnel	Man days spent	Project Capacity	Location of the Project	Project Cost (in Rs. crore/ US$ million)	Name of Company/Firm for which the Key Personnel worked	Designation of the Key Personnel on the Project
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1										
2										
3										
4										
5										

[$] Use separate Form for each Key Personnel.

[$$] The names and chronology of projects included here should conform to the project-wise details submitted in Form-13 of Appendix-I.

Note: The Applicant may attach separate sheets to provide brief particulars of other relevant experience of the Key Personnel.

APPENDIX-I

Form-12

Eligible Assignments of the Applicant
(See Clause 3.1.4)

1.	Name of the Project	
2.	Nature of the Project	
3.	Name of the Client	
4.	Address, Telephone no. and E-mail address of the Client	
5.	Date of Commencement	
6.	Date of Commissioning	
7.	Project Capacity	
8.	Location	
9.	Project Cost	
10.	Whether credit is being taken for the eligible Experience of an Associate (Yes/ No)	
11.	Brief description of the Project:	
It is certified that the aforesaid information is true and correct to the best of my knowledge and belief. (Signature and name of Applicant)		

Notes:

1. Use separate sheet for each Eligible Project.
2. Exchange rate for conversion of US $ shall be as per Clause 1.7.1.

APPENDIX-I

Form-13

Eligible Assignments of Key Personnel
(See Clause 3.1.4)

1.	Name of the Project	
2.	Nature of the Project	
3.	Name of the Client	
4.	Address, Telephone no. and E-mail address of the Client	
5.	Date of Commencement of work of the Key Personnel	
6.	Date of Completion of work of the Key Personnel	
7.	Man days spent	
8.	Project Capacity	
9.	Location	
10.	Project Cost	
11.	Name of Company/Firm for which the Key Personnel worked	
12.	Designation of the Key Personnel on the Project	
13.	Brief description of the Project:	
It is certified that the aforesaid information is true and correct to the best of my knowledge and belief. (Signature and name of Key Personnel)		

Notes:

1. Use separate sheet for each Eligible Project.
2. The Applicant may attach separate sheets to provide brief particulars of other relevant experience of the Key Personnel.
3. Exchange rate for conversion of US $ shall be as per Clause 1.7.1.

APPENDIX-I

Form-14

Curriculum Vitae (CV) of Key Personnel and Professional Personnel
(See Clause 2.14.6)

1. Proposed Position:

2. Name of Personnel:

3. Date of Birth:

4. Nationality:

5. Educational Qualifications:

6. Employment Record: (Starting with present position, list in reverse order every employment held)

7. List of projects on which the Personnel has worked

Name of Project	**Description of Responsibilities**

8. Details of the current project and the time duration for which services are required for the current project.

Certification:

1. I am willing to work on the Project and I will be available for entire duration of the Project as required.
2. I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications and my experience.

(Signature and name of the Key Personnel)

Place……

(Signature and name of the authorised signatory of the Applicant)

Notes:

1. Use separate form for each Key Personnel and Professional Personnel

2. The names and chronology of projects included here should conform to the project-wise details submitted in Form-11 and Form-13 of Appendix-I.

3. Each page of the CV shall be signed in ink or digitally signed and dated by both the Personnel concerned and by the Authorised Representative of the Applicant along with the seal of the Applicant. Photocopies will not be considered for evaluation.

APPENDIX-I

Form-15

Deployment of Personnel

S. No.	Designation	Name	Man-Days (MD)		Week Numbers													
			At Project site	Away from Project site (specify)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		
Total Man days																		

APPENDIX-I

Form–16

Survey and Field Investigations

Item of Work/ Activity	**To be carried out/ prepared by**		**Week**													
	Name	Designation	1	2	3	4	5	6	7	8	9	10	11	12	13	14

APPENDIX-I

Form-17

Format of Self-Attested Certificate regarding Associate

Self-Attested Certificate regarding Associate

Based on the authenticated record of [*Insert name of the Company*], this is to certify that [more than 50% (fifty per cent) of the subscribed and paid up voting equity of ……..…….. (name of the Applicant/Member/ Associate) is held, directly or indirectly, by ….……..……..……... (name of Applicant/Member/Associate)

By virtue of the aforesaid, the latter exercises control over the former, who is an Associate.]

[…….…….. (name of Applicant/Member/Associate) has the power, directly or indirectly, to direct or influence the management and policies of …….…….……. (Applicant/Member) by operation of law, contract or otherwise]. By virtue of the aforesaid, the former exercises control over the latter, who is an Associate.]

A brief description of the said equity held, directly or indirectly, is given below:

{Describe the share-holding of the Applicant/Member and the Associate. In the event the Associate is under common Control with the Associate/Consortium Member or the Control is exercised by operation of law, the relationship may be suitably described and similarly certified herein.}

Name of the Applicant/Member: Seal of the Applicant/Member:

APPENDIX-I

Form-18

Format of Information on Litigation

(To be provided by the Applicant/each Member)

S. No.	Name	Forum and Counterparty	Brief Description of the matter	Estimated financial liability	Current Status of Litigation	Orders passed Against the Applicant/Member

APPENDIX - II

FINANCIAL PROPOSAL

APPENDIX-II

Form-1

Covering Letter
(On Applicant's letter head)

(Date and Reference)

To,

…….

…….

…….

Dear Sir,

Subject: Appointment of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste

I/We, …… (Applicant's name) herewith enclose the Financial Proposal for selection of my/our Company/Joint Venture/Consortium as Concessionaire for above.

I/We agree that this offer shall remain valid for a period of 90 (ninety) days from the Proposal Due Date or such further period as may be mutually agreed upon.

Yours faithfully,

(Signature, name and designation of the authorised signatory)

Note: The Financial Proposal is to be submitted strictly as per forms given in the RFP.

APPENDIX-II

Form-2

Format for Bid Price Sheet[7]
(See Clause 2.1.3)

(Only for Reference: Quotation to be filled and uploaded online only)

Date:

To,

Re: Request for proposal for Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste

Dear Madam/Sir,

We are pleased to submit our Financial Proposal for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste under DBFOT (Design, Build, Finance, Operate and Transfer) structure.

S. No.	Description	Quotation (in figure and words)
1.	**Capital Cost of the Project (Net Present Value) (inclusive of all taxes)**	INR
2.	**O&M Charges** per ton of collection, transportation and processing of municipal solid waste (Net Present Value) (inclusive of all taxes)	INR
3.	**Guaranteed Energy Consumption during O&M Period**	Units
4.	**Land Requirement for the Project**	Units

In witness thereof, I/we submit this Financial Proposal under and in accordance with the terms of the RFP document no……...

[7] Formula for calculation of the Bid Price to be determined by the State Government and the Authority

Yours faithfully

Authorized signatory

(Name & seal of the Applicant)

Date:

Place:

Applicants to note the following while filling-up the Financial Proposal:

- The Applicants shall essentially submit the Bid Price online as provided above for construction period and operations period separately during the concession period.
- The quoted amount must include two places of decimals.

APPENDIX-II

Form-3

Letter of Declaration

(The Letter of Declaration is to be submitted by EACH Member in case of Joint Venture/Consortium)

Date: _____

Place: _____

To,

……..

……..

Dear Sir/Madam,

Sub: "Selection of Concessionaire for Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste"

This has reference to the Proposal being submitted by_____(mention the name of the Applicant/ Lead Member of the Joint Venture/Consortium), as single entity/ Lead Member of the Joint Venture/Consortium comprising _____ (mention name(s) of the Members) in respect of Selection of Concessionaire for Development and Operation of Integrated Solid Waste Management System and Reclamation of Land through Bio-Remediation of Legacy Waste in response to the Request for Proposal (the "**RFP**") issued by the State Government and the Authority dated [•].

We hereby confirm the following:

1. We _____ (name of the Applicant/ Member furnishing the Letter of Declaration), have examined in detail and have understood and satisfied ourselves regarding the contents including in respect of the following:

   - For the purpose of all subsequent communications with the State Government and the Authority the Applicant shall be represented by _____ (mention name of the authorized representative of the Applicant/ Lead Member);
   - *{The Joint Bidding Agreement has been signed between/among (names of the*

Members), as members of the Joint Venture/Consortium; and the Proposal is being submitted on behalf of the Joint Venture/Consortium (name of the Lead Member).}[8]

2. We have satisfied ourselves regarding our role as (here give a brief description of the role) in the Project as specified in the Proposal. If the Applicant/Joint Venture/Consortium is awarded the Project, we shall perform our role as outlined in the Proposal to the best of our abilities. We have examined the Proposal in detail and the commitments made in the same. We agree and undertake to abide by the Proposal and the commitments made therein.
3. We authorize _____ (name of the authorized representative of the Applicant/Lead Member), as the Lead Member and authorize the same to perform all tasks including, but not limited to providing information, responding to enquiries, entering into contractual commitments etc. on behalf of the Joint Venture/Consortium, in respect of this Project.
4. *{We understand that, no change in the membership in the Joint Venture/Consortium, in the role and form of responsibility of any Member shall be permitted after submission of the Proposal. If any change in the membership of the Joint Venture/Consortium is desired, it would need to be communicated to the State Government and the Authority in writing for its approval. The State Government and the Authority would reserve the right to reject such requests for a change of Joint Venture/Consortium structure, if in its opinion; it would adversely affect the same.}*[9]

For and on behalf of:

[Signature]

(Authorised Representative and Signatory)

Name of the Person:

Designation:

[8] Applicable only in case of a Joint Venture/ Consortium
[9] Applicable only in case of a Joint Venture/ Consortium

APPENDIX-II

Form-4

Declaration regarding customs/excise duty exemption for materials to be purchased for use in developing the Project

(Applicant's Name and Address)

To:

Dear Sir:

Ref: ---------- [Name of the Project] - Certificate for Import/Procurement of Goods and materials/Construction Equipment.

1. We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our Proposal and in case of failure to receive such waivers for reasons whatsoever, the Owner will not compensate us.
2. We are furnishing below the information required by the State Government and the Authority for issue of the necessary certificates in terms of the Government of India Central Excise Notification No. *** along with all subsequent amendments including the amendment dated *** and Customs Notification No. ***.
3. The goods, equipment and materials for which certificates are required are as under:

Items	**Make/ Brand Name/Class**	**Capacity [where applicable]**	**Quantity**	**Value**	**State whether it will be procured locally or imported [if so from which country]**	**Remarks regarding justification for the quantity and their usage in development of the Project**
Goods						
[a]						
[b]						

4. We agree that no modification to the above list is permitted after Proposals are opened.

5. We agree that the certificate will be issued only to the extent considered reasonable by the State Government and the Authority for the work, based on the Proposal submitted by us, the proposed methodology, technology and work plan furnished along with the Proposal.

6. We confirm that the above goods will be exclusively used for the construction of the above work. We are aware that exemption will be issued to only goods/material/equipment which form part of the work on permanent basis but not for the goods/material/equipment which are used by the us for execution of project and after completion of the project, the goods remain with the us being owner of such goods for further deployment in other projects.

Date: _____ (Signature) _____

Place: _____ (Printed Name) _____

(Designation) _____

(Common Seal) _____

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CHECKLIST FOR SUBMISSION AND SCRUTINY OF DPR
(MUNICIPAL SOLID WASTE MANAGEMENT)

(to be filled in and certified by the highest city –level Officials, both technical and administrative, such as Chief Engineer/City Engineer/ Municipal Commissioner)

Instructions:

1. The DPR shall be formulated as per the Manual on Municipal Solid Waste Management published by the Ministry and as per the Department procedures.
2. DPR shall be technically sanctioned by the Competent Authority the State Govt./ULB before forwarding it to the Ministry.
3. Each and every page has to be signed at the bottom by the officials.
4. Each field has to be filled in appropriately as 'yes', 'no', 'not required', 'not done', 'not used' etc. No field has to be left blank. Give explanatory comments wherever 'no' is indicated.
5. Non- definite entries such as 'will be done later', 'will be furnished later' etc. will not be accepted.

CERTIFICATE:

This is to certify that the undersigned have read the contents of the check list fully and have responsibly made the entries true to the best of knowledge and understanding. In case the information furnished in the check list enclosed is found to be incorrect for any reason, whatsoever, the undersigned may be held liable for disciplinary action as per applicable Government rules.

Certified that

(i) The designs and drawings have been approved by the Competent Authority.
(ii) The detailed estimates and cost estimates are as per the current schedule of rate and/or rate analysis and latest pro-forma invoices (current market rates).
(iii) The DPR has been technically sanctioned by the Competent Authority in the State Govt./ULB.

Signed:	Signed:
Name:	Name:
Designation:	Designation:

CHECKLIST FOR SUBMISSION AND SCRUTINY OF DPR
(MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM)

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
3	**General Components**	
3.1	Name of the town/city/District/State for which scheme has been formulated with name of the scheme (a) Name of the City/Town: (b) Name of the District: (c) Name of the State : (d) Name of the Scheme:	
3.2	Date of DPR appraised by State Level Nodal Agency (SLNA) and whether a copy of appraisal report (duly authenticated by the competent authority) has been forwarded with DPR. (a) Date of appraisal: (b) Name of the appraisal agency: (c) Original Estimated cost: (d) Appraised cost:	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	(e) Major comments/observations made by appraisal agency.	
3.3	Whether Administrative approval of State Government is obtained to implement the scheme immediately after approval of GOI and enclosed in DPR?	
3.4	Whether Project formulation justification (need for the project) has been furnished in DPR	
3.5	Whether linkages of this scheme have been established with ANY other municipal solid waste management (MSW) schemes being funded by the Central/State Govt./other agencies, if any. Please specify.	
3.6	Whether the compatibility between existing MSW system (if applicable) and proposed MSW system has been annexed in DPR	
3.7	Whether the map showing administrative and political jurisdiction has been given in DPR	
3.8	Whether the land use pattern of the city / town - Master Plan has been given in DPR	
3.9	Whether the DPR was authenticated by Competent Authority of State Govt./ ULB.	
3.10	(A) Whether the Certificate of Land Acquisition / possession for setting up MSW Treatment Plant (MSWTP), landfill and MSW transfer stations by ULBs & Right of Way (ROW)/spots for setting up community MSW storage containers has been attached with DPR.	
	(B) If not, whether the action plan for acquiring the required land has been furnished in the DPR.	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
3.11	(A) Whether the proposals for setting up MSW treatment plants and landfill received clearance / consent from the State Pollution Control Board, Airport / Airfield Authorities, Flood Control/Ground water Management Authorities etc. (B) Whether clearance for environmental impact assessment obtained for the proposed sanitary landfill site. If not, whether a status note and the date by which the clearance is expected to be received has been enclosed	
3.12	Whether the provision for separate electric feeder line to MSW treatment plant, landfill and transfer stations from HT line and an agreement between Electricity Deptt. and Urban Local Bodies (ULBs) has been furnished in the DPR	
3.13	Whether the commitment from Electricity Department for un-interrupted power supply is obtained	
3.14	Whether the Topographic map of the city/town/project area to scale –has been given in DPR / Zone wise Maps to scale showing all Streets	
3.15	Whether geo-technical (soil) investigation reports and bore hole logs for the site of MSW treatment plant and landfill has been furnished with DPR	
3.16	Whether Executive Summary of the project is enclosed in the DPR.	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
4	**Engineering Components**	
4.1	a) Whether population pattern identification of urban / urban agglomeration and population projection has been adopted as per CPHEEO Manual and given in DPR	
	i. Area of the city/town ..... Sq Km.	
	ii. Extent of Project Area ..... Sq Km	
	iii. No. of households (present) ..... nos	
	iv. Population projection	
	v. 2001 Census ..... lakhs	
	vi. 2011 Census ..... lakhs	
	vii. Population Growth rate .....% per year	
	viii. Initial Stage (year of commissioning) .....Lakhs	
	ix. Floating population, if any -----No. & %	
	x. Design population including floating population ..... No.	
	b) Whether basis for adopting tourist/floating population has been described in the report and related documents annexed	
	c) Whether initial year has been taken as the likely year of completion of the project	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
4.2	Whether the Garbage survey for waste generation has been conducted or not. (i) per capita waste generation ----gm/c/day (ii) Waste generation (MT/day) Present --- MT/day Initial --- MT/day Design Qty. (after 5 years) ----MT/day	
4.3	Whether the characteristics of municipal solid waste have been analysed using a recent composite sample and certificate to that effect from a laboratory accredited by State Pollution Control Board/ MOEF / State Govt. furnished in DPR.if yes, please specify the name of Lab. Detailed component wise break up of physical and chemical analysis need to be appended. i. Biodegradable ----MT/day, (.....%) ii. Non-biodegradable ----MT/day (.....%) iii. Recyclables ----MT/day (.....%) iv. Others (please specify) .....MT/Day (.....%)	
4.4	a) Whether the quantum of earth required for covering the layers of rejects at the sanitary landfill site has been calculated and its source/ availability as also the quality has been ascertained and made a part of the DPR	

S. No.	Description		Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	b) Whether a detailed note on performance of existing solid waste management system has been furnished in the DPR		
	i. Present waste generation	.....MT/day	
	ii. Per capita waste generation (present)	.....gm/ cap/day	
	iii. % collection and transportation	.....%	
	iv. % of segregation of waste	.....%	
	v. % road sweeping efficiency	.....%	
	vi. % of door to door collection	.....%	
	vii. Existing capacity of compost plant (please specify method)	--------MT/day	
	viii. Qty of waste going to landfill	----MT/day	
	ix. Status of landfill	-Sanitary landfill/ open dumping	
	x. Sanitary workers involved for door to door collection	Govt. ..... nos. Private .....nos. Total .....nos.	
	xi. Sanitary workers involved for road sweeping	Govt. .....nos. Private ..... nos.	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	xii. Total no. of vehicles for transportation of waste Total .....nos. Govt. .....nos. Private ..... nos. Total ..... nos. c) Whether the rationale for location of the transfer station and operating schedule of primary and secondary collection vehicles for synchronization has been calculated and attached with the DPR d) Whether the number of trips for each of the primary and secondary collection vehicles along with timing has been calculated and given in the DPR for calculating the number of vehicles required e) Whether the existing vehicles have been considered while calculating the additional vehicles required and whether such calculations form a part of the DPR. f) Whether the system of segregation at source has been considered and if yes, the design of vehicles for carrying the organic and recyclable waste separately has been incorporated and explained in the DPR.	
4.5	Details of ongoing project (Estimated cost) Rs……. Lakh i. Year of sanction	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	ii. Funding agency & funding pattern …… iii. Population coverage …….. iv. Infrastructure for collection, transportation has been envisaged or not …… MT/day v. Capacity of compost plant ……MT/day vi. Capacity of sanitary landfill (please specify design period and qty. of waste disposed/day) …… MT/Day & Year	
4.6	Please furnish the proposed major components and component-wise cost (Rs. In lakh)	
4.7	a) Whether all components of MSW management system such as door to door collection, primary transportation, community/street side storages, secondary transport, transfer stations, bulk transport, waste receiving pad, segregation/recycling facilities, MSW treatment plant and landfill have been designed as per the CPHEEO Manual and detailed drawings have been provided in the DPR. i. Design period -----year ii. Total design quantity of waste -----MT/day iii. Bio-degradable waste and its percentage of total waste -----MT/day….% iv. Recyclables and its percentage -----MT/day …% v. Construction & demolition waste -----MT/day vi. Inerts and rejects and its percentage -----MT/day…%	

S. No.	Description		Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	vii. No. of households proposed for door to door collection	------Nos.	
	viii. No. of bins proposed for door to door collection	------Nos.	
	b) Details of primary collection facilities proposed		
	i. No. of bins proposed for primary collection	….nos.	
	ii. Streets/tourist spot etc.	….nos.	
	iii. Wheel-barrow (capacity in cum.)	…. nos.	
	iv. Tricycles (capacity in cum.)	…..nos.	
	v. Auto rikshaws/tipper (capacity in cum.)	…..nos.	
	c) Details of Secondary collection and transportation		
	i. Transfer stations	-----No.	
	ii. Transportation vehicles (Refuse collectors, compacters, dumper placers)	-----No.	
	iii. Standy provision for vehicles	-----%	
	iv. Machinery proposed for mechanical sweeping of roads	-----No.	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	d) Details of the capacity of various treatment and disposal facilities - Compost plant -----MT/day - Sanaitary land (5 years) -----MT/day - RDF plant -----MT/day - Other technologies -----MT/day - Brick manufacturing -----MT/day - Reusable material - Total e) Design of Leachate collection system furnished in the DPR Yes/No f) Whether the treated leachate effluent shall conform to the standards/effluent discharge guidelines of the Pollution Control Board Yes/No g) Capacity of Leachate treatment facility ---MLD h) Technology proposed for leachate treatment	
4.8	Hazardous waste generated ------MT/day Any facility for hazardous waste treatment is available or not	
4.9	Whether Biomedical waste is separately collected and treated as per BMW Rules	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
4.10	Whether the calculation for the requirement of number of primary and secondary transport vehicles has been shown along with route map to the scale and quantum of waste to be collected from each route in the DPR	
4.11	Whether the process Flow Diagram for entire MSW management system involving all components has been furnished in DPR	
4.12	Whether drawings to scale of the components such as landfill, transfer station, weigh-bridges, building, toilets etc., have been furnished in DPR	
4.13	Whether geometry of the land available for locating MSW treatment plant / landfill / transfer stations has been certified and furnished.	
4.14	Whether the MSW treatment process has been adopted using different proven technologies duly considering the temperature/climate existing in the city/town	
4.15	Whether the site of the proposed MSW treatment plant / landfill / transfer facilities has been located as the Master Plan of the town	
4.16	Whether the provision of the land for MSW treatment plant / landfill / transfer facilities has been made as per 30 years requirement and future expansion in the DPR a) Total requirement of land (Pl also specify the design period) ----Ha Landfill ----Ha Compost Plant ----Ha	

S. No.	Description		Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	Transfer Station	----Ha	
	RDF Plant	----Ha	
	Total	----Ha	
	b) Land possession with Implementing Agency	----Ha	
	c) Whether Govt. land is yet to be transferred to the Implementing Agency and specifying time required to transfer.	-- Ha, ----months	
	d) Whether Private Land under acquisition and time required for acquisition	-- Ha, ----months	
	e) Status of action initiated for transfer of Govt. land and acquisition of Private land (please specify)		
4.17	Whether modular approach has been adopted to facilitate "addition" units to MSW treatment plants/landfills at a future date, whenever required		
4.18	a) Whether Bill of Qualities (BOQ) and cost estimates of individual component of MSW management system prepared as per latest SOR and copy of latest Schedule of Rates (SOR) and Pro-forma invoices have been annexed with DPR.		
	Prevailing SOR	---Year	
	Market price	---Year	
	b) Whether the authenticated document for various equipment/machinery is enclosed (invoice)		

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	c) Whether provision has been made for IEC expenditure required for commissioning the new SWM system. If so, details thereof.	
4.19	Whether detailed drawing, estimation & detailed BOQ for ancillary works such as boundary wall / fencing, approach & internal road, electrification, buildings, water supply & drainage, site development / landscaping etc. has been provided in the DPR	
4.20	Whether provision for DG set has been made in the DPR to take care of interruptions in power supply, if any	
4.21	In case provision for DG set has been given in the DPR, whether the calculations to arrive at the capacity of the same has been mentioned in the technical statement	
4.22	Whether detailed PERT/CPM network showing implementation schedule has been furnished in DPR	
4.23	Whether Internal rate of return (IRR) / Economic rate of return (ERR) has been furnished in DPR	
4.24	Whether traffic diversion/ control arrangements for public and workers' safety, arising out of construction phase of MSW management works have been furnished in the DPR	
4.25	Whether Institutional and financial status of Project Executing Agency (PEA) has been reported in DPR	
4.26	Whether mechanism for marketing of compost/RDF has been tied Up with any agency Name of the agency with whom the marketing arrangement is tied up for compost and RDF ---	

<table>
<tr><td rowspan="2">S. No.</td><td rowspan="2">Description</td><td>Write ‘Yes’ or ‘No’ etc in the column below</td></tr>
<tr><td>If Yes, give Page No./DPR volume reference. If No, reasons thereof</td></tr>
<tr><td>4.27</td><td>Whether Operation & Maintenance cost and revenue generation details (O &M Framework – existing & proposed) has been furnished in DPR

(a) Existing MSW management tariff / cess / charges (in Rs.)
Residential –
Commercial –
Institutions –
Industries --
(b) Proposed MSW management tariff/ cess/ charges (in Rs.)
Residential –
Commercial –
Institutions –
Industries --</td><td></td></tr>
<tr><td rowspan="3"></td><td>(c) Annual SWM Cess (as a component of property tax) (in Rs. Lakhs)</td><td></td></tr>
<tr><td>(i) Existing (last 5 years</td><td><table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table></td></tr>
<tr><td>(ii) Proposed</td><td></td></tr>
</table>

<table>
<tr><td>S. No.</td><td>Description</td><td>Write ‘Yes’ or ‘No’ etc in the column below
If Yes, give Page No./DPR volume reference. If No, reasons thereof</td></tr>
<tr><td></td><td>Annual Revenue (in Rs. Lakhs)
(i) Existing (last 5 years)
(ii) Proposed
(d) Whether the proposed tariff charges has different rates for different categories such as residential, commercial, establishments, hotels, restaurants, vegetable markets etc. if yes, whether these have been arrived at after adequate public consultation and if yes, whether summary of such consultation has been annexed to the DPR</td><td><table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table></td></tr>
<tr><td>4.28</td><td>Whether Service Level Benchmarking has been furnished in DPR. Please furnish SLBs.
<table>
<tr><th>Sl. No.</th><th>Indicators</th><th>Before implementation of the proposed project</th><th>After implementation of the proposed project</th><th>Benchmark</th></tr>
<tr><td>1</td><td>Household Level Coverage</td><td></td><td></td><td>100%</td></tr>
<tr><td>2</td><td>Efficiency in Collection of Solid Waste</td><td></td><td></td><td>100%</td></tr>
<tr><td>3</td><td>Extent of Segregation of MSW</td><td></td><td></td><td>100%</td></tr>
<tr><td>4</td><td>Extent of MSW Recovered</td><td></td><td></td><td>80%</td></tr>
<tr><td>5</td><td>Extent of Scientific Disposal of MSW</td><td></td><td></td><td>100%</td></tr>
<tr><td>6</td><td>Extent of Cost Recovery</td><td></td><td></td><td>100%</td></tr>
</table></td><td></td></tr>
</table>

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
	7 Efficiency in Collection of SWM Charges — 90% 8 Efficiency in Redressal of Customer Complaints — 80%	
4.29	Comprehensive report/ Action plan on National Mission on Sustainable Habitat (NMSH) for solid waste management as evolved by Ministry need to be included in DPR (Please refer Ministry's web site www.urbanindia.nic.in for the NMSH parameters)	
4.30	Whether Environmental and social problems (if applicable) has been furnished in DPR	
4.31	Whether provision has been made @ 0.5% of the project cost in the DPR for capacity building of ULBs for further O&M of the scheme after taking over the scheme from implementing agency. Please furnish the action plan for conducting capacity building programme. The action plan must specify specific actions such as the number of officials to be deployed in the project post commissioning, their designations, qualifications and training proposed to be given.	
4.32	a) Whether any PPP component involved in the DPR. Please specify the PPP components and funding pattern by Govt. and Private Party. b) Whether the options of method of operation of SWM collection i.e. departmentally or PPP mode has been considered and reasons for selection mentioned in the DPR. If PPP mode, whether the financial viability of the PPP has been calculated and attached with the DPR c) Whether key points to safeguard the interest of the department and the provision of regulation has been provided in case the PPP mode has been selected.	

S. No.	Description	Write 'Yes' or 'No' etc in the column below **If Yes, give** Page No./DPR volume reference. If **No**, reasons thereof
4.33	i. Whether there is any association with the waste pickers organisations ii. No. of waste pickers working in the town ..... Nos. iii. Any plan to engage them in the door to door collection activities iv. No. of waste pickers proposed to be involved in the door to door collection ..... Nos.	
4.34	Whether Rehabilitation and Resettlement plan (if applicable) has been given in DPR	
4.35	Whether all the hard copies of the DPR furnished along with soft copies	
4.36	Period of completion of the project	

Signed:
Name:
Designation

Signed:
Name:
Designation

This part to be filled-in by the Ministry		
Sl. No	Description	Remarks
1	Details of project area (State/District/City/Town)	
2	Whether the SLNA/SLSC recommendation is attached with DPR	
3	Project cost recommended by SLNA/SLSC	
4	Period of project implementation	
5	Date of receipt of first DPR	
6	Date of final acceptance of DPR	
7	Date of checklist confirmation	
8	Date of first information sent to the State Govt. on scrutiny of check list	
9	Date of receipt of DPR after reformulation (revision) if applicable	
10	Date of DPR sent to the Appraisal Agency (CPHEEO)	
11	Date of Comments / appraisal report of appraisal agency	
12	Date of comments conveyed by the Admn. Division to the State Govts. & ULBs for revision of DPR, if any	
13	Date of Receipt of Revised DPR for appraisal	

(**Signature of Verifying Officer**)

NOTE: The DPR should be forwarded to the Ministry along with the complete checklist duly filled in without which DPR shall not be processed and shall be returned to the State Government.

Ministry of Housing and Urban Affairs

Check List for Scrutiny of Preliminary Project Report (PPR)or Pre-Feasibility Report (PFR) forSolid Waste ManagementProjects seeking External Assistance.

<table>
<tr><td>1.</td><td>Name of the Project:</td></tr>
<tr><td>2.</td><td>Name of the ULB, District, State/UT:</td></tr>
<tr><td>3.</td><td>No. of wards of the ULB:</td></tr>
<tr><td>4.</td><td>No. of households in the ULB a per Census (latest):</td></tr>
<tr><td>5.</td><td>Need for the project :</td></tr>
<tr><td>6.</td><td>Objectives of the Project:</td></tr>
<tr><td>7.</td><td>Scope of the project:</td></tr>
<tr><td>8.</td><td>Outcomes of the project:
a) Increase in household coverage of waste collection from……% to ……% (Door-to-door)
b) Increase in source segregation from…….% to …….%
c) Increase in recovery of recyclables from……..% to……..%
d) Increase in processing from…….% to……%
e) Decrease in quantity of waste to be landfilled ……% to……%</td></tr>
<tr><td>9.</td><td>Implementing Agency:</td></tr>
<tr><td>10.</td><td>Ownership of the project</td></tr>
<tr><td>11.</td><td>Present Scenario of Solid Waste Management including collection to disposal and existing infrastructure</td></tr>
<tr><td>12.</td><td>Waste Quantification with the waste streams (TPD) of the current year and design year
<table>
<tr><td>Sl No.</td><td>Population in</td><td>Initial year (Base year)</td><td>Ultimate Design year</td></tr>
<tr><td>1</td><td>MSW</td><td></td><td></td></tr>
<tr><td>2</td><td>C&D</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>13.</td><td>Basic Waste Characterization of MSW (inTPD)
a) Wet or Biodegradable waste
b) Dry or Non-biodegradable waste</td></tr>
</table>

c) Domestic hazardous waste

14. Project Area:

15. Percentage of Population & Area covered of ULB with solid waste management services , including all slums:

	Covered	Uncovered	Balance, if any
Population-wise			
Area-wise			

16. Door to door collection service in the ULB:

Total No. of Households	Households having Door to door collection service	Households without Door to door collection service	Households to be covered under this project	Balance, If any

17. Source segregation in the ULB:

Total No. of Households	Households practicing Source segregation	Households not practicing Source segregation	Households to be covered under this project	Balance, If any

18. Pre-Feasibility Report (PFR) to be attached in Annexure –I, prepared as per the guidelines given in the Manual on Municipal Solid Waste Management.

19. Population of ULB:

1991 Census	2001 Census	2011 Census	2021 Census (in future)

20. Design Years of the proposed project:

Implementation period (No.of years)	Initial year (Base year)	Ultimate Design year
------ years	Year ----- (Eg.2019 + 2 years for implementation=2021)	Year ----- (year --- of previous col. +15 years)

21. Projected Population for Design:

Population in	Initial year (Base year)	Ultimate Design year
ULB		
Project area		

22. Proposed framework for Integrated Municipal Solid Waste Management, including technological options for waste processing from various streams such as Composting, Biogas, RDF, Recyclables, C&D Recycling

23. Major Outputs of the project:

	Door to door collection service	Source segregation	MRF	Processing of waste	Landfill required
Proposed			Recycling	a) Compost b) Biomethanation c) RDF d) C&D	

24. Estimated Cost:

Block estimated cost (Abstract cost to be furnished as Annexure-II)	Per Capita Cost as per Estimate (for the initial beneficiary population)	O & M Costs per capita

25. Whether Operation & Maintenance cost and revenue generation details (O & M Framework – existing & proposed) has been furnished in PPR or PFR:

	User charges (in Rs. Per MT)	
	Existing	Proposed
Residential		
Commercial		
Institutions		
Industries		

	Existing (average of last 5 years)	Proposed
Annual O & M cost (Rs. in lakhs)		
Annual Revenue generation (Rs. in lakhs)		

26. Land Acquisition:

(a) Whether entire land required for all components of the project in possession of

	the Implementing Agency: (b) If not, time required for acquiring land: (c) Whether Resettlement and Rehabilitation involved? If yes, whether R&R project/plan approved and funds allocated?
27.	Status of Solid Waste Management Service Level Benchmarks

S. No.	Indicator	Unit	Baseline before project	Reliability of measurement	After project	Reliability of measurement
1	Household level coverage of SWM services	%				
2	Efficiency of collection of municipal solid waste	%				
3	Extent of segregation of municipal solid waste	%				
4	Extent of municipal solid waste recovered	%				
5	Extent of scientific disposal of municipal solid waste	%				
6	Efficiency in redressal of customer complaints	%				
7	Extent of cost recovery of SWM services	%				
8	Efficiency in collection of SWM related user charges	%				

<table>
<tr><td>28.</td><td>Whether the infrastructural linkages of PPR and PFR project with the other ongoing projects under any funding have been established. Please give details</td></tr>
<tr><td>29.</td><td>Whether the required Statutory clearances have been obtained</td></tr>
<tr><td>30.</td><td>Name of the External Development Agency applied for loan assistance</td></tr>
<tr><td>31.</td><td>Financial Pattern
<table>
<tr><td rowspan="2">Total external assistance sought (%)</td><td colspan="4">Counterpart funds being made available by (%)</td><td rowspan="2">Total</td></tr>
<tr><td>Implementing agency (%)</td><td>State (%)</td><td>GoI (%)</td><td>Others, if any (pl. specify)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>32.</td><td>List anticipated hindrances in project implementation and measures for solutions</td></tr>
</table>

Certificate (to be furnished by State officials):

Certified that the facts and figures mentioned have been duly verified and found to be correct.

Signatures of responsible officers (Officer 1) (Officer 2) (Officer 2)

Annexure-I

File No: Q-15014/6/2015-CPHEEO
Government of India
Ministry of Housing and Urban Affairs

Nirman Bhavan, New Delhi
Dated 20th November 2017

Subject: Expansion of Empanelment of Transaction Advisors (TAs) for Solid Waste Management (SWM) with PPP arrangements. – Reg.

With reference to the DO MD-SBM/AA/64/2016 dated 30th May 2016 and Corrigendum No 1 (of 1) F.No. Q-15014/6/2015-CPHEEO dated 29th August 2016 regarding the empanelment of Transaction Advisors for Solid Waste Management (SWM) with PPP arrangements, an expansion of existing list was carried out following a similar process.

After completing the process of expansion of Transaction Advisors by the Ministry of Housing and Urban Affairs under the bid number 2017_MoUD_232325_1, the consolidated list of Transaction Advisors including reclassification of categories is as follows :-

List A: Bidders Empaneled as Category 'A' Transaction Advisors (for SWM projects costing ₹40 crore and above)

S.No	Name of the Agency	Category
1.	Darashaw & Co. Pvt. Ltd.	A
2.	Infrastructure Development Corporation	A
3.	Deloitte Touche Tohmatsu India LLP	A
4.	PricewaterhouseCoopers Pvt. Ltd	A
5.	Ernst & Young LLP	A
6.	Feedback Infra Pvt. Ltd.	A
7.	Axykno Capital Services Ltd.	A
8.	Credible Management & Consultants	A
9.	Jones Lang LaSalle Property Consultants (India) Pvt. Ltd.	A
10.	Fortress Infra Advisory Services	A
11.	DDF Consultants Pvt. Ltd.	A
12.	Tandon Urban Solutions Pvt. Ltd.	A
13.	Innovest Advisory Services Pvt. Ltd.	A
14.	DRA Consultants Pvt. Ltd in JV with Unity Consultants Pvt. Ltd.	A
15.	MAZARS Advisory Pvt. Ltd. *(Newly upgraded)*	A

16.	Almondz Global Securities Limited *(Added after Expansion)*	A
17.	Arcadis India Pvt. Ltd. *(Added after Expansion)*	A
18.	CRISIL Risk and Infrastructure Solutions Limited *(Added after Expansion)*	A
19.	IL&FS Energy Development Company Ltd. *(Added after Expansion)*	A
20.	Intercontinental Consultants and Technocrats Pvt. Ltd. *(Added after Expansion)*	A
21.	The Boston Consulting Group (India) Pvt. Ltd. *(Added after Expansion)*	A

List B: Bidders Empaneled as Category 'B' Transaction Advisors (for SWM projects costing less than ₹40 crore)

S.No	Name of the Agency	Category
1.	SREI Infrastructure Finance Limited	B
2.	JPS Associate Pvt. Ltd	B
3.	InfraEn India Pvt. Ltd.	B
4.	Meghraj Capital Advisors Pvt. Ltd	B
5.	Grant Thornton India LLP	B
6.	Development Environenergy Services Ltd. *(Added after Expansion)*	B

Note – "Empanelment done on the basis of bid received and self-certification of documents the empaneled organizations are liable to be removed from the list if facts given and documentation are found to be incorrect at any stage"

Transaction Advisors (TAs) in Category A can bid for projects under category B but not vice-versa. In special circumstances where sufficient no. of bids from category A Transaction Advisors are not received, then category B Transaction Advisors may be asked to bid with the approval of competent authority.

(Scope of work Annexed)

Chaurasia
20/11/2017

(V.K.Chaurasia)

Advisor (I/C), PHEE

Annexure

SCOPE OF WORK

The scope of work to be performed by qualified Agencies will but is not limited to, the following tasks:

1 Provide technical, commercial, financial and legal services in support of PPP project preparation and transactions, which shall include but not limited to :
   (i) prepare bidding documents and draft contracts after reviewing the Detailed project Report prepared by the state
   (ii) Carry out Value for Money (VfM) analysis and assess PPP options,
   (iii) Conduct financial analysis and modeling, and project structuring;
   (iv) Carry out the bidding process until signing of the contract with the prospective private sector proponent or concessionaire
   (v) Provide advisory services until the commissioning of the project or as & when required, etc. Project review, development and implementation activities of various projects shall be carried out in Municipal Solid Waste Management.

2 Help structure projects to enable recovery of the investments made in such projects through innovative business and commercial practices such as levy of user charges/ fee/ toll, facilitating financial contribution under the various schemes of Government of India and exploitation of development rights/ concessions etc., as appropriate under the applicable laws.

3 Proactively market the structured projects to potential investors, both domestic and foreign, at appropriate stages.

4 Structure and market the projects in such a manner that various forms of aid, grant etc. from the Government of India, national and international institutions etc. can flow into the projects.

5 Propose institutional structures required for implementation of projects and operation & maintenance thereof with private sector financing and recommend a suitable project management agency for the purpose of ensuring that the project is structured and executed in line with the specifications as stipulated in the Detailed Feasibility and Investment Banking Report (DFIBR) and / Techno Economic Feasibility Report (TEFR) or other appropriate report.

6 Assist the state/ULB in establishing eligibility, if possible, of the projects for financial assistance of multilateral and bilateral agencies.

7 Project monitoring activities and related consultancy services during the execution/ construction period of the project until commissioning of the project.

8 Training and capacity building of the Municipal staff with respect to the PPP project

9 Any other activity related to the project

20/11/2017

Ministry of Housing and Urban Affairs
Government of India

LIST OF EMPANELED AGENCIES FOR PROVIDING TRANSACTION ADVISORY SUPPORT TO CITIES/TOWNS FOR SOLID WASTE MANAGEMENT PROJECTS

#	Agency	Address	Phone Number	Email	Contact Person
Category A (for projects with estimated value more than Rs 40 Crores)					
1	Darashaw & Co. Pvt. Ltd.	6th Floor, Express Building, 14th 'E' Road, Near Government Law College, Churchgate (W), Mumbai 400 020	Phone: 022 43022300; Fax: +91 22 43022366	contact@darashaw.com	Narender Kumar, Assistant VP
2	Infrastructure Development (Karnataka) Corporation	9/7, K.C.N. Bhavan, Yamuna Bai Road, Madhavanagar Extension, Off Race Course Road, Bengaluru - 560001	Phone: 080 43448000; Fax: +91 80 4344 8001	ideckinfo@idfc.com; debashis@idfc.com	Debashis Ghosh, Executive VP (+91 9845536876)
3	Deloitte Touche Tohmatsu India LLP	7th Floor, Building 10, Tower B, DLF Cybercity Complex, DLF Phase 2, Gurgaon - 122002 Haryana India	Phone: 0124 6792363; Fax: +91 124 6792012	sksinha@deloitte.com	Sudeep Kumar Sinha, Partner
4	PricewaterhouseCoopers Pvt Ltd	Floor 17, Building 10-C, DLF Cyber City, Gurgaon, India 122002	Phone: 0124 3306009	ranen.banerjee@in.pwc.com	Ranen Banerjee, Executive Director
5	Ernst & Young LLP	MG703B, The Magnolias, DLF Golf Links, DLF City Phase-V, Gurgaon 122009 Haryana	Phone: 011 26611012 to 13	abhaya.agarwal@in.ey.com	Abhaya Krishna Agarwal, Partner-Infrastructure & PPP
6	Feedback Infra Private Limited	15th Floor, Building 9B, DLF Cyber City, Phase 3, Gurgaon-122002	Phone: 0124 4169100; Fax: +91 124 4169175	inquiries@feedbackinfra.com	Aditi Vyas, Senior Consultant (+91 9810789181)
7	Axykno Capital Services Limited	Leela Vista, Level 3, Bajaj Nagar, WHC Road, Nagpur, Maharashtra 440024	Phone: 0712 451999/6452 999/3999; Fax: 0712 2236999/2245338	admin@axykno.com	Parag Somwanshi, Leader-Infrastructure
8	Credible Management &	177, Block R, LGF, Greater Kailash, New Delhi 110048	Phone: 011 4670 2241-246; Fax: 011 41090127	info@cmcindia.net	Karam Kumar, General Manager-

	Consultants				F&A
9	Jones Lang LaSalle Property Consultants (India) Pvt. Ltd.	2, Dr Martin Luther King Sarane (formerly Upper Wood Street), Kolkata 700016	Phone: 033 39415678; Fax: +91 33 33436101	saugata.maitra@ap.jll.com	Saugata Maitra, National Director, Infrastructure Services (+91 9830070624)
10	Fortress Infrastructure Advisory Services (a division of Fortress Financial Services Ltd)	Daryanagar House, 2nd Floor, 69 Maharshi Karve Road, Marine Lines, Mumbai 400002 India	Phone: 022 22007973 to 76; Fax: +91 22 22031609	fortress@fortress.co.in	Yogesh More, Assistant Manager
11	DDF Consultants Private Limited	501, B-9, I.T.L. Twin Towers, Netaji Subhash Place, Pitampura, New Delhi - 110034	Phone: 011 47400500; Fax: 011 47400555	info@ddfgroup.com	Puneet Gupta
12	Tandon Urban Solutions Pvt. Ltd.	701, Harbhajan Building, Kalina, Santacruz (E), Mumbai 400 098	Tele-Fax: 022 2665 5335	tandonandassociates@gmail.com	Amit (GM - Business Development), Mobile: 09867687797
13	Innovest Advisory Services Pvt. Ltd.	1115, 11th Floor, Tower B 4, Spaze Tech Park, Sector 49, Sohna Road, Gurgaon 122002 Haryana, India	Phone: 0124 4777555; Fax: +91 124 4777599	info@innovest.in	Varushi Shinghal, Manager
14	DRA Consultants Pvt Ltd in JV with Unity Consultants Pvt. Ltd.	Plot no. 58, Ingole Nagar, Behind Hotel Pride, Opposite Airport, Wardha Road, Nagpur, Maharashtra - 440005	Phone: 0712 - 3027575 to79, 3027502; Fax - 0712 3027527	dra.nagpur@gmail.com; dra.cement@gmail.com	Jatin Rathi
15	MAZARS Advisory Pvt. Ltd. (Newly Upgraded)	Mazars House, Lpot no 421, Udyog Vihar, Phase - IV, Sector 18, Gurugram - 122016, Haryana	9810119871	sumit.singhal@mazars.co.in	Sumit Singhal
16	Almondz Global Securities Limited (Added after Expansion)	F-33/3, Okhla Industrial Area, Phase - II, New Delhi - 110020	011-43500700-800	ashwini.ghai@almondz.com	Ashwini Ghai

17	Arcadis India Pvt. Ltd. (Added after Expansion)	3rd Floor, Tower B Logix Techno Park Sector 127, Noida - 201304, India	120-4368400; 120-4368401	mainak.hazra@arcadis.com	Mainak Hazra
18	CRISIL Risk and Infrastructure Solutions Limited (Added after Expansion)	Plot No - 46, Sector - 44, Opposite Provident Fund Office, Gurgaon - 122003, India	0124-6722484; 0124-6722000; 9810234251	rvi.poddar@crisil.com	Ravi Poddar
19	IL&FS Energy Development Company Ltd. (Added after Expansion)	1st Floor, Corporate Office Tower, Ambience Mall Island, Gurgaon, Haryana - 122001, India	0124-4716199; 0124-4716120-21	s.baskaran@ilfsindia.com	S. Baskaran
20	Intercontinental Consultants and Technocrats Pvt. Ltd. (Added after Expansion)	A-8, Green Park, New Delhi - 110016, India	011-40863000	eoi@ictonline.com	Saurabh Khanna
21	The Boston Consulting Group (India) Pvt. Ltd. (Added after Expansion)	14th Floor, Nariman Bhavan 227, Nariman Point - Mumbai - 400021, India	022-67497000	bcgindia@bcg.com	Suresh Subudhi
	Category – B (for projects with estimated value less than or equal to Rs 40 Crores)				
1	SREI Infrastructure Finance Limited	Vishwakarma 86-C, Topsia Road (South), Kolkata - 700046	Phone: 033 22850112-15, 61607734; Fax: +91 33 22858501/ 7542	corporate@srei.com	A K Mohapatra, Head - Infrastructure Advisory
2	JPS Associates Pvt. Ltd	R-16, Hauz Khas Enclave, New Delhi 110016 India	Phone: 011 26862487/ 26862193/26854335; Fax: +91 11 26864547	info@jps-india.com	C Divakar Dhaveji, Executive Director
3	InfraEn (India) Private Limited	#4932, High Point - IV, Palace Road, Bangalore - 560 001	Mobile: 08069000130	info@infraen.com	Sumit Gautam, Deputy Manager-Environmental Practice

4	Meghraj Capital Advisors Pvt. Ltd	2nd Floor, 201 Rajan House, Appasaheb Marathe Marg, Prabhadevi, Mumbai 400025 India	Phone: 022 67445100; Fax: +91 22 67445150	info@meghrajindia.com	Chandrasekhar Iyer, MD
5	Grant Thornton India LLP	7th Floor, Block 3, White House, Kundanbagh, Begumpet, Hyderabad - 500 016, India; Head Office - 21st Floor, DLF Square, Jacaranda Marg	Phone: 040 66308200; Fax: +91 40 66308230	gv.subrahmanyam@in.gt.com	G V Subrahmanyam, Partner
6	Development Environenergy Services Ltd. (Added after Expansion)	819, 8th Floor, Antriksh Bhavan, 22, K.G.Marg, New Delhi - 110001, India	011-40791100	desl@deslenergy.com	R. Rajmohan

File No. Q-15014/2/2009-CPHEEO
Ministry of Urban Development
Government of India

List of Institutes/ Agencies empanelled for providing support to the cities/towns for Solid Waste Management under Swachh Bharat Mission

Indian Institute of Technology

S. No.	Name of Institute	Contact Details
1	Indian Institute of Technology Delhi	Dr. Manoj Datta Professor & Head Department of Civil Engineering Indian Institute of Technology Delhi Hauz Khas, New Delhi-110 016 Mobile: 09818196229 Email: mdatta@civil.iitd.ac.in
2	Indian Institute of Technology Bombay	Prof. K. V. Krishna Rao Professor & Head Department of Civil Engineering Powai, Mumbai- 400076, Maharashtra Email: head.civil@iitb.ac.in Tel No.: 91-22-25767300
3	Indian Institute of Technology Kanpur	Dr. Rajesh Srivastava Professor & Head Department of Civil Engineering Indian Institute of Technology Kanpur 311 Faculty Building Kalyanpur, Kanpur-208016 Email: rajeshs@iitk.ac.in Tel. No.: (91-512) 259 7755
4	Indian Institute of Technology Madras	Prof. Meher Prasad Professor & Head Department of Civil Engineering Indian Institute of Technology Madras Sardar Patel Road, Chennai 600 036 E-mail: cehod@iitm.ac.in, ceoffice@iitm.ac.in Tel. No.: +91 - 44 - 2257 4250
5	Indian Institute of Technology Kharagpur	Professor Subhasish Dey Professor & Head Department of Civil Engineering Indian Institute of Technology Kharagpur Kharagpur – 721302 Tel. No.: +91 - 3222 – 283418 Email: sdey@civil.iitkgp.ernet.in
6	Indian Institute of Technology Roorkee	Shri C.S.P Ojha Professor & Head Department of Civil Engineering Roorkee, Uttarakhand – 247667

		Tel No.: 91 - 1332 – 285494 Email: cojhafce@iitr.ac.in
7	Indian Institute of Technology (BHU) Varanasi	Dr. Devendra Mohan Professor & Head Department of Civil Engineering Indian Institute of Technology (Banaras Hindu University) Email: head.civ@iitbhu.ac.in Tel. No.: 0542-6702679, 6702680 Fax: 0542-2368283
8	Indian Institute of Technology Bhubaneswar	Prof. Ratnam V. Raja Kumar Director Indian Institute of Technology Bhubaneswar Samantapuri (Rearside of Hotel Swosti Plaza) Bhubaneswar-751 013 Tel.: 2306200, 2576001(TP) Email: director@iitbbs.ac.in
9	Indian Institute of Technology Gandhinagar	Prof. D.P. Roy Professor & Head of Engineering Department Indian Institute of Technology Gandhinagar VGEC Complex, Chandkheda Ahmedabad – 382424 Tel. No.: 093-28474204/ +91-79-2397 Fax: 079-2397 2586 Email: dproy@iitgn.ac.in
10	Indian Institute of Technology Guwahati	Dr. Ajay Kalamdhad Associate Professor Dept. of Civil Engineering IIT Guwahati Email: kajay@iitg.ernet.in Mobile: 09678621395
11	Indian Institute of Technology Hyderabad	Prof. K.V.L. Subramaniam Professor and Head Department of Civil Engineering Indian Institute of Technology Hyderabad Ordnance Factory Estate Yeddumailaram 502205, Andhra Pradesh Tel. No.: +91 40 2301-6093 Email : kvls@iith.ac.in
12	Indian Institute of Technology Indore	Prof. Pradeep Mathur Director Indian Institute of Technology Indore Pithampur Auto Cluster Limited (PACL) Building, Survey No. 113/2-BVillage Harnia Khedi, Dist. Indore, (opposite Veternary College) Madhya Pradesh Tel. No.: 2438711, Email: director@iiti.ac.in
13	Indian Institute of Technology Jodhpur	Professor C V R Murty Director

		Indian Institute of Technology Jodhpur Old Residency Road, Ratanada Jodhpur - 342 011 Email: director@iitj.ac.in Tel. No.: 0291 251 2141, Fax: 0291 251 6823
14	Indian Institute of Technology Tirupati	IIT Tirupati is mentored by IIT Madras
15	Indian Institute of Technology Palakkad	IIT Palakkad is mentored by IIT Madras
16	Indian Institute of Technology Mandi	Prof. Timothy A Gonsalves Director Indian Institute of Technology Mandi Kamand Campus, VPO Kamand, Distt. Mandi - 175005 Himachal Pradesh Tel. No.: 01905-267001, Fax: 01905-267009 Email: diroffice@iitmandi.ac.in
17	Indian Institute of Technology Patna	Dr. Pradipta Chakrabortty Professor and Head Department of Civil Engineering Indian Institute of Technology Patna Navin Government Polytechnic Campus Patliputra Colony, Patna - 800 013 Tel. No.: 06122-260077 Email: pradipt@iitp.ac.in
18	Indian Institute of Technology Ropar	Prof. Sarit Kumar Das Director Indian Institute of Technology Ropar Nangal Road, Rupnagar, Punjab- 140001 Tel.: 01881-242101 Email: director@iitrpr.ac.in

National Institute of Technology

19	National Institute of Technology Kurukshetra	Prof. S.K. Patidar Civil Engineering Department National Institute of Technology Kurukshetra – 136119, Haryana Mob: 09416411005
20	Dr. B R Ambedkar National Institute of Technology Jalandhar	Dr. Ajay Bansal Associate Professor Department of Chemical Engineering Dr. B R Ambedkar National Institute of Technology, Jalandhar G T Road Bye Pass, Jalandhar – 144011, Punjab Tel. No.: 0181-2690301, 2690453 Mob: 09417223839 Email: bansala@nitj.ac.in

21	Sardar Vallabhai National Institute of Technology Surat	1. Dr. R.A. Christian Mob: 09426185768 Email: rac@ced.svnit.ac.in 2. Dr. M. Mansoor Ahammad Mob: 09825875162 Email: mma@ced.svnit.ac.in 3. Dr. Mrs. A.K. Khambete Mob: 09662539337 Email: akk@ced.svnit.ac.in
22	Malaviya National Institute of Technology, Jaipur, Rajasthan	Prof. Gunwant Sharma, Head Of Department Civil Engineering Department MNIT, JLN Marg, Jaipur-302017 Rajasthan Tel. No: 0141-2713379, Fax: 0141-2529029 Email.id: hodcivil.mnit@gmail.com
23	National Institute of Technology, Tiruchirappallli, Tamilnadu	Dr. P. Jayabalan Head Of Department Civil Engineering Department NIT, Tiruchirappallli– 620 015 Tamilnadu Tel. No: 0431-2503150, Fax : 0431-2500133 E-mail: pjeya@nitt.edu
24	Motilal Nehru National Institute of Technology Allahabad, Uttar Pradesh	Dr. R.C. Vaishya, Head Of Department Civil Engineering Department MNIT, Allahabad, UP rcvaishya@mnnit.ac.in Tel. No: 0532-2545752,2545653 Fax: 0532-2545341, 2545077 E-mail: rcvaishya@yahoo.com
25	National Institute of Technology Durgapur, West Bengal	Dr. Tarkeshwar Kumar Director National Institute of Technology Durgapur-713209, West Bengal Tel. No: 0343-2546397, Fax: 0343-2547375 Email: director@admin.nitdgp.ac.in
26	National Institute of Technology Bihar	Prof. (Dr) Vivekananda Singh, Head Of Department Civil Engineering Department NIT, Patna-800005 Bihar Tel. No: 2371929, 2370419 Email: civil@nitp.ac.in
27	National Institute of Technology Raipur,	Dr. R.K. Tripathi Head Of Department Civil Engineering Department National Institute of Technology Raipur G.E. Road, Raipur, Chhatisgarh-492010 Tel. No: 0771-2554114, Fax: 0771-2254600 Email: rktripathi.ce@nitrr.ac.in

28	National Institute of Technology Agartala	Dr. Umesh Mishra Head Of Department Civil Engineering Department (former Tripura Engineering College Barjala,) Jirahia,Tripura (W) -799055 Tel. No: 03812348531, Mob: 9436926569 E-mail: umishra123@rediffmail.com, umeshmishra2010@gamil.com
29	National Institute of Technology Arunachal Pradesh	Jumrik Taipodia Head Of Department Civil Engineering Department National Institute of Technology Arunachal Pradesh, Yupia Papum Pare – 791112, Arunachal Pradesh Tel. No: 094019 61710 Email: jtaipodia@gmail.com
30	National Institutes of Technology Delhi	Prof. Ajay K Sharma Director National Institute of Technology Delhi Institute of Applied Manpower Research (IAMR Campus) A-7, Institutional Area Near Satyawadi Raja Harish Chandra Hospital, Narela, Delhi – 110040 Tel No : 011-27787503, Fax No : 27787503
31	National Institute of Technology Goa	Dr. G. R. C. Reddy Director Farmagudi, Ponda, Goa- 403401 Tel. No. 0832-2404200, Fax: 0832-2404202
32	National Institute of Technology Manipur	Dr. Palbino Kumar Head Of Department Civil Engineering Department 2nd Floor Academic building,Manipur Tel. No: 03852058566, Fax: 03852445812 Email: hodcivil@nitmanipur.ac.in
33	National Institute of Technology Meghalaya	Dr. Comingstarful Marthong, Head Of Department Civil Engineering Department Laitumkhrah, Shilong, Meghalaya-793003 Tel. No: 03642501294 E-mail:commarthong@gmail.com
34	National Institute of Technology Mizoram	Prof. U.C. Ray, Director Chaltlang, Aizawl- 796012 Tel. No/ Fax: 0389-2391236/ 0389-2391774 / 0389-2391699 Email: nit-mizoram@nitmz.ac.in
35	National Institute of Technology Nagaland	Mr. Nzanthung Ngullie, Head Of Department Civil Engineering Department

		Chumukedima, Dimapur 797103 Email: nzan01@gmail.com
36	National Institute of Technology Sikkim	Mr. Samyajit Basu, Head Of Department Civil Engineering Department Barfung Block Ravangla Sub-Divison South Sikkim- 737139 Mobile: 08116305405 E-mail: samyajitnitskm@gmail.com
37	National Institute of Technology Uttarakhand	Ms. Smita Kaloni, Head Of Department Civil Engineering Department Temporary Campus, Government Polytechnic Srinagar, Garhwal 246174 Tel. No: 01346-257400, 01346-250792, 251249 E-mail : smita@nituk.ac.in
38	National Institute of Technology Puducherry	Dr. V.L. Naresimha, Head Of Department Civil Engineering Department P.K.C Campus, Second Floor, Rear Side, Nehru Nagar, Karaikal, Puducherry – 609605 Tel. No: 9443537995 Email: vin@pec.edu
39	National Institute of Maharashtra Visvesvaraya National Institute of Technology, Nagpur	Prof. V.A. Mhaisalkar, Head Of Department Civil Engineering Department VNIT, Nagpur South Ambazari Road, Nagpur, Maharashtra – 440010 Tel. No: 0712-2801338 Fax: 0712-2223230 Mob: 09822291701 Email: vasantmhaisalkar@yahoo.com
40	National Institute of Technology Kerala	DR. M.V.L.R Anganeyuler, Head Of Department Civil Engineering Department NIT Campus calicut, Kerala- 673601 Email: civilhod@nic.ac.in
41	National Institute of Technology Assam	Dr. Upendra Kumar, Head Of Department Civil Engineering Department NIT Silchar Cachar, Assam- 788010 Tel. No: 09435176340 Email: upendre_kumar72@rediffmail.com
42	National Institute of Technology Andhra Pradesh	Prof. T. Srinivasa Rao Director NIT of Technology Warangal -506004, Andhra Pradesh Tel. No: 870-2459216, 2462000

		Fax: 870-2459119 Email: director@nitw.ac.in
43	National Institute of Technology Warangal	Dr. Gunneswara Rao TD Associate Professor & Head Of Department Department of Engineering Mob: 08702462139 Email: tdg@nitw.ac.in, tdgtdg@gmail.com
44	National Institute of Technology, Jamshedpur	Mr. Rakesh Pratap Singh, Head Of Department Civil Engineering Department NIT, Jamshedpur, Jharkhand- 831015 Tel No: 91-657-2374123, Fax: + 91-657-2373246 Email: hod.civil@nitjsr.ac.in
45	National Institute of Technology, Srinagar, J&K	Dr M.A Lone, Head Of Department Civil Engineering Department NIT, Srinagar, Hazratbal-190006 Srinagar (J&K) Mob. No.: 09419019381
46	National Institute of Technology, Hamirpur, Himachal Pradesh	Prof. Rajnish Shrivastava Director NIT, Hamirpur-177005 (H.P) Tel No.: 01972 - 222308 Email: director@nith.ac.in
47	National Institute of Technology Surathkal, Karnataka	Dr K.N Lokesh Head Of Department Civil Engineering Department NIT Surathkal-575025 Tel No: 0824-2473041, Fax : 0824-2474033 Email hodcivil@nitk.ac.in
48	Maulana Azad National Institute of Technology, Bhopal, Madhya Pradesh	Dr. Anil K. Sharma Head Of Department Civil Engineering Department MANIT, Bhopal-462007 (M.P) Tel. No: 0755 4051000, 4052000, 2670900 Fax : 0755 2670562 Email: hodcivil@manit.ac.in
49	National Institute of Technology, Rourkela, Orissa	Dr. Sunil Kumar Sarangi Director NIT Rourkela-769008 (Orissa) Email: director@nitrkl.ac.in Tel. No: 0661-2462001

All India Institute of Local Self-Government

50	All India Institute of Local Self-Government	Shri Nachiket Dhruva Sr. Executive Director (North – West) All India Institute of Local Self-Government Barfiwala Bhavan, Nr. Bhavan's College,

		Khanpur, Ahmedabad – 380 001 Tel. No.: 079-2560 1296 Fax: 079-2560 Email: ahmedabad@aiilsg.org
51	All India Institute of Local Self-Government	Shri Ashish M Deosthali Dy. Director General All India Institute of Local Self-Government Pinnac Memories, Phase-II, "L" Building, Near Bhujbaal Baag, Kothrud, Pune -411038 Tel. No.: 020- 25411385, 25461624, 25460793, 25455099 email-ashishdeostahli@gmail.com, amdeosthali@aiilsg.org
52	All India Institute of Local Self-Government	Shri M.P. Bhat Regional Director All India Institute of Local Self-Government 1 / 1, 2nd Main, 6th Cross, Gandhi Nagar, Bangalore – 560 009 Tel. No.: 080-22261876/22371441/40911198 Mob no: 9945011198 / 9538798971 Email: bangalore@aiilsg.org, onlinebangalore@aiilsg.org
53	All India Institute of Local Self-Government	Shri S. K. Sharma Regional Director All India Institute of Local Self-Government Sthanikraj Bhavan, 4 Shivaji Nagar Nr. 6 No. Bus stop, Bhopal – 462 016 Tel. No.: 0755-2550861 / 2762289 Email: bhopal@aiilsg.org
54	All India Institute of Local Self-Government	Shri Debesh Patra Regional Director All India Institute of Local Self-Government Municipal Council Union office Vivekanand Marg, Bhubaneshwar – 751014 Tel. No.: 0674 – 2544268/2435498 Fax: 0674 – 2435498 Email: bhubaneshwar@aiilsg.org
55	All India Institute of Local Self-Government	Dr. S. Gopinathan Regional Director All India Institute of Local Self-Government 'Sopanam' Complex, 2nd & 3rd floor Peroorkada, Thiruvananthapuram – 695005 Tel. No.: 0471-2431301, 0471-2431316 Email: trivandrum@aiilsg.org
56	All India Institute of Local Self-Government	Shri. Apoorva Shukla Regional Director All India Institute of Local Self-Government Sector- C10/56/26, Vikas Nagar, Near Kishor Filling Pump (Ring Road) Lucknow – 226 022

		Tel. No.: 0522-3241702, 4065196 Fax : 0522-3241702, 4065196 Email: lucknow@aiilsg.org
57	All India Institute of Local Self-Government	Shri . Sumit Kumar Singh Regional Director All India Institute of Local Self-Government 'Main Baldev Nagar Road, Near Akhalia Choratha, Chopasani Road, Jodhpur – 342 004 Tel. No.: 0291-2771609, Fax: 0291-2719842 Email: jodhpur@aiilsg.org
58	All India Institute of Local Self-Government	Shri. Loji Thomas Regional Director All India Institute of Local Self-Government 22,23 Institutional Area, Janakpuri D Block, Pankha Road, New Delhi-110058 Tel. No.: 011-28525465/ 011-28521783 Fax: 011-28522117 Email: delhi@aiilsg.org

Regional Centre for Urban and Environmental Studies

59	Regional Centre for Urban and Environmental Studies, Mumbai	Dr. Sneha Palnitkar Director Regional Centre for Urban and Environmental Studies M.N. Roy Human Development Campus, Plot No.6, F-Block, T.P.S. Road-12, Behind Teachers' Colony, Bandra-East Mumbai – 400 051 Tel. No.: 022-26573803, 26573765 Fax: 022-26573973, Mob: 09820105098 Email: dir.rcues@aiilsg.org, snehapalnitkar@gmail.com
60	Regional Centre for Urban and Environmental Studies, Hyderabad	Prof. E. Suresh Kumar Registrar & Director I/C Regional Centre for Urban and Environmental Studies Osmania University, Hyderabad, Telangana -500007 Tel. No.: 040-27098494, 2709032, 27682254, Fax: 040 - 27090321 Email: director_rcues_ou@yahoo.co.in
61	Regional Centre for Urban and Environmental Studies, Lucknow	Prof. Nishith Rai Director Regional Centre for Urban and Environmental Studies Adjacent Registrar's Office, University Campus, Lucknow-226007 Tel No: 0522-2740108, Fax No: 0522-4042039 Email: directorrcueslko@gmail.com

Other Institutes

62	International Council for Local Environmental Initiatives (ICLEI), Delhi	Mr. Emani Kumar Executive Director, ICLEI South Asia Ground Floor, NSIC-STP Complex NSIC Bhawan, Okhla Indsutrial Estate New Delhi- 110020 Tel. No.: 41067720 Email: eman.kumar@iclei.org, iclei-southasia@iclei.org
63	Indian School of Mines	Prof. S.K. Maiti Professor & Head Department of Environmental Science & Engineering Dhanbad-826004 Mob: 09471191278 Email: skmism1960@gmail.com Dr. S.R. Samadder Assistant Professor Department of Environmental Science & Engineering Dhanbad – 826004 Mob: 09471191823 Email: such_samadder@yahoo.co.in Prof. Sekhar Chandra Dutta Professor & Head Department of Civil Engineering Indian School of Mines Dhanbad-826004 Mob: 07894407830
64	Environment Protection Training and Research Institute (EPTRI)	Sri. B. Kalyan Chakravarthy, IAS Director General Environment Protection Training and Research Institute (EPTRI) 91/4, Gachibowli, Hyderabad - 500 032, Telangana Tel. No.: 040-23180100; Fax: 040-23180135 Email:enquiry@eptri.com,eptrihrd@gmail.com
65	Birla Institute of Technology Mesra	Dr. Gopal Pathak Head of Department Department of Civil and Environmental Engineering Birla Institute of Technology Mesra, Ranchi, Jharkhand 835 215 E-Mail: headcivil@bitmesra.ac.in

66	National Institute of Urban Affairs	Prof. Jagan Shah Director National Institute of Urban Affairs 1st and 2nd Floor, Core 4B, India Habitat Centre, Lodhi Road New Delhi - 110003 Tel. No.: 24643284/24617517/24617513 Email: niua@niua.org
67	Administrative Staff College of India (ASCI), Hyderabad	Mr. Ravi Kant Director General Administrative Staff College of India (ASCI), Bella Vista, Plot No.6-3-644, Raj Bhavan Road, Somajiguda, Telangana 500082 Hyderabad Tel. No.: +91-40-23312600, 23310852 Email: ravikant@asci.org.in

Annexure II

File No. A-46020/3/2013-EA
Ministry of Urban Development
Government of India

LIST OF AGENCIES EMPANELLED FOR PROVIDING SUPPORT TO THE CITIES/TOWNS FOR SOLID WASTE MANAGEMENT

Sr No	Name of Firm	Contact Details
1	AECOM India Pvt. Ltd., Gurgaon	9th Floor, infinity Tower C. DLF Cyber City, DLF Phase II, Gurgaon 122002 0124-4830138, Somnath.mukherjee@aecom.com
2	Agricultural Finance Corporation Ltd in association with M/s N H Consulting Pvt Ltd	B-1/9, III Floor, Community Centre, Janakpuri, New Delhi - 110058 T: 011-45791190-96, 25596976 F: 011-45791189 Email: afcdelhi@afcindia.org.in / nro.afc@gmail.com Web: www.afcindia.org.in
3	All India Institute of Local Self Government, New Delhi	Pinnac Memories, Phase II , L Building, Near Bhujbal Bag, Kothrud, Pune -411038 020-25461624/ 25460793, ailsg@bom3vsnl.net.in
4	ACPL Global Pvt Ltd	M-23 MIG, Indira Nagar, Kanpur - 208026 Telefax: 0512-2570473, Email: acpl.knp@gmail.com, www.acplglobal.in
5	Asian Consulting Engineers Pvt Ltd. In association with Innovative and Comprehensive solutions for Urban Climate	66, Hemkunt Colony, IInd Floor, New Delhi - 110048 T: 011-41635644, F: 011-41634926, Email: info@asianconsulting.org, Web: www.asianconsulting.org
6	CDM Smith Inc. , Bangalore	#8, 2nd Floor, 80 Feet Road, RT Nagar Banglore - 560032, Karnataka, India tel : 080-3918-7500 /7529 fax : 080 2363 4097
7	Central Agricultural and Allied Farmers Co-operative Limited (Central Agro Limited)	Door No 4/ 299, Selas Katry, PO, The Nilgiris, Tamil Nadu, 643213 0423-2284255, info@centralagro.in
8	Consulting Engineering Services (I) Pvt Ltd., New Delhi (A Jacobs Group Company)	57 (5th Floor) , Manjusha Building Nehru Place, New Delhi - 110019 Tel : 011-4139 2300, 4139 2316 email milan.debb@cesinter.com

9	DeloitteTouche Tohmatsu India Pvt Ltd in association with M/s Foundation for Greentech Environmental Systems (FGES) and SAI Consulting Engineers Pvt Ltd	7th Floor, Building 10, Tower B, DLF Cyber City Complex, DLF City phase-II, Gurgaon - 122 002, Haryana, India. T: 0124-6792000, F: 0124-6792012, Web: deloitte.com
10	Eco Pro Environmental Services., Indore	302, Swastic Chamber 9, Manoramaganj, A B road, Indore -452001 0731-4065172, ecopro@rediffmail.com
11	Emergent Ventures India in association with M/s Ricardo-AEA	5th Floor, Universal Trade Tower, Sohna, Gurgaon Road, Sec 49, Gurgaon 0124-6653100, contact@emergent-ventures.com
12	Ernst & Young Pvt Ltd., in association with M/s Paradigm Environmental Strategies Pvt Ltd.	Golf View Corporate Tower 'B' Sector 42, Gurgaon -122002 0124-4644000
13	Facile Maven Pvt Ltd. Ahemdabad	A-2, Sarita darshan, opp Jay Hind press, Nr Mithakali Underpass, Ashram Road, Ahmedabad 079-26580102, info@facilemaven.com
14	Feedback Infrastructure Services Pvt Ltd.	15th floor , Tower 9B, DLF Cyber City, Phase III, Gurgaon - 122002 Haryana tel : 0124- 4169100 Fax : 0124-4169175, 0124- 4629255 email : inquiries@feedbackinfra.com www.Feedbackinfra.com
15	GHK Development Consultants Pvt. Ltd. In association with Athena Infonomics & Excel Industries	304-305, Lotus Chambers, 207/38, Nalwa Street, Karol Bagh, New Delhi -110005 011-64721312, delhi@ghkint.com
16	Grant Thornton India, LLP (Formely Grant Thornton India), Gurgaon	21st Floor floor, DLF Square Jacaranda Marg, DLF Phase II Gurgaon 122002 India Phione : 0124-4628000 Fax 0124 - 4628001 www.grantthornton.in
17	HUDCO , New Delhi	Core 7 A, HUDCO Bhawan, India Habitat Centre, Lodhi Road, New Delhi -110003 011-24616209, prs@hudco.org

18	ICRA Management Consulting Services Ltd.	1105, Kailash Building , 11th Floor, 26, Kasturba Gandhi Marg, New Delhi -110001 011-23357940-50, raghuttama.rao@imacs.in
19	IL&FS Environment, Mumbai	B 303, Citypoint, Andheri Kurla Road, Andheri (East), Mumbai - 400059 , T: 022-40298568 / 21 / 13, F: 022-40298512, Web: www.ilfsenv.com, Email: chetan.zaveri@ilfsenv.com
20	IPE Global , New Delhi	IPE Towers, B 84, Defence Colony, Bhisham Pitamah Marg, New Delhi 011-40755904, ipe@ipeglobal.com
21	IRG Systems South Asia Pvt. Ltd, New Delhi	LGF, AADI Building, 2 Balbir Saxena Marg, Hauz Khas, New Delhi - 110016 011-45974597, irgssa@irgssa.com
22	J. M. EnviroNet Pvt Ltd., Gurgaon	SCO 16, Sector 10A, Gurgaon, 122001 0124-3206559, jmenviron@hotmail.com/ jmpkdeepa@hotmail.com
23	JPS Associates Pvt Ltd., New Delhi	R-16, Hauz Khas Enclave, New Delhi - 110016 011-26862487, 26862193, jpsdelhi@del3.vsnl.net.in, info@jpsconsultantsindia.com
24	M/s Kadam Environment Consultants in association with M/s COWI A/S, Denmark.	871/B/3, GIDC Makarpura, Vadodara - 3900100265-3001000, kadamenviro@kadamenviro.com
25	MaRS Planning & Engineering Services Pvt Ltd., Ahemdabad	601, Sur Mount Building, Opp. Iscon Maga mall, On S.G.Highway, Ahmedabad PIN 380015 Phone 0179- 26860890 Fax : 26860130 email : info@marsconsultancy.com
26	Mott Mc Donald India Pvt Ltd	501, Sakar _II, Ellis Bridge, Ahmedabad 079-26575550, pankaj.trivedi@mottmac.com
27	MSV International Inc.(USA) in association with MSV International, (India) Ltd. Gurgaon.	D-7 , South City - I Gurgaon- 122002 Haryana, India email - 1nfo@msvgroup.com Tel : 0124 - 4002603,4671200 Fax 0124 - 4002605

28	Mukesh & Associates, Tamil Nadu	Division - 2' , 2/6 Ranganathar Avenue Perumal Malai Main Road Narasothipatty SALEM - 636004 Tamil Nadu, India Phone : 0427-2333563/2330568 Fax : 0427- 2333564 email : info@mukeshassociates.com, mukeshassociates@vsnl.com www.mukeshassociates.com
29	National Institute of Urban Affairs (NIUA) in association with The Energy and Resources Institute (TERI) and Centre for Environment Education (CEE).	I & II Floor, Core 4 B, India Habitat Center, Lodhi Road, New Delhi -110003 011-24643576, niua@niua.org
30	NCPE Infrastructure India Pvt. Ltd. , Hyderabad	12-2-826/A/12, LIC Colony, Mehdipatnam Hyderabad - 500028 tel : 040 - 2351 7558 Fax : 040 - 23514379 email : info@ncpe.org.in www.ncpe.org
31	NK Buildcon Pvt Ltd., Jaipur	B-62, 'UGANTA" University Marg, Bapu Nagar, Jaipur (Raj) 01412710841 -44, bussiness@nkbuildcon.com
32	Operations Research Group Pvt Ltd. ,New Delhi	Beetal House, Ground Floor, 99 Madangir, B/H LSC, New Delhi - 110062, India Tel No : 011-29964445/29964446/29964448 Facsimile : 011- 29964450 email : orgpl@orgplindia.com Web : www.orgplindia.com
33	PBS Consultancy Services Pvt Ltd. , Hyderabad	H No 6-2-966/5/1/2, Hill Colony, Opp lane of Hindi Prachara Sabha, Khaitrabad, Hyderabad -500004 040-23316336, pbsconsultancy@rediffmail.com, pbsconsultancy9@gmail.com
34	Ramky Enviro Engineers Ltd., Hyderabad	Door No 6-3-1090, 4th Floor, TSR Towers, above standard chartered bank, Rajbhavan Road, Somajiguda, Hyderabad 040-44422147/148, consultancy@ramky.com
35	Socio Economic and Educational Development	No .1, Iind Floor, 54th Street, 9th Avenue, Ashok Nagar, Chennai - 600083, Tamilnadu.

	(SEED) Trust, Chennai.	T: 044-42318467, Web: www.hihindia.org
36	Senes Consultants India Pvt Ltd., Noida	1st Floor , Tower B, Logix Techno Park Plot No 5, Sector 127, Noida, U.P. India Tel (EPBX) - 0120 - 4368400 Fax : 0120 - 4368401 email : senes@senesindia.com website : www.senesindia.com
37	Shah Technical Consultant Pvt Ltd. Mumbai	407, Raheja Centre, Nariman Point, Mumbai - 400021 T: 022- 22871061, 22820018, 22820121 Email: stcmumbai@vsnl.com, stc@stc.co.in, Web: www.stc.co.in
38	SMEC India Pvt Ltd. In association with M/s SMEC International Pty Ltd and M/s Brisbane City Enterprises	5th Floor, Tower C, DLF Building No 8, DLF Cyber city Ph II, Gurgaon 122002 0124-4552800, 4501100, india@smec.com
39	SREI Infrastructure Finance Ltd., New Delhi	D 2, 5th Floor, Southern park, Saket Place, Saket, New Delhi -110017 033-22850112, nro@seri.com
40	Sriram Institute for Industrial Resources	19, University Road, Delhi -110007 Phone : 011 - 27667267, 27667860, 27667436 Fax 011- 27667676, 27667207 email : sridhi@vsnl.com www.shriraminstitute.org
41	Stantec Consulting Pvt Ltd. , Ahmedabad	71/72, Titanium Corporate Road, Nr Prahladnagar Auda garden, Satellite, Ahmedabad 079-66128870/71/72, manish.shah@stantec.com
42	Sycom Projects Consultant Pvt Ltd.	H 22, Jungpura extension, New Delhi - 110014 011-24329452, sycomprojects@gmail.com, pdadlani01@gmail.com
43	TATA Consulting Engineers Ltd. , New Delhi.	17-18, Zamurdpur Commercial Complex, Kailash Colony Extension, New Delhi-110048. T: 011-66169180, F: 011-66169100 Email: mail@tce.co.in Web: www.tce.co.in
44	Tide Technocrates Pvt Ltd., Bangalore	768, 14th cross, 33rd main, J P Nagar, Phase I, Bangalore 91-8026656191, sampath@tidetechnocrats.in
45	Urban Management Centre(UMC), Ahmedabad	III Floor, AUDA Building, Usmanpura, Ashram Road, Ahmedabad 079-27546403/5303, manvita@umcasia.org

46	Urban Management Consultant (UMC Global), Ahmedabad	403, 4th Floor, Gala Argos, Gujarat College Road, Ellis Bridge, Ahmedabad, Gujarat 380006 Phone : 079 - 26423487 Fax : 079 - 26466652 info@uranmanagementconsultants.com www.urbanmanagementconsultants.com
47	Wapcos Ltd, Gurgaon	76-C, Sector 18, Gurgaon -122015 0124-2397396, environment@wapcos.gov.in

Template on Management of Dumpsites

1. Background information

a) Name of ULB & City, Name of Municipal Commissioner, postal address, phone, email, mobile

b) Population of city – as per census 2011, present and projected for next 25years

c) How many open dumpsites are in the city? (Provide details called for in 1c and 1d for each of the dumpsites)

d) Details of location like area in hectare, elevation w.r.t.o. mean sea level, bounded on all four sides by ……. to a distance of xx m, google map showing the dumped waste in the open environment.

e) Is the dumpsite bounded by a compound wall or is it accessible to animals.

f) Does the city have any location(s) earmarked for dumpsites in future? If yes provide details.

g) Is there any scientific landfilling or only open dumping is being carried out at site(s)?

h) If open dumping is carried out, is there any plan for closure of the site?

i) Is any part of the open dump partially capped?

j) Has there been an instance of major fire at the open dump? How many times in a year? How many were reported in the last one year?

k) Has the open dumpsite area been ever flooded? How many times and its impact?

l) What is the average height and area of the open dumped waste? If there is more than one, provide information for each.

m) Has there been a contour survey been carried out of the waste lying at site? If yes provide the details of the latest survey.

n) Has any characterisation of the waste in the open dump site been carried out? If yes provide the details.

o) Have there been any dumping of Bio-medical waste at the dumpsite?If yes provide details.

p) Has there been any dumping of Hazardous waste at the site? If yes provide details.

q) Does the city have a carcass processing/ disposal plant? Are the carcass of animals been brought to open dump site for burial? If yes provide the details.

r) Is there a MSW processing plant in the city? – Give details – process, capacity, operational condition etc

s) Does the city have a C & D waste processing facility? If yes provide the details.

2. Information on Open dump sites (name of dumpsite)
(In case there are more than one dumpsite, provide information for each)

a) Period since when open dumping is being done,

b) Is it located close to area of environmental importance such as designated nature reserve, ASI sites, etc

c) Location, latitude & longitude, distance from river/nala/canal, distance from highway

d) Topographic surveys.

e) Present land use of the surrounding areas

f) Villages / towns / cities around the dumpsite, there distance from dumpsite and their population

g) Details of existing conditions on and surrounding the dumpsite.

- Property boundaries,
- Topography and Slopes,
- Flora and Fauna details,
- Wetlands,
- Utilities,
- Roads,
- Permanent or semi-permanent structures,
- Earthquake zone

h) Hydro-geological information of the dump site

- Soils (depth, texture, structure, bulk density, porosity, permeability, moisture, if avaiable)
- Bedrock (depth, type, presence of fractures, location of surface outcrops, if available)
- Groundwater (average depth, seasonal fluctuations, hydraulic gradient and direction of flow, rate of flow, quality, uses etc. depending upon availability)

i) Compilation of climatological data

- Average annual Precipitation for the past 50 years or as available in metrological records
- Highest rainfall in a day over the last 50 years or as available in metrological records

- No. of rainy days per year
- Temperature (Monthly avg. temperature round the year)
- Evaporation (Monthly avg. temperature round the year)
- Wind direction and velocity(all round the year)- provide wind rose

j) Waste Characterisation

- Quantityof waste dumped at site
- Characteristics of the dumped waste

k) Photographic record

- Provide a photographic record of the dumped waste

3. Environment Management & Regulatory Compliance

In line with the Solid Waste Management (SWM) Rules, 2016 as documented in Section 4.1and revised SWM Manual (2016), sanitary landfills minimise the harmful impact of solid waste on the environment through the use of the following mechanisms:

- The storm water drainage system
- Non-permeable lining system at the base and walls of waste disposal area.
- Provisions for management of leachates including its collection andtreatment shall be made. Arrangement shall be made to prevent leachate runoff from landfill area entering any drain, stream, river, lake or pond
- Methodology for water quality monitoring
- Methodology for ambient air quality monitoring
- Methodology for Green cover/ plantation
- Methodology for control of other problems due to rodents, pests, fire, bird menace, slope failure, erosion, etc.
- Landscape- As per the SWM Rules, 2016 Schedule I (g), there is a defined criteriafor plantation at the landfill site which needs to be adhered to.

4. Remediation and Closure Plan Options

4.1 Dumpsite Closure:

The dumpsite closure is recommended when:

a) “Not in my Backyard” issue significantly prevails. The city has expanded around the dumpsite and pose serious concerns on the health and wellbeing of public.

b) Alternate site for dumping/ scientific disposal of landfill is available with the city.

c) The dumpsite cannot accommodate more waste

d) Landfill mining and remediation options cannot be exercised

The proposed scientific closure plan for [Name of Dumpsite] should have following components:

i. Whether any DPR / feasibility study has been prepared for Bio-mining/ capping/ remediation

ii. Whether partially capped

iii. Approval from the concerned State Pollution Control Board (SPCB)/committee

iv. Slope reformation and waste levelling

v. Closure cover

vi. Landfill gas collection & management system

vii. Leachate collection & management system

viii. Surface runoff management system

ix. Fire control measure

x. Prevention of illegal dumping- measures to check

xi. Other infrastructure (periphery road, administrative building, boundary wall landscaping, electrical works etc.)

xii. Resettlement / Action plan

xiii. The revised manual on municipal solid waste management by the Ministry of Urban Development (2016) shall be referred to for guidance.

4.2 Post Closure Maintenance

After scientific closer of the dumpsite, post closure activities are undertaken to ensure that the closed/ capped facility remain in proper condition and adhere to environmental regulations. Post-closure care activities consist of monitoring and maintaining the waste containment systems, any gas extraction system and observing groundwater. Determination of the end use of a dumpsite site is an essential part of theplan for dumpsite closure and post-closure maintenance. The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of thefollowing:

- plan for vegetative stabilisation of the final dumpsite cover
- plan for management of surface water runoff with an effective drainage system,
- plan for periodical inspection and maintenance of dumpsite cover
- (settlements) and facilities,
- plan for quantity and quality of leachate monitoring in the dumpsite,
- plan for quantity and quality of dumpsite gas monitoring,
- plan for groundwater quality (up gradient and down gradient) check, and
- plan for surface water quality check at the periphery of dumpsite and at receiving water bodies.

4.3 Landfill Mining

Landfill mining and reclamation (LFMR) is a process whereby solid wastes which have previously been landfilled are excavated and processed. The function of landfill mining is to reduce the amount of landfill mass encapsulated within the closed landfill and/or temporarily remove hazardous material to allow protective measures to be taken before the landfill mass is replaced. In the process, mining recovers valuable recyclable materials, a combustible fraction, soil, and landfill space. The aeration of the landfill soil is a secondary benefit regarding the landfill's future use. The combustible fraction is useful for the generation of power. The overall appearance of the landfill mining procedure is a sequence of processing machines laid out in a functional conveyor system. The operating principle is to excavate, sieve and sort the landfill material. Some old dumpsites may require aeration to diffuse any harmful gases entrenched in the dumped mass. This would reduce risk of exposure for the manpower operating on the project. The steps for LFMR are explained below:

4.3.1 Preliminary Excavation

- The number of pits and/or trenches to be dug;
- Equipment and material handling procedure;
- Labour requirements and their safety;
- Creation of a work zone with clearly marked boundaries; and
- Necessary analytical testing, measurements and data collection.
- Proper time to begin extracting material from the landfill, taking into consideration the odour that will be produced (please see above for requirement of aeration)
- Methodology that should be adopted to conduct feasibility studies
- Methodology in taking representative samples
- Development of methods of analysis of the mined samples
- Materials that can be recovered through mining of dump sites/landfills
- Expected quantity of the various recovered materials
- Variation of degradation with time, wastes and space
- Environmental and health risks of landfill rehabilitation works
- Enhancement of waste stabilization and integration of landfill design and operation

4.3.2 Slope Stability

4.3.3 Access Road

4.3.4 Leachate Accumulation

4.3.5 Dumpsite Fire Control

4.3.6 Scavenging Control

4.3.7 Mechanical Equipments

- Functions related to soil (excavation, handling, spreading and compaction);
- Functions related to wastes (spreading and compaction)
- Support functions (maintenance of on-site haul roads, water clearance and drainage ditches and removal of trapped trucks from the landfill working area)

4.3.8 Waste Disposal Plan

- Size and location of the first and subsequent sequence of areas to be filled with waste after the site has been rehabilitated, leading ultimately to the completion of the site and its final landform. Each waste emplacement area will have a unique reference number indicated on a scale drawing of the site
- Method of waste emplacement and soil covering to be used
- Structure, roles and responsibilities of the management and manual staff at the site
- Procedures for record keeping related to incoming vehicles, waste types and estimated quantities
- Procedures for record keeping related to on-site mechanical equipment, other routine maintenance and accident and defects reporting
- Traffic control at the site
- Fire prevention and smoking rules
- Maintenance and repair water drainage ditches
- Instructions for dealing with prohibited wastes that arrive at the site reception.

4.3.9 Staff Requirement

- A site manager with sufficient delegated authority to manage daily site activities and access to physical and financial resources to overcome day-to-day operational problems
- A gatekeeper/office clerk
- Security guards
- Traffic marshal(s) for directing trucks to discharge waste at the working part of the disposal site
- Mechanical equipment drivers (minimum of two)
- Manual labourers (minimum of ten)
- Maintenance mechanic(s) if it is intended to establish a maintenance facility at the disposal site.

4.4 Dumpsite Management using Windrows (Nagpur Model)

This method of dumpsite management is suitable for ULBs where treatment of waste is not happening and all waste is dumped at the dumpsite. The old waste dumped on the dumpsite along with the fresh waste is managed together. The procedure is stated as under:

- At the old dumpsite, windrows are made by piling biodegradable waste in long rows
- It leads to the bio-stabilisation of Bio-degradable waste. Normal Windrow operations are practiced for this windrow.
- Bio-culture is sprayed to accelerate organic decomposition and to control foul smell. It controls flies and treat leachate at no extra cost.
- Windrow size is reduced significantly by action of microbes and stabilization of organics.
- Cost effective solution for dumpsite management
- Longer life of dumpsite facility

4.5 Dumpsite Reduction by using Recovered material for Construction of Roads Embankment (CRRI Model)

This method prominently helps in volume reduction by utilization of segregated dry inert from landfill mining into Construction of Roads Embankment. The procedure is stated below:

- Manual/mechanical segregation of the landfill mining material is done
- The dry inert material which is generally 65-75% of the mined material can be used in roads embankment construction, which saves natural resources
- Use of segregated plastic material in road construction

5 DPR Prepration Format

The following section in italics shall form part of the DPR for dumpsite closure

5.1 Concept Plan and Drawing (layout and elevation)

5.2 Slope Reformation and Waste Levelling

5.3 Provide detailed plan for slope reformation/ waste levelling plan:

- *Side Slope*
- *Landfill operational until xxxx*
- *Waste receipt rate:*
    - *Municipal Solid Waste (MSW) (TPD)*
    - *C&D waste (TPD)*
- *Earthwork in cut and filling back and compaction for slope reformation (cum)*
- *Base Elevation (m)*
- *Maximum Elevation (m)*
- *Capacity of the landfill for future waste (cum)*
- *Surface Area (3-D) (sqm)*

5.4 Proposed Closure cover Layer as per SWM Rules, 2016

- *Top Soil*
- *LFG Collection Layer*
- *Drainage Layer*
- *Impervious Layer*

5.5 Landfill Gas (LFG) Management System

- *LFG extraction wells*
- *A network of header and feeder pipes,*
- *Condensate control system,*
- *Centrifugal Blowers for gas pumping*

5.6 LFG Flaring/Power Production Systems

5.7 Leachate Management System

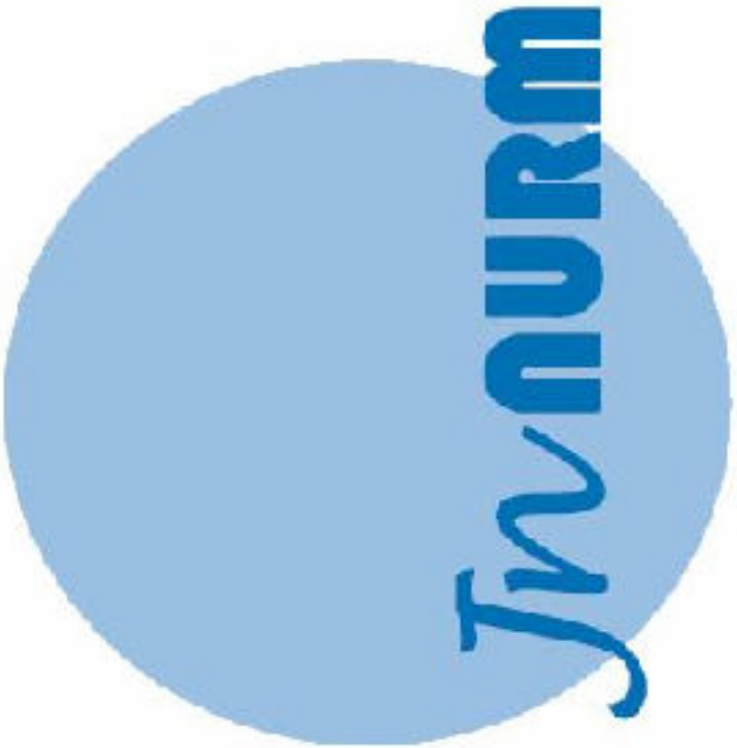
5.8 Water (tertiary treated sewage) availability details for carrying out O & M of the capped dumpsite.

5.9 Resettlement / action plan

5.10 If there are informal settlers (scavengers/waste pickers) at the disposal site, they should be relocated and an alternative livelihood provided for them. If there is an operating Materials Recovery Facility (MRF), these people can be formally hired since they are efficient in waste segregation.

Jawaharlal Nehru
National Urban Renewal Mission
Government of India

DETAILED PROJECT REPORT:
Preparation Toolkit
(SUB-MISSION FOR URBAN INFRASTRUCTURE AND GOVERNANCE)



Ministry Of Urban Development
GOVERNMENT OF INDIA

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Introduction

The Detailed Project Report (DPR) is an essential building block for the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in creating infrastructure and enabling sustainable quality service delivery. The DPR is to be prepared carefully and with sufficient details to ensure appraisal, approval, and subsequent project implementation in a timely and efficient manner.

This document provides a reference format for preparing DPRs/Project Reports across sectors. The major sections covered are as follows:

1. Sector background context & broad project rationale
2. Project definition, concept and scope
3. Project cost
4. Project institution framework
5. Project financial structuring
6. Project phasing
7. Project O&M framework and planning
8. Project financial viability/sustainability
9. Project benefits assessments

The key issues needing to be addressed and other relevant details are outlined separately for each section

General notes for use of this toolkit

i. This document provides a general reference framework for DPR preparation; additional relevant details are to be incorporated as per the requirements of the ULB city planners/ entity preparing the project report.

ii. The headings (the numbered section headings and sub-headings) for the DPR are to be as per this document. Any additional headings may be incorporated as per requirement.

iii. The Detailed Project Report is to be accompanied by a separate Executive Summary

iv. Within 30 days of clearance by the CSMC, the ULB/parastatal may arrange to digitize (create a soft copy of) the entire project report including drawings and forward the same to the Ministry of Urban Development (MoUD)

v. Further feedback and suggestions for improving the "DPR Preparation Toolkit" are welcome and may be suggested to the MoUD

1. Sector Background Context & Broad Project Rationale

Key issue for the section:
Have the relevant aspects of the sector (eg. Water supply sector, transportation sector etc) been adequately profiled and the context of the proposed project adequately explained?

The DPR needs to provide information covering the following areas:

1.1 Existing status of the physical infrastructure (brief description)

1.2 Base line information in terms of user coverage & access (by different user categories/segments including urban poor)

1.3 List of various projects proposed for the sector in the City Development Plan (CDP) and confirmation /explanation of how this project is aligned with stated CDP priorities

1.4 List of other capital expenditure projects supported by other schemes for the sector (sanctioned projects that have yet to commence as well as ongoing projects)

1.5 Existing tariff and cost recovery methods and extent of cost recovery

- Past five year trends
- Existing per unit cost; existing per unit service delivery price (in absolute terms and also on per capita basis)

(*The basis, assumptions and method of calculations in regard to the above are also to be provided)*

1.6 Existing areas of private sector/community participation in the sector for design, construction, project management, and/or O&M services (including billing & collection)

1.7 Any other qualitative information (eg list of key issues that are of importance to this sector and project; importance of the project to the sector, extent to which the project would address key issues/problems of the sector etc.)

2. Project Definition, Concept and Scope

Key issue:
Has the project concept been defined in a complete manner and its components/modules clearly delineated?

The proposed project needs to be clearly demarcated in terms of all its constituent sub-components.[1] (Several project DPRs specify only the "to-be-constructed" infrastructure component which does not represent the complete project) The project concept comprises several sub-components /elements including:

2.1 Land[2]

- Total quantum of land required and being provided for the project
- Confirmation that the required land is owned /already purchased by the ULB/parastatal; land title is to be clear and unencumbered.

2.2 Physical infrastructure components

(Please refer Annexure-1 for sector specific reference components)

The physical infrastructure of each project/DPR can be considered in terms of specific components. (component 1, component 2, component 3, …etc) These would be unique for each project and would also vary across sectors. For reference purposes, a wide range of sector specific project components have been provided in Annexure.1. The design, detailed engineering and drawings as applicable for the components are to be included in this section
These project components can also serve as a reference for "packaging of contracts" either individually, in parts, or through combinations.

2.3 Environmental compliance/protection measures/improvement measures

- Environment impact assessment
- Environment management plan

2.4 Rehabilitation and Resettlement[3]

2.5 Specialised procured services for design, independent supervision, and quality assurance

2.6 Other information

- Details of surveys and investigations required to be carried out (site, customer, etc)
- Assessment of requirements related to utilities shifting
- List of clearances and agencies from which these are to be obtained

[1] Such demarcation additionally serves to facilitate planning of (a) phasing and (b) costing
[2] Land cost is not funded by JNNURM ACA Grants (except for North-Eastern states & designated hilly states: Uttaranchal, J&K, HP)
[3] Rehabilitation and resettlement are not funded by JNNURM Additional Central Assistance (ACA) grants; ULB/state governments have to make their own arrangements.

- Disaster related risk assessment and broad countermeasures (including earthquake/other natural disaster resistant design of structures)

3. Project Cost

Key issue
Have all the relevant project costs been accounted for *in addition to costs of physical infrastructure construction works?*

The project (construction) cost should cover distinct elements, including but not limited to the specific components listed below:

3.1 Land acquisition/site development (Land acquisition is not covered by JNNURM ACA Grant-- except for North-Eastern and designated hilly states. In all other cases, land acquisition is to be completed prior to application for JNNURM support).

3.2 Physical infrastructure component-wise cost (should correspond to section 2.2)

3.3 Environmental compliance cost

3.4 Rehabilitation & resettlement cost (to be borne by ULB/ parastatal/ state government)

3.5 Cost of surveys & investigations

3.6 Cost of shifting utilities

3.7 Cost of consultancy services: (a) Design (b) Supervision (c) Quality Assurance

3.8 Other statutory compliance costs if applicable

3.9 Finance/interest cost during construction

3.10 Contingency

3.11 Any other

For all cost elements, assumptions (rates, methods of calculations etc) are to be clearly given either in the main text or as an attached appendix of the DPR.

Note:
(1) All cost heads are to be provided for in the DPR; if an element is not applicable, "0" may be put against it when entering actual figures. O&M costs are covered in a separate section; this section covers only capital cost.
(2) if survey cost are included in design cost (ie 3.7), this may be clearly specified to avoid double counting
(3) The project, for implementation purposes, can be broken into contract packages for tendering. This perspective of cost is being covered separately in the section on Project Institutional framework

4. Project Institution Framework (for construction)

Key issue
Have the institutional arrangements for project construction implementation been clearly specified?

The DPR needs to clearly specify the institutional arrangement details, including the information requested below:

4.1 Roles of different institutions involved in the construction phase of the project

(i) A Roles/responsibility matrix could be a convenient option to present this information.

(ii) The relationship between ULB on the one hand and parastatal or state government agencies on the other are to be made explicit. Innovative approaches to provide for improved coordination and/or working arrangements can be highlighted.

4.2 Manner of undertaking construction works

…ie whether construction works are envisaged to be undertaken:

(i) in-house through one of the Govt. agencies/parastatals' own staff OR

(ii) by being tendered out under the supervision/management of the ULB/ parastatal OR

(iii) through a separately established legal entity/project implementation company such as an SPV (Special Purpose Vehicle)

4.3 Involvement of the construction entity in the subsequent O&M activities

….ie whether the contracted entity undertaking construction works are also to be retained and involved in (any aspect of the subsequent) O&M phase

4.4 Areas of involvement of the private sector in the construction phase[4]

(tick mark as appropriate):

i	*Project Feasibility Study*	
ii	*Project Engineering Design*	
iii	*Specialized Surveys*	
iv	*Construction Works*	
v	*Supervision Consultants*	
vi	*Quality Assurance Consultants*	
vii	*Any Other Please Specify (Eg: Equipment Lease)*	

Additional information regarding the above can be provided. (in brief) if required.

[4] In case any of these activities are provided by govt. agencies (including autonomous agencies) specify their names and include the results as a part of section 4.1.

4.5 Construction "Packages" for works construction

Brief description of strategy for the overall works programme including information on indicative packages for tendering as per the following format:

Project implementation planning: Package-wise contracting relationships		
List: tender packages		**Cost**
Package No,	*Package Description*	*Estimate*
1		
2		
3		
4		
...n		
		Total:

Within 30 days of DPR approval by CSMC, a more detailed format is required to be submitted covering break down by tender packages, contract type, and corresponding estimates for cost, tendering time frame, and package-wise completion schedules *(Please refer Annexure-2 for the project implementation planning format)*

If possible, the complete information as per Annexure-2. may be presented in the DPR itself prior CSMC approval; this approach would expedite time towards project implementation.

5. Project Financial Structuring

Key issue
Have the sources of financial contribution of the ULB and state's share been clearly identified?
To what extent is there a comfort level that these sources have been tied up and would be available for the project?

The project financial structuring examines the sources and composition of funding for the project. For this section, the DPR needs to provide:

5.1 Overall Financial Structuring of the project

In this regard, the DPR should include information as per the table given below:

(1)	(2)	(3)	(4)	(5)	(6)	(7)
sn	**Govt**	**Project contribution source**	**Amount** *(Rs. Lakhs)*	**% share by specific source**	**% share by govt. entity**	**Remarks** on when and how state and ULB shares would be arranged
1	Central	ACA Grant				Not applicable
2	State	Grant towards its share in project				
3		Loan taken by state govt towards its share in project				
4	ULB/ Parastatal	Devolved funds				
5		Own surplus resource				
6		Debt/Term Loan taken from State govt.				
7		Debt/Term Loan taken from bank/FI				
8		Debt: from accessing capital market				
9		Private equity /community resource funding; others				
			Total amount	100%	100%	

Note:
(1) in case of SPV /separate project legal entity, equity share of each contributing entity including govt entities need to be specified
(3) Term loans and other private funding commitments: are required to be supported by sanction letter/agreement/in- principle letter of support containing the terms (for example: loan/debt should include details such as moratorium grace, interest rate, payment schedule of principal and interest etc).
(4) Column no. 6 refers to percentage distribution as per JNNURM guidelines as applicable for the city
(5) State Government's contribution commitment: are required to be supported by approval for sanction in the annual plan/state cabinet approval/ in principle letter of support from the state finance ministry
*(6) **Within 30 days of CSMC approval**, a quarterly forecast of when state and ULB contributions will be received in the project bank account is to be specified and forwarded to MoUD in the format as provided in **Annexure-3**.*

Project financial structuring can involve a combination of equity, grant, debt and finance from private participation (and in some cases, contribution from user communities)

5.2 Review of options for

- **Institutional debt** and/or
- **Private sector participation.**

The ULB, should ideally review the scope and options for possible debt and/or private sector financing while preparing the DPR. To provide a perspective in this regard, a brief overview of debt and private sector finance is given below:

The Debt Component

Supporting the capital cost of the project entirely by Grant and ULB internal sources (surplus) might not necessarily reflect the best manner of financing urban infrastructure projects. A debt component would-

(a) provide gearing and hence support a larger number/scale of infrastructure projects by the ULB and
(b) provide (an additional) project appraisal by the funding agency and hence contributes to risk reduction and improved project structuring
(c) contribute to project management discipline for the ULB, specially in the context of O&M management, user charge levy etc.

The Debt Component[5] can be from:

(a) general bank finance: however banks are unlikely to accord long tenure finance (these could typically be around eight years at a stretch)
(b) specially issued municipal bonds
(c) term loan from financial intermediary such as HUDCO, LIC, IL&FS, IDFC, SBI Caps ICICI bank; state level financial institutions (including those specific to development of urban infrastructure) etc

The ideal debt component is dependent upon a number of factors including the nature and sector of the project, project cash-flows as well as the financial condition of the municipality and financial management practices of the municipality. *However, several projects might be able to support at least a small debt component (such as 5-10% of the total project cost) and take advantage of the stated benefits.*

Private Participation in financing construction of infrastructure project

Private sector can be involved in financing (as well as managing the) construction of the infrastructure project and it can contribute towards the ULB or state share of finance This could be through -

(a) a *separate legal entity* created specifically for this purpose (SPV)
(b) a direct *BOT/BOOT arrangement* and its variant models with or without an SPV arrangement.

[5] institutional debt—ie loans other than from the central or state government

(c) a simple *management contract or lease based contract*

All variants involve payment to the private entity to enable them cost recovery of construction (and also for O&M). This could be in the form of:

(a) Private party being allowed direct recovery of user charges for a specified long term duration (say, for illustrative purposes only, 15-25 years)
(b) Private party being paid a fixed annuity (or on a fixed rate per unit quantity for service delivery undertaken) for its services over the specified term duration. The ULB can directly recover user charges or retain the option of contracting out billing and collection to a different private entity.

Linking construction with a long term O&M performance contract could provide the advantage of operational cost efficiency as well as accountability (including quality) for creating the original infrastructure asset.

All the models of private entity involvement envisages ULB/parastatal monitoring/supervision of outcomes. Hence the ULB/parastatal continues to be actively involved in these activities though its role is modified.

Private sector financing and /or debt financing helps the ULB to leverage the grant support funds provided by JNNURM. **The true spirit of JNNURM (in the project perspective) is to use funds to catalyse additional funds and ensure their efficient management**. **The ULB will need to examine various options for project structuring in this regard on a case to case basis** .Project proposals are hence no longer a simplistic case of detailing technical parameters supplemented by cost estimations based on an administratively defined schedule of rates.

In summary, for the section concerning project financial structuring, the DPR needs to provide:
5.1 Information as per the given tabular format
5.2 Confirmation that project planners have examined the scope and options for institutional debt (financing at the very least a small component of the total project cost) and/or private sector participation. Brief analysis and conclusions in this regard may be presented.

6. Project Phasing

Key issue
Has the project been adequately planned in terms of scheduling and phasing (including pre-construction commencement activities) and covering all relevant modules and components? Have all these activities been adequately thought through?

Planned schedules (as a part of the DPR) need to be prepared for the following types of activities (other activity heads can be included as per requirement of the city planners/project preparation team)

6.1 Schedule for tendering/selection for procurement of services:

(i) Construction contractors
Can be given in indicative terms in the DPR. This has to be firmed up and given in more specific detail within 30 days of CSMC approval--as per the package-wise contract implementation template[6] *(Refer Annexure 2)*

(ii) Consultants / firms for supervision and quality assurance

(iii) Consultants/firms for any other specialized activities that has to be carried out to fine-tune DPR/ undertake CSMC directed inclusions based on in-principle project approvals (eg: additional surveys, design activities etc. as applicable)

6.2 Schedule for bringing in State level and ULB level contributions to the project
Can be given in indicative terms in the DPR. This has to be firmed up and given in more specific detail within 30 days of CSMC approval as per template provided in **Annexure 3**

6.3. Schedule for obtaining all clearances (along with list of major clearances)

6.4. Schedule for shifting utilities

6.5 Project infrastructure component-wise implementation
For each of the component given in section 2.2 (Component1, Component2, Component 3……Component n)

The implementation schedules/work plan can be presented in a simple bar chart[7] on a quarterly basis, as shown below:

Bar Chart for Key Activities

S. No	Item	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10* …
1											
2											

**Additional Quarters to be introduced as per requirement*

[6] Already referred to in section 4.5
[7] Also referred to GANTT chart

Note:
(1) In case the project is to be commissioned (in parts) even before the complete project is constructed, then this can be made explicit in the phasing plan along with clarifying explanations.
(2) Contractor phasing as per Annexure-2: As already stated, this is to be provided within 30 days of CSMC approval of DPR. If possible, the complete information as per Annexure-3 may be presented in the DPR itself prior CSMC approval; this approach would expedite time towards project implementation.
(3) State and ULB fund contribution(reference Annexure- 3): same as the above ; The" in-principle" and other such documentary support provided at DPR stage would have to be converted into ***confirmed arrangements*** *within 30 days.*

6.6 For projects having a capital cost value of Rs. 25 crores plus, presentation of a PERT and CPM diagrams are required in addition to the Gantt charts.

The PERT chart provides a further detailed break down of activity tasks and milestones and the inter-relationship between tasks[8]. The PERT and CPM would be useful for the ULBs/parastatal both for project planning and subsequently for project management.

[8] These interlinkages could be defined in several ways such as:
SS: Start to Start; SF: Start to Finish; FS: Finish to Start: & FF: Finish to Finish

7. Project O&M planning

Key issue
Has the Project Report assessed the requirements and planned for long term O&M sustainability?

Long term project sustainability requires that long term O& M is planned in terms of
(a) Institution framework including billing & collection (organization & operations) strategy and
(b) Tariff and user-cost recovery (financial) strategy

7.1 Institution framework (organization & operations) strategy

The DPR is to incorporate/include information relating to the following five areas:

(i) The institution to be engaged in the O&M of the created infrastructure asset/enhanced infrastructure assets[9].

(ii) Brief outline of the existing method of billing & collection (including user/customer-segment wise differentiated strategy, if any)

(iii) Select performance metrics in regard to billing & collections (for the most recent completed financial year, and if possible, for the current quarter of the ongoing financial year)

- the billing/billable ratio (in terms of physical and financial units separately)
- cost of billing & collection (in absolute terms; as percent of total cost; and details of the cost break up)
- any other, if possible

(*The basis, assumptions and method of calculations in regard to the above are also to be provided)*

(iv) Brief description/analysis of the key issues and obstacles in regard to O&M (including billing/collection issues) and proposed countermeasures to overcome them for the sector in general and for the project in particular

(v) The scope for private entity/community /NGO to be involved in defined aspects of O&M for any specific/all components of the infrastructure asset.

- Private entity/ community entity/NGO can participate through a variety of models for performance based O&M (even without participating in the infrastructure construction; in this context, contract periods can be of shorter duration[10] since capital cost has not been borne by the private entities and to prevent service delivery complacency on the part of the contracted entities)

[9] In case project is of augmenting/partial revamping nature.
[10] Smaller period than the case when the private entity also finances capital asset construction

- The ULB can aim to promote competitiveness among an empanelled group of such entities and distribute geographical regions (eg identified ward areas) among a limited number of selected private/community based/NGO entities. This would enable comparisons of performance[11].

(vi) The DPR should explicitly define the requirements of manpower, energy, spares and consumables etc. for O&M on an annual basis giving details of existing usage, norms and proposed additional requirements..[12]

7.2 Tariff and user cost recovery

In regard to tariff and user cost recovery, the DPR is to provide:

(i) The tariff (revenue) model for each customer/user group for the sector (including underlying assumptions) and forecast growth of customer/ user groups over the next 20 years.

(ii) Unit cost of service and unit price (existing year and forecast for next 20 years)

(iii) Outline plan to restructure tariff system to any or all categories of user groups to comply with MoA requirement (institution of full cost recovery user charges)
In this regard, cross-subsidization requirements/ strategy if applicable are to be explicitly specified and addressed.
(*The basis, assumptions and method of calculations in regard to the above are also to be provided)*

[11] Citizens'/user segment feedback could be an important source of feedback for O&M activity specially service delivery.

[12] Codes, guidelines of respective nodal technical appraising agencies shall be referred for the respective sectors

8. Project Financial Viability & Sustainability

Key issue
Has the financial viability assessment taken into consideration both capital cost & O&M sustainability? Has it additionally taken into consideration the ULB financial situation?

The project viability assessment will be based on a combination of multiple perspectives as given below:

8.1 Overall project perspectives:

The DPR is to provide financial analysis for (Net Present Value) NPV and (Internal Rate of Return) IRR defined in the following two ways:

(i) *NPV & IRR (overall):* examines overall project viability, including finance cost and asset replacement cost
(ii) *NPV & IRR (O&M):* examines only O&M viability

The complete supporting project cash flow projections along with underlying assumptions have to be presented. (A reference project cash flow template is provided in **Annexure-4).**

The Project financial assessment should explicitly state the cost of capital considered and calculation method to arrive at the same

8.2 ULB level perspectives and financial situation assessment

The DPR is to provide the following information:

(i) ULB cash flow:

This includes a complete cash flow covering the last 5 years on an actual basis and projections for the next 20 years. The underlying assumptions for the projections also need to be mentioned (a reference format for ULB Cashflow is given in **Annexure 5)**[13].

An assessment of the annual impact of the project on the ULB's finances (i.e. revenue receipts, revenue expenditure, capital receipts and capital expenditure) for the Mission Period is to be provided showing the impact being high/medium/low (more than 20 %; between 20% and 5%; less than 5% respectively). The base year to be considered for this exercise is the last completed financial year. A format for providing the impact is given below:

[13] The ULB cash flow format has also been separately circulated to all cities as a part of updating/ standardizing their Financial Operating Plans (FoP). The FoP can be taken as the reference document and duly updated, if required

Sl. No.	Head	Impact Low/ Medium/ High (more than 20 %; between 20% and 5%; less than 5% respectively)						
		2005-06	2006-07	2007-08	2008-09	2009-20	2010-11	2011-12
1	2	3	4	5	6	7	8	9
1	Revenue Receipt							
2	Revenue Expenditure							
3	Capital Receipt							
4	Capital Expenditure							

Base Year: _____ (last completed financial year)

(ii) Debt situation assessment

This includes

- Debt schedules and terms for all debt taken (to be provided in Appendices to the DPR. (**Refer Annexure 6** of this document)
- Debt service coverage ratio (DSCR)
- Debt-equity ratio for the project and the ULB

(iii) Other financial information:

- Has the ULB been credit rated? If yes: provide the name of the rating agency, type of rating and existing rating details.
- In case of Special Purpose Vehicle (SPV) or Joint Venture (JV) as a separate legal project implementation entity, the Profit & Loss (P&L) Statement and Balance Sheet forecasts for the next 20 years shall be provided. In this context, the given project cash-flow template (as per Annexure 4) may be used as the initial reference format on which appropriate modifications can be made.

Note:
(1) The requirements for financial information under section 8.2 and elsewhere are applicable to parastatals (as well as to ULBs). The given formats may be appropriately modified for the organization entity context.

9. Project Benefits Assessment (Social Cost-Benefit Assessment)

The DPR is to provide the following:

9.1 **A list of benefits from societal perspective** (both social and economic) supported by:

(i) Explanation or description in qualitative terms

(ii) Quantification of these benefits to the extent possible (or wherever possible) along with underlying assumptions

Benefits are to be focused on project outcomes (in the context of the project outlays made) and specially on their impact on citizens/user segments covering elements such as:

- access	- supply continuity	-time savings
- coverage	- safety	-environment improvement
- service quality	- cost savings	-employment
- improved efficiency	- improved efficiency	- improved quality of life, etc.

The above are illustrative only with type of benefits being specific to a project/sector/region.etc.

9.2 **A list of "negative externalities**" (ie adverse impacts) from a societal perspective (both social and economic) supported by:

(i) Explanation or description in qualitative terms

(ii) Quantification of these negative/adverse impacts to the extent possible (or wherever possible) along with underlying assumptions
Examples of negative/adverse impacts include:

- pollution; environmental distortions
- reduced green cover
- reduced access to any specific user segments
- supply interruptions (especially during project construction phases) etc
- displacement of inhabitants
- disruption in livelihood /reduced employment/ labour redundancy
- possible haphazard development around/adjacent project site areas (eg resulting In slums)

The listing or identification of adverse impacts facilitates planning for possible countermeasures and also recognizes possible trade-offs in taking up the project

Note for (9.1) and (9.2)

(1) The Project Benefit/"dis-benefit" assessments should be carried out for the project life or at least consider a 20 year time frame

(2) For convenience, the following format may be considered (this is optional and is given for reference)

S.No	Benefits Description	Comments	Quantitative Impacts & Underlying Assumptions
	Societal Benefits		
1			
2			
3..etc			
	Societal adverse impacts		
1			
2			
3..etc			

The societal benefits and "disbenifits"(adverse impacts) streams should be projected for the time period specified (entire project life cycle or for a minimum of 20 years; it should ***not*** *be restricted to the construction period or for the Mission period only).*
(3) Benefits and adverse impacts identified ***must be specific and not generic/general statements.*** *Examples:*

- *if certain specific wards are benefiting from increased access, they should be identified*
- *if some specific sections of slum area or some specific slums are benefiting, these should be specifically identified.*

(4) Both direct and indirect societal impacts and assessments are to be considered (for benefits/ adverse impacts). This constitutes the "with project scenario" which has to be compared to the prior status or "without project scenario".
(4) Impact on the poor (including poor households & settlements) may be specifically highlighted/documented

9.3 Economic Internal Rate of Return (EIRR) (for projects above Rs. 100 crores or otherwise designated as considerably complex by the State Level Nodal Agency)

For projects above Rs 100 crores (or otherwise designated as considerably complex by the State Level Nodal Agency), structured estimation of the *Economic Internal Rate of Return (EIRR)* would be prescribed as a part of the Social Cost-Benefit Assessment. The EIRR would incorporate monetization of the identified (quantifiable) social benefits and adverse impacts and additionally provide for social perspective corrections to the costs and benefits considered for financial viability assessments. For projects where the EIRR is found to be less attractive or is a borderline case, and at the same time the project planners deem that there are substantial benefits which are intangible, then the project EIRR analysis is to be supported by detailed descriptive statements and assessments on such benefits.

For projects of less than Rs. 100 crore cost, the Benefits Assessment are to be as per 9.1 and 9.2 given above; with EIRR being optional.

Annexures

1. Sector specific infrastructure components (illustrative)

1.1 Water supply

1.2 Sewerage

1.3 Solid waste management

1.4 Preservation of water bodies

1.5 Drainage

1.6 Roads and Transport

1.7 Urban public transport

1.8 Urban renewal and heritage conservation

Scheduling related information to be provided either within DPR or at latest within 30days of DPR approval by CSMC

2. Project implementation planning: package-wise contracting

3. Project financial contribution planning

4. Project cashflow template

ULB/Parastatal Financial information

5. ULB cashflow template

6. Debt and Loan schedules

Annexure 1: Sector specific infrastructure components

Indicative components and subcomponents for infrastructure sectors are mentioned below, which will serve as guidelines for preparation of detailed project report and for tendering/packaging of projects as an individual component or in combination. Each component shall include all associated works for completion of the Component works.

1.1 Water Supply

S.No.	Major components	Sub-components
1	**Source Development**	
(i)		Type of source
(ii)		Diversion Structure
(iii)		Intake Structure
(iv)		Plant and Machinery (raw water pumps, motors, electrical, instrumentation, piping)
(v)		Other Structures (offices, housing, roads, etc)
2	**Raw Water Transmission System**	
(i)		Raw Water Transmission main (Pumping/Gravity)
3	**Water Treatment** (Civil works, Plant and Machinery)	
(i)		Inlet Works
(ii)		Primary Treatment (Aeration, Clarification)
(iii)		Chemical House and Dosing systems
(iv)		Rapid Mixing
(v)		Filter House, and associated plant and equipments
(vi)		Clear Water Reservoir and Pumping Station
(vii)		Chlorine House and chlorination systems
(viii)		Control Room and Laboratory
4	**Clear Water Transmission System**	
(i)		Transmission Main (Pumping/Gravity)
(ii)		Booster stations and Control rooms
5	**Service Reservoirs**	
(i)		Master balancing reservoir
(ii)		Ground Level Service Reservoirs
(iii)		Overhead Service Reservoirs
(iv)		Booster Stations / Control Rooms (Civil, Plant, Equipment)
6	**Distribution System**	
		Distribution pipeline

Note: The following details are also required in DPR

1. Raw Water Analysis Report
2. Source reliability study and report
3. DPRs for water supply projects are to be prepared as per guidelines given in the Manual on Water Supply and Treatment 1999, Ministry of Urban Development

1.2 Sewerage

S.No.	Major components	Sub-components
1	**Collection and Conveyance system**	
(i)		Sewer Network
(ii)		Manholes
2	**Sewage Pumping Stations**	
(i)		Civil Works-wet well and dry well
(ii)		Plant and Machinery
3	**Sewage Pumping Mains**	
(i)		Trunk Mains
4	**Sewage Treatment and Disposal** (Civil works, Plant and machinery)	
(i)		Primary Treatment
(ii)		Secondary Treatment
(iii)		Tertiary Treatment
(iv)		Sludge Treatment
(v)		Chlorination
(vi)		Gas collection system
(vii)		Recycle and reuse
(viii)		Disposal System
(ix)		Control room and laboratory

Note:

1. The following details are also to be included in the in DPR : Sewage Analysis Report

2. The DPRs for sewerage systems shall be prepared as per the guidelines given in the Manual of Sewerage and Sewage Treatment – 1993., Ministry of Urban Development

1.3 Solid Waste Management

S.No.	Major components	Sub-components
1	**Primary Collection**	
(i)		System of Collection (door-to-door collection, segregation of waste)
(ii)		Waste storage and collection bins (Household bins, Community bins)
(iii)		Primary collection vehicles (for collection and transfer to transfer stations)
2	**Transfer Stations**	
(i)		Development of Transfer Stations
(ii)		Equipment
3	**Transportation**	
(i)		Vehicles (for transfer from transfer stations to disposal site)
(i)		Vehicle Depot
4	**Disposal of Waste**	
(i)		Development of disposal site (land-fill site, compost plant, vehicle depot)
(ii)		Equipment at disposal site
(iii)		Recycling plant (briquette, waste-to-energy, etc)

1.4 Preservation of Water Bodies

S.No.	Components
1	**Embankment works and other civil works**
2	**Desilting/cleaning of water bodies**
3	**Desilting/cleaning of primary channels**
4	**Provision of facilities** (public facilities/refreshments/entertainments)

1.5 Drainage

S.No.	Components
1	**Roadside Drains** (cleaning, rehabilitation, new works)
2	**Major Drainage Channels** (desilting, cleaning, rehabilitation works, new works)
3	**Disposal** (desilting, cleaning, rehabilitation works at receiving water body)

Note: The DPR for drainage systems shall be prepared as per the guidelines given in the Manual of Sewerage and Sewage Treatment – 1993., Ministry of Urban Development

1.6 Roads and Transport

S.No.	Components	Sub-components
1	**Road works with drainage**	
(i)		ROW availability and utility shifting
(ii)		Road work
(iii)		Drainage work
(iv)		Street lights/signals
(v)		Street furniture
(vi)		Painting/Markings/Signages
2	**Bridges**	
(i)		Bridge work
(ii)		Lighting
(iii)		Painting/markings/signages
3	**Flyovers/ROBs/RUBs**	
(i)		Flyover/ROBs/RUBs work
(ii)		Lighting
(iii)		Painting/markings/signages
4	**Terminals**	
(i)		Area demarcation
(ii)		Civil work
(iii)		Access
(iv)		Provision of basic urban services (Water Supply, Drainage Network, Sewerage Network, Solid Waste Collection, other Service lines and Ducts)
5	**Other Infrastructure development**	
(i)		Street lighting
(ii)		Signalization
(iii)		Junction improvement
(iv)		TSM
(v)		Parking

Note:

1. The DPR for Roads and Transport project shall in general be in line with the National Urban Transport Policy and shall refer to the MORTH guidelines and IRC codes as applicable.
2. Detailed engineering design of project component shall include but not be limited to:
   - General drainage conditions, HFL, water level
   - Traffic analysis, traffic growth, desire line based on O-D survey, traffic flow diagrams.
   - Evaluation of alternative proposals/structural solutions

- Characteristics of existing facility and integration with new facility supported with maps
- Design life
- Planning and design criteria considering overall scenario
- Layout plan, GAD and detail drawings.
- Cost estimate-assumptions, basis of adoption of rates supported with rate analysis
- Source of construction material

1.7 Urban Public Transport

S.No.	Components
1	**Corridor development** (BRTS, MRTS, multi-modal etc.)
2	**Ridership estimate**
3	**System requirement**
4	**Fleet Requirement**
5	**Stations/Terminals/depots** (Civil works, Tools and Plant for maintenance)
6	**Other associated infrastructure for operation and maintenance**

1.8 Urban renewal and heritage conservation

S.No.	Major components	Sub-components
1	**Public space/Area improvement and conservation scheme**	
(i)		Provision of basic urban services (Water Supply, Drainage Network, Sewerage Network, Solid Waste Collection, other Service lines and Ducts)
(ii)		Provision of Amenities
(iii)		Street Furniture and Lighting
(iv)		Landscaping
(v)		Access Pathways, Pavements, and Roads
(vi)		Parking Areas
(vii)		Information System
2	**Restoration Works**	
(i)		Public Space
(ii)		Street façade
(iii)		Building, Monument, and Structure
(iv)		Street Furniture
(v)		Pavements and Landscape Elements
(vi)		Water Bodies
(vii)		Waterfront or Ghats
(viii)		Hillocks, Forests, Sacred Groves, and other natural features.

Annexure 2: Project implementation planning: package wise contracting relationship

Project implementation planning: Package-wise contracting relationships						
list: tender packages		**contract type**	**Cost**	**tendering**		**Completion**
package no,	package description	unit rate/ turnkey/ percentage/ others	estimate	release date (month & year)	award date (month & year)	scheduled date (date & month)
1						
2						
3						
4						
5						
6						
7						
…n						
			Total:			

Annexure 3: Schedule for financial contribution and sources

Proposed project schedule – to be provided wither within DPR or at latest within 30 days of DPR approval by CSMC

	Financial contribution and sources table *(in Rs. Lakhs)*															
S. No	**Sources**	**FY 06-07**					**FY 07-08**					**FY 08-09**	**FY 09-10**	**FY 10-11**	**FY 11-12**	**Total**
		Q1	**Q2**	**Q3**	**Q4**	**Total**	**Q1**	**Q2**	**Q3**	**Q4**	**Total**					
		Scheduled month and amount					scheduled month and amount					scheduled amount	scheduled amount	scheduled amount	scheduled amount	scheduled amount
1	GoI															
2	State															
3	ULB															
4	Others															
	Total															

Note (for filling table):
(1)For year of sanction of project and following year, provide quarterly schedule (month- year and amount),. For subsequent years provide annual schedule month-year and amount

Annexure 4 Project cashflow template (including optional templates)

Annexure 4A

PROJECT CASH FLOW FOR JNNURM											
Particulars	**Block 1 - JNNURM Duration**							**Block 2 - Beyond JNNURM Duration**			
	2005-06	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**……..2024-25**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12-21**
Cash Flow during Construction phase											
Inflows											
Central Government Grant – JNNURM											
State Government Grant											
ULB's own contribution											
Loans from banks/ FIs											
Debentures/ Bonds											
Beneficiary contribution											
Others (Please specify)											
Sub Total (A)											
Outflows											
Capital expenditure (Note 1)											
Interest during construction											
Project related Establishment charges											
Others (Please specify)											
Sub Total (B)											
Net cash flow during Construction phase (A-B)**(C)**											
Cash Flow during O & M phase											
Inflows											
User charges											
Revenue grant from State Government											
Other income (Please specify)											
Income earmarked for the project (Note 2)											
Others (Please specify)											
Sub Total (D)											
Outflows											
Establishment charges											
O & M charges (Note 3)											
Loan repayments (Principal)											
Interest											
Others (Please specify)											
Sub Total (E)											
Net cash flow during O & M phase (D-E) **(F) (Note 4)**											
NPV and IRR (O&M)											
Net cash flow during Construction and O & M phase (C+F) **(G)**											
NPV and Project IRR (overall)											

Note:

1. Provide details in Annexure 4B (optional)
2. Income earmarked for the project includes those own sources of income for the organisation which is earmarked for O&M or loan repayment of the project
3. Provide details in Annexure 4C (optional)
4. NPV and IRR (O&M) should be calculated after adding back the amount of Loan repayments (Principal)

Annexure 4B

Details of Capital Expenditure											
	2005-06				2006-07				…… (entire construction phase)		
Particulars	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	……		
Land acquisition											
Rehabilitation and Resettlement											
Civil works											
Administrative buildings											
Plant and Machinery											
Technical/ Supervision/ Other consultancies											
……..											
……..											
Total											

Annexure 4C

Details of Operation & Maintenance Charges											
Particulars	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**……...2024-25**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12-21**
Electricity charges											
Petrol, Oil and Lubricants											
Rent, Rates and Taxes											
Consultancy/ Professional charges											
Office-Maintenance											
Communication Expenses											
Billing and Collection											
Printing and Stationery											
Insurance											
Consumption of Stores											
Repairs and Maintenance											
Annual maintenance charges											
Patents and Royalties											
Bank charges											
……..											
……..											
Total											

Annexure 5 : ULB Cash-flow Template

" Name" of the Urban Local Body																									
S.No	Particulars	Actual					Projected																		
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14 to 2019-20							2020-21 to 2024-25				
		Rs in Lakhs					Rs in lakhs							Rs in lakhs							Rs in lakhs				
	Indicate status of accounts (**A**- Audited and **U**-Unaudited) →																								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
O	***Opening Balance (O)****																								
A	**Revenue Income**																								
A-1	Tax Revenue																								
A-2	Non-Tax Revenue																								
A-3	Assigned Revenue and Compensations																								
A-4	Grants, Contributions and Subsidies																								
A-5	Other Income																								
TA	**Total**																								
B	**Revenue Expenditure**																								
B-1	Establishment Expenditure																								
B-2	Administrative expenditure																								
B-3	O & M Expenditure																								
B-4	Interest and Finance charges/Debt servicing (only interest)																								
B-5	Grants/contributions to allied institutions																								
B-6	Other Expenses																								
TB	**Total**																								
X	***Revenue Surplus/(Deficit) (A-B)(X)***																								
C	**Capital Income and Borrowings**																								
C-1	Grants/Contributions for capital works																								
C-2	Loans/Borrowings (deduct principal repayments)																								
C-3	Deposit works (grants received)																								
C-4	Others																								
TC	**Total**																								
D	**Capital Expenditure**																								
D-1	Capital Works																								
D-2	Deposit works (expenditure incurred)																								
D-3	Transfer to Reserves																								
D-4	Investments (deduct sale)																								
D-5	Stores/Inventory																								
D-6	Others																								
TD	**Total**																								
Y	***Capital Surplus/(Deficit) (C-D)(Y)***																								
C	***Closing Balance** (O+X+Y)*																								
Note:	*Opening Balance of cash-in-hand and cash at bank , **Closing Balance of of cash-in-hand and cash at bank																								

Annexure 6 : Loan Schedules and Loan Ageing

Annexure 6 A

Rs. Lakhs

Long Term Debt Situation of ULB/Parastatal																
Details of loans & borrowings					**Overall Status**		**Repayment Schedule**									
Loan	Source	Year taken	Original loan amount	Terms in brief	Total Loan outstanding	Total arrears	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
loan1																
loan2																
loan3																
loan4																
loan5																
….n																

Notes

1 Loan refers to long term loans ie having tenure of greater than 1 year

2 Repayment schedule of the 10 year time frame is being requested

3 Terms cover: tenure, interest rate, moratorium period, total repayment period

4 Original loan amount to cover only principal

5 Total loan outstanding includes principal and interest

Annexure 6 B

Long Debt Situation of ULB/Parastatal: Aging Analysis of Total Arrears								
Details of loans & borrowings					**Aging Analysis (in years)**			
sLoan	Source	Year taken	Total Loan outstanding	Total arrears	< 3 Years	3-5 Years	5-10 Years	>10 Years
loan1								
loan2								
loan3								
loan4								
loan5								
….n								

Public Private Partnership

in

Integrated Development and Operation

of

Sewage Treatment Plants and Faecal Sludge Management System

under

Hybrid Annuity Model

MODEL CONCESSION AGREEMENT

**** [Month], 20****

[Executing Agency],

Government of [Name of the State]

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CONCESSION AGREEMENT

This Concession Agreement (**Agreement**) is executed on this [●] day of [●] Two Thousand and ***[YEAR]*** at ----------:

AMONGST

(1) ***[Executing Agency],*** a statutory body constituted under the ***[Act under which the Executing Agency is established]*** with its registered office at ***[Address of Executing Agency]***. (hereinafter referred to as ***[Executing Agency]***, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(2) ***[Name of the State / National Level Agency, if any]***[1], a statutory body constituted --------, with its registered office at ---------- (hereinafter referred to as ---------, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(3) [_____[***insert name of the Concessionaire***], a company organized, incorporated, registered and existing under the Companies Act, with its registered office at _____ [***insert address***] acting through _____, _____ [***insert name of the authorised signatory and his/her designation***] duly authorized by resolution dated _____ ***[insert date of the Board Resolution***] (hereinafter referred to as the **Concessionaire**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns)

[Executing Agency], ***[Name of the State / National Level Agency, if any]*** and the Concessionaire shall collectively be referred to as the **Parties** and individually as a **Party**.

WHEREAS:

A. ---------- (Brief about the genesis of the project).

B. ***[Executing Agency]*** has the power to ***[Powers & Authority with the Executing Agency]*** in state of ***[Name of State where the Executing Agency is established]***. With a view to implement the ----------(Name of the project/scheme), ***[Executing Agency]***in association with the ***[Name of the State / National Level Agency, if any]***, has decided to undertake integrated development, operation and maintenance of Sewage Treatment Plant(s) (the **"STP"**) and Faecal Sludge Treatment Plant(s) (the **"FSTP"**) and the collection and transportation of faecal sludge, with a proposed Design Capacity of ***[Capacity of STP in MLD]*** MLD of STP and [***Capacity of FSTP in MLD***] MLD of FSTP, along with other Facilities and Associated Infrastructure at ***[Location(s)]***, on a PPP basis, through a hybrid annuity model (the **"HAM"**).

C. For this purpose, ***[Executing Agency]*** intends to engage a concessionaire who will design, develop, part-finance, construct, operate and maintain the Facilities on the ***[Location(s)]*** Facilities Sites, and after the expiry of the Term, transfer the Facilities (the "**DBFOT**") to ***[Executing Agency]***, in accordance with this Agreement (collectively the "**Project"**).

[1] If there is a State Level/National Level intermediate agency funding the project and such an entity is part of the contract/procurement process the name of that agency can be inserted here. Otherwise all references to the National/State Level agency in the document are to be deleted.

D. The ***[Executing Agency]*** had accordingly invited proposals under its {Request for Proposals/ Request for Qualifications} No. _____][2] dated [●] (the "**Request for Proposals/Request for Qualification**" or "**RFP/RFQ**") for shortlisting of bidders for undertaking the development, operation and maintenance of the Project on DBFOT basis and had shortlisted certain bidders including *inter alia*, the {the selected bidder/consortium comprising ……. and ……. (collectively, the "**Consortium**") with …… as its lead member (the "**Lead Member**").

E. Pursuant to the terms of the RFP, ***[Executing Agency]*** received proposals from various bidders, including a proposal submitted by the Selected Bidder on ***[insert date]***.

F. Following a process of evaluation of qualification proposals and financial proposals submitted by the bidders (including the Selected Bidder), ***[Executing Agency]*** has on ***[insert date]*** accepted the proposal submitted by the Selected Bidder for the development of the Project. Subsequently, ***[Executing Agency]*** has issued the letter of award dated ***[insert date]*** to the Selected Bidder (the "**LOA"**).

G. The Selected Bidder has accepted the LOA and has agreed to undertake the Project in accordance with the terms of this Agreement.

H. The Selected Bidder has incorporated a special purpose vehicle to act as the Concessionaire, to implement the Project and perform the obligations and exercise the rights of the Concessionaire, including the obligation to enter into this Agreement.

J. ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** have agreed to enter into this Agreement with the Concessionaire for implementation of the Project, subject to and on the terms and conditions set out in this Agreement.

IT IS AGREED as follows:

[2]To be inserted upon issuance of the RFP/ RFQ.

ARTICLE 1
DEFINITIONS AND INTERPRETATION

1.1 Definitions

Acres	means a unit of land area equal to 43,560 sq.ft.
Additional Performance Security.	means a performance security that must be submitted by the Selected Bidder to ***[Executing Agency],*** together with the Performance Security and ESHS Performance Security to secure the obligations of the Concessionaire/Bidder in relation to the Clause 16.5 of the RFP document.
Adjoining Property	means any land and/or property adjoining or adjacent or any part of the Site, including all conduits, roads, footpaths, walls, fences, buildings and other erections, structures and other apparatus on, under or within such land and/or property.
Adjusted DG Set Units	has the meaning ascribed to it in Clause 9.4(g)(ii)(B)(II).
Adjusted Equity	shall mean the Equity funded in Indian Rupees and adjusted on the first day of the current month (the "**Reference Date**"), in the manner set forth below, to reflect the change in its value on account of depreciation and variations in WPI, and for any Reference Date occurring: (a) on or before COD of the Facilities, the Adjusted Equity shall be a sum equal to the Equity funded in Indian Rupees and expended on the Project, revised to the extent of one half of the variation in WPI occurring between the first day of the month of Effective Date and the Reference Date; (b) from COD and until the [4th (fourth)] anniversary thereof, an amount equal to the Adjusted Equity as on Project COD shall be deemed to be the base (the "**Base Adjusted Equity**") and the Adjusted Equity hereunder shall be a sum equal to the Base Adjusted Equity, revised at the commencement of each month following Project COD to the extent of variation in WPI occurring between COD and the Reference Date; and (c) anytime after the [4th (fourth)] anniversary of COD, the Adjusted Equity hereunder shall be a sum equal to the Base Adjusted Equity, reduced by [x% (x per cent)][3] thereof at the commencement of each month following the [4th (fourth)] anniversary of COD and the amount so arrived at shall be revised to the extent of variation in WPI occurring between COD and the Reference Date; For the avoidance of doubt, the Adjusted Equity shall, in the event of Termination, be computed as on the Reference Date immediately preceding the Transfer Date; provided that no reduction in the Adjusted Equity shall be made for a period equal to the duration, if any, for which the Term is extended, but the revision on account of WPI shall continue to be made;
Affected Party	means the Party affected by a Force Majeure Event.

[3] This number may be arrived at upon dividing 100 by the number of months comprising the Term rounded off to two decimal points.

Applicable Laws	means the Constitution of India and all and any laws, enacted or brought into force and effect by the GoI, any State Government (including the ***Go[xx]***), any Government Authority or any local government having jurisdiction over the Parties, the Site or the Project, including rules, regulations and notifications made thereunder, and judgments, decrees, injunctions, writs and orders of any court of record, as may be applicable to the execution of this Agreement and the performance of the respective rights and obligations of the Parties, as may be in force and effect during the subsistence of this Agreement. For the avoidance of doubt, and without in any way limiting the generality of thefore going, Applicable Laws shall include the EPA, the EPA Rules and the***[Act under which the Executing Agency is established]*** Act.
Applicable Permits	means any permissions, clearances, concessions, authorizations, consents, licenses, permits, rulings, exemptions, no objections, resolutions, filings, orders, notarizations, registrations or approvals of whatsoever nature that are required to be obtained from time to time in connection with the Project, and for generally performing the obligations contemplated by this Agreement in accordance with the Applicable Laws, as set out in Schedule 8.
Appointed Date	means the date of signing of this Agreement.
Arbitration Act	means the Arbitration and Conciliation Act, 1996, as amended from time to time.
Article	means an article of this Agreement.
Associate	means, in relation to the Concessionaire, [the Selected Bidder or a Member of the Selected Bidder], a Person who Controls, or is Controlled by, or is under the common Control of the same Person who controls the Concessionaire, the Selected Bidder or Member of the Selected Bidder, as the case may be.
Associated Infrastructure	means infrastructure facilities associated with operation of ***[Location]*** STP(s) and ***[Location]*** FSTP(s), including but not limited to Sewage pumping stations (including main pumping stations, intermediate pumping stations and any other pumping stations) and the rising mains, as described in greater details in technical specifications of each STP and FSTP in relevant Facilities Schedule, and the GPS-enabled vehicles, machinery, equipment and facilities for the entire sanitation value chain with containment, extraction, door-to-door collection, transportation, treatment, and disposal / re-use of all faecal sludge, septage and other liquid waste and their by-products and end-products, which need to be constructed and/or operated and maintained by the Concessionaire in accordance with this Agreement, and complete such infrastructure as lighting, ancillary infrastructure, other functional building such as administrative building etc., if any, for the STP(s) and FSTP(s).
Availability	means the availability of the Facilities to convey, accept and treat the Sewage, as determined in accordance with Clause 8.12(a)(i) and the term '**Available**' shall be construed accordingly.
Availability Liquidated Damages	means the liquidated damages payable by the Concessionaire to the ***[Executing Agency]*** for failure to achieve the Guaranteed Availability, in accordance with Clause 8.12(a)(v).
Basic Engineering Designs	means the following designs and documents to be submitted by the Concessionaire and approved by the ***[Executing Agency]*** as a Condition Precedent: (a) process description, process calculations,

	(b) hydraulic calculations; (c) list of design codes and standards; (d) master drawing schedule; (e) drainage design; (f) STP(s)/FSTP(s) Facilities layout; (g) process flow diagram; (h) hydraulic flow diagram; (i) mass balance diagram; (j) process and instrumentation diagram; (k) tentative single line diagram; (l) electrical load list.
Bid	means the bid consisting of the Qualification Proposal and the Financial Proposal submitted by a Bidder for qualification and award of the Project.
Bid Due Date	means the last date of submission of the Bids as set out in the RFP.
Bid Process	means the single-stage bidding process, with two sub-stages, undertaken by the ***[Executing Agency]*** to award the Project to the Selected Bidder on the terms and conditions set out in the RFP. The Bid Process commenced with the issuance of the RFP and ends on the Appointed Date.
Bid Price	means the price calculated for each Bidder, based on the values provided by such Bidder in the Bid Price Sheet, as a part of its Financial Proposal, to design, finance, develop, construct, rehabilitate, operate, and maintain the ***[Location]*** Facilities.
Bid Project Cost	means INR [_____] (Rupees [_____]), being the cost of construction of the ***[Location]***Facilities, as quoted by the Selected Bidder in its Bid, which includes the interest during construction, Taxes and all other pre-operative expenses in relation to the ***[Location]*** Facilities.
BOD	means biochemical oxygen demand.
Business Day	means any day other than Saturday, Sunday or any public holiday, on which the ***[Executing Agency]*** and the banks are open for business in ***[Location]***
Capex Annuity	means the amount payable to the Concessionaire per quarter during the O&M Period, towards reimbursement of [60% (sixty per cent)] of the ***[Location]*** Facilities Completion Cost.
Capital	means, in respect of the Concessionaire, the total capital of the Concessionaire that will be raised by the issuance of equity shares, preference shares and convertible instruments.
Change in Law	means the occurrence of any of the following events after the Bid Due Date: (a) the modification, amendment, variation, alteration or repeal of any existing Applicable Law; (b) the enactment of any new Applicable Law or the imposition, adoption or issuance of any new Applicable Law by any Government Authority; (c) changes in the interpretation, application or enforcement of any Applicable Law or judgment by any court/Government Authority; (d) the introduction of a requirement for the Concessionaire to obtain any new Applicable Permit or the unlawful revocation of an Applicable Permit; or (e) the introduction of any new Tax (including goods and services tax) or a change in the rate of an existing Tax.

	It is clarified that Change in Law shall not include any change in the (Indian) Income Tax Act, 1961 with regard to the taxes on the income of the Concessionaire.
Clause	means a clause of this Concession Agreement.
COD Certificate	means the certificate issued by the ***[Executing Agency]*** to the Concessionaire upon issuance or deemed issuance of the Trial Operations Completion Certificates for the ***[Location]***Facilities and satisfaction of the conditions set out in Clause 7.15(a).
Commercial Operations Date or **COD**	means the date on which the COD Certificate is issued or deemed to be issued to the Concessionaire in accordance with Clause 7.15(a).
Companies Act	means the (Indian) Companies Act, 1956 or the (Indian) Companies Act, 2013, as amended from time to time, as the context may require.
Completion Cost	means the cost of completing the construction of the ***[Location]***Facilities, as calculated in accordance with Clause 9.4(b).
Concessionaire	has the meaning ascribed to it in the array of Parties.
Concessionaire Applicable Permits	means the Applicable Permits which are required to be obtained and maintained by the Concessionaire to develop, operate and maintain the Facilities, as set out in Schedule 8.
Concessionaire Event of Default	has the meaning ascribed to it in Clause 16.1.
Concessionaire Related Parties	means any of the following: (a) the Selected Bidder or Associates of the Selected Bidder; (b) an officer, servant, employee or agent of the Concessionaire acting in that capacity; (c) any Subcontractor engaged by the Concessionaire and their directors, officers, servants, employees or agents acting in that capacity; or (d) any Person acting on behalf of the Concessionaire.
Concessionaire's Representative	means the Person nominated by the Concessionaire, from time to time, to act on its behalf and liaise with ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** for the purposes of this Agreement and notified as such in writing to ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]***.
Conditions Precedent	means collectively, the obligations of the Concessionaire that are set out at Clause 3.2, the obligations of ***[Executing Agency]*** that are set out at Clause 3.3 and the obligations of ***[Name of the State / National Level Agency, if any]*** that are set out at Clause 3.4, and '**Condition Precedent**' means any one of these.
Confidential Information	means any part of this Agreement, or any information contained therein or any material provided to any Party pursuant to this Agreement, all of which information shall be deemed to be confidential, except to the extent that this Agreement otherwise requires.
Construction Completion Certificate	means the certificate issued by ***[Executing Agency]*** to the Concessionaire to certify completion of construction of the ***[Location]*** Facilities and the satisfaction of all other conditions required to be fulfilled by the Concessionaire in accordance with Clause 7.13(c).
Construction Completion Date	means the date on which the ***[Location]*** Facilities Construction Completion Certificate is issued or deemed to be issued to the Concessionaire, in accordance

	with Clause 7.13(c) (iii), and the reference to **Construction Completion Date** shall be construed accordingly.
Construction Payments	means, for each Facilities, the payments to be made to the Concessionaire during the Construction Period, upon satisfactory completion of the Payment Milestones, which shall, in aggregate, be equivalent to 40% of the Bid Project Cost, as adjusted from time to time to reflect the variation in the Construction Price Index.
Construction Period	has the meaning ascribed to it in Clause 7.1
Construction Plan	means the detailed construction plan for the ***[Location]*** Facilities to be prepared by the Concessionaire, which will set out the work to be performed by the Concessionaire to achieve each of the ***[Location]*** Facilities Payment Milestones, in a manner such that the Facilities are completed on or prior to the Scheduled Construction Completion Date. The Construction Plan shall be approved by ***[Executing Agency]*** in accordance with Clause 7.3.
Construction Price Index	shall comprise: (a) 70% of WPI; and (b) 30% of CPI(IW), which constituents may be substituted by such alternative index or indices as the Parties may mutually agree.
Control	means, with respect to a Person: (a) the ownership, directly or indirectly, of more than 50% of the voting shares of such Person; or (b) the power, directly or indirectly, to direct or influence the management and policies of such Person by operation of law, contract or otherwise, and the term '**Controlled**' shall be construed accordingly.
Cost	means all documented expenditure reasonably incurred by the Concessionaire, whether on or off the Site, including overhead and similar charges, but does not include profit.
CP Long-Stop Date	has the meaning ascribed to it in Clause 3.5(a)
CPI(IW)	means the Consumer Price Index for Industrial Workers published by the Labour Bureau, GoI and shall include any index which substitutes the CPI(IW), and any reference to CPI(IW) shall, unless the context otherwise requires, be construed as a reference to the CPI(IW) published on the last date of the preceding quarter.
Debt Due	means the aggregate of the following sums expressed in Rupees outstanding on the date of issuance of the Notice of Intent to Terminate: (a) the principal amount of the debt provided by the Lenders under the Financing Documents for financing 45% of the Bid Project Cost but excluding any part of the principal that had fallen due for repayment 2 years prior to the date of the Notice of Intent to Terminate, as set out in the Financial Package; (b) all accrued interest, financing fees and charges payable under the Financing Documents on, or in respect of, the debt referred to in (a) above until the date of the Notice of Intent to Terminate but excluding (i) any interest, fees or charges that had fallen due 1 year prior to the

	date of the Notice of Intent to Terminate, (ii) any penal interest or charges payable under the Financing Documents to any Lender, and (iii) any pre-payment charges in relation to accelerated repayment of debt except where such charges have arisen due to an ***[Executing Agency]*** Event of Default or an ***[Name of the State / National Level Agency, if any]*** Event of Default; and (c) any Subordinated Debt which is included in the Financial Package and disbursed by Lenders for financing the Bid Project Cost; provided that if all or any part of the Debt Due is convertible into equity at the option of Lenders and/or the Concessionaire, it shall for the purposes of this Agreement be deemed to be Debt Due even after such conversion and the principal shall be dealt with as if such conversion had not been undertaken. For the purpose of calculating Debt Due: (i) the aggregate of the principal amounts of the debt provided by the Lenders under the Financing Documents shall, in no event, exceed 45% of the Bid Project Cost; and (ii) any amount of Debt Due in foreign currency as on the date of the Notice of Intent to Terminate shall be converted to Rupees at the exchange rate published on the official website of the Reserve Bank of India as at 12 noon on the relevant date.
Default Liquidated Damages	means the Delay Liquidated Damages, Availability Liquidated Damages, Performance Liquidated Damages, and the Power Consumption Liquidated Damages.
Delay Event	has the meaning ascribed to it in Clause 7.11(b).
Delay Liquidated Damages	has the meaning ascribed to it in Clause 7.12(a).
Design Capacity	means the average flow of Sewage and Faecal Sludge / Septage that the ***[Location]*** Facilities should be designed to handle and treat in a day, which, for the ***[Location]*** Facilities shall be ***[Capacity of the proposed STP(s) and FSTP(s) in MLD]*** MLD.
Designs and Drawings	means, collectively, the Phase I Designs and Drawings and the Phase II Designs and Drawings.
DG Sets	means the backup diesel generators set maintained by the Concessionaire at the Site, to ensure continuous supply of power for the operation of the Facilities, when the supply of power from the grid is not available.
Digested Sludge	means the sludge which is obtained after the treatment and digestion of the Sewage and Faecal Sludge / Septage at the ***[Location]***STP(s) and FSTP(s).
Direct Political Force Majeure Events	has the meaning ascribed to it in Clause 14.1(b)(iii).
Discharge Points	means the points at which the Treated Effluents from the STP(s) and FSTP(s) will be discharged, as set out in the Schedule 12 (Technical Specifications), and

	'Discharge Point' shall mean any of these.
Discharge Standards	means, for each ***[Location]*** Facilities, the minimum standards set out in the Technical Specifications that the Treated Effluent and Digested Sludge must comply with.
Dispute	has the meaning ascribed to it in Clause 21.1.
Dispute Meeting	has the meaning ascribed to it in Clause 21.1.
Dispute Notice	has the meaning ascribed to it in Clause 21.1.
Effective Date	means the date on which all the Conditions Precedent have been satisfied by ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]*** and the Concessionaire in accordance with this Agreement.
Emergency	means a condition or situation that endangers, or which in the reasonable opinion of ***[Executing Agency]***, the Project Engineer or the Concessionaire, may endanger the environment or lives or security of people at or around the Site or that poses an imminent threat of material damage to any property (including the Facilities) at or around the Site.
Encumbrance(s)	means mortgage, charge, pledge, lien (statutory or otherwise), assignment by way of security, hypothecation, right of set-off, trust, priority, retention of title or ownership or other security interest and any other agreement or arrangement having substantially the same effect.
EPA	means the Environment (Protection) Act, 1986, as amended from time to time.
EPA Rules	means the Environment (Protection) Rules, 1986, as amended from time to time.
Equity	means the sum expressed in INR, i.e. Indian National Rupee, representing the paid-up equity share capital of the Concessionaire for meeting the equity component of its financial obligations under this Agreement and the Financing Documents, which, for the purpose of this Agreement, shall include convertible instruments that shall compulsorily convert into equity share capital and any loans provided by any shareholder of the Concessionaire.
Escrow Account	means the interest-bearing account opened by ***[Name of the State / National Level Agency, if any]*** with the Escrow Bank in accordance with the Escrow Agreement, which shall be operational until the expiry of the Term.
Escrow Agreement	means the agreement to be executed among ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]***, the Concessionaire, and the Escrow Bank in relation to the opening and operations of the Escrow Account, in the form set out at Schedule 3.
Escrow Bank	means the Scheduled Bank with which ***[Name of the State / National Level Agency, if any]*** opens the Escrow Account, pursuant to the Escrow Agreement.
ESHS	means Environment, Social, Health and Safety requirements, including any requirements, which the Concessionaire is required to comply with in developing, renovating, operating and maintaining the Facilities, as set out in Schedule 9.
ESHS Documents	means, collectively, the Safeguard Documents and Safety Documents prepared by the Concessionaire and approved by ***[Executing Agency]*** in accordance with Clause 7.4.
ESHS Performance Security	has the meaning ascribed to it in Clause 5.1.
ESMF	means the Environment and Social Management Framework agreed with the -----

	---------(name of the agency if any)[4], available at http://---------- .
Event of Default	means***[Executing Agency]*** Event of Default, ***[Name of the State / National Level Agency, if any]*** Event of Default or a Concessionaire Event of Default, as the context may require.
Executing Agency	means the ***[Executing Agency]*** , a statutory body constituted under ***[Act under which the Executing Agency was constituted]***.
***[Executing Agency]* Applicable Permits**	means the Applicable Permits which are required to be obtained by ***[Executing Agency]*** to undertake the Project, as set out in Schedule 8.
***[Executing Agency]* Event of Default**	has the meaning ascribed to it in Clause 16.3.
***[Executing Agency]* Related Parties**	means any of the following: (a) an officer, servant, employee or agent of ***[Executing Agency]***, acting in that capacity; (b) any contractor or subcontractor of ***[Executing Agency]*** and their directors, officers, servants, employees or agents, acting in that capacity; or (c) any Person acting on behalf of ***[Executing Agency]***. For the avoidance a doubt, '***[Executing Agency]*** Related Parties' does not include the Concessionaire or ***[Name of the State / National Level Agency, if any]***.
***[Executing Agency]*'s Representative**	means any officer nominated by ***[Executing Agency]***, from time to time, to act on its behalf and liaise with the Concessionaire and ***[Name of the State / National Level Agency, if any]*** for the purposes of this Agreement and notified as such in writing to the Concessionaire and ***[Name of the State / National Level Agency, if any]*** in accordance with the Clause 7.8 (d).
Expiry Date	means the date occurring after the expiry of [15 (fifteen)] years from the COD
Facilities	(or the ***[Location]*** Facilities) means collectively, the ***[Location]*** STP(s), the ***[Location]*** FSTP(s), the online monitoring system for STP(s), Sewage pumping station(s) and FSTP(s), the on-site testing laboratory facilities, and such other facilities associated with the ***[Location]*** STP(s) and ***[Location]*** FSTP(s), and its Associated Infrastructure, or under any schedule, required to be set up by the Concessionaire, as described in greater detail in the Scope of Work and Technical Specifications, and infrastructure facilities associated with ***[Location]*** STP(s) and ***[Location]*** FSTP(s), including but not limited to Sewage pumping stations (including main pumping stations, intermediate pumping stations and any other pumping stations), the rising mains, plant lighting, ancillary power requirement, power plant if provided or existing, other non-functional buildings such as administration building, staff quarters, common areas etc., as described in greater details in technical specifications of each STP/FSTP in relevant Facilities Schedule, which need to be constructed and/or renovated and/or operated and maintained by the Concessionaire in accordance with this Agreement.

[4]Delete if not applicable

Faecal Sludge	means raw or partially digested, in a slurry or semisolid form, the collection, storage or treatment of combinations of excreta and black water, with or without grey water. It is the solid or settled contents of pit latrines and septic tanks. The physical, chemical and biological qualities of faecal sludge are influenced by the duration of storage, temperature, soil condition, and intrusion of groundwater or surface water in septic tanks or pits, performance of septic tanks, and tank emptying technology and pattern. Faecal sludge is the solid or settled contents of pit latrines and septic tanks. Faecal Sludge comes from onsite sanitation systems. Examples of onsite technologies include pit latrines, non-sewered public ablution blocks, septic tanks, aqua privies, and dry toilets.
Financial Assistance	means all funded and non-funded financial assistance, including loans, advances and guarantees or any re-financing that the Concessionaire may avail of for the Project from the Lenders.
Financial Capacity	means the financial capacity and strength of the ***[Selected Bidder/Member(s)]***[5] determined in accordance with the RFP.
Financial Close	means, the date on which the Financing Documents become effective, the conditions precedent under the Financing Documents for disbursements are fulfilled and the Concessionaire has access to the Financial Assistance.
Financial Package	means the financing package indicating the means of financing the Facilities, and includes all Financial Assistance specified in the Financing Documents, the Equity and the Subordinated Debt, if any.
Financial Proposal	means the financial proposal submitted by the Selected Bidder in accordance with the RFP for undertaking the Project.
Financial Year	means each 12 (twelve) month period commencing on 1 April of one calendar year and ending on 31st (thirty first) March of the next calendar year; and if different for a company, then the 12 (twelve) month period for which such company files its statutory audited accounts in the normal course of its business.
Financing Documents	means, collectively, the documents entered into or to be entered into by the Concessionaire with the Lenders, in respect of all funded and non-funded financial assistance, including loans, advances and or any refinancing that the Concessionaire may avail of for the Project from the Lenders and includes any document providing Security to the Lenders.
First Breach	has the meaning ascribed to it in Clause 8.12(b)(iii)(A).
First Breach Notice	has the meaning ascribed to it in Clause 8.12(b)(iii)(A).
FM Notice	has the meaning ascribed to it in Clause 14.2(a).
Force Majeure Event	means a Non-Political Force Majeure Event, an Indirect Political Force Majeure Event or a Direct Political Force Majeure Event, as the case may be.
Forced Unavailability	means an interruption of or a reduction in the Availability of any Facilities that is the result of: (a) a maximum capacity utilization of such Facilities, as notified by the Concessionaire to ***[Executing Agency]*** in accordance with Clause 8.9; (b) a suspension of the performance of the O&M services for such Facilities pursuant to Clause 15.1(a)(i) or Clause 15.2(a)(i), to the extent any such event is not attributable to the Concessionaire; or

[5] Delete Member(s) if the Selected Bidder is a single entity.

	(c) a suspension of the operation of any Facilities pursuant to any order or instruction from the relevant Government Authority restricting the discharge of the Treated Effluents from such Facilities at the relevant Discharge Point; or (d) unavailability or breakdown of the Supporting Infrastructure for such Facilities.
FSTP	means a faecal sludge treatment plant
FSTP By-Products	means the by-products of the treatment process after the Faecal Sludge/Septage has passed through the Facilities, comprising the Digested Sludge, the Residual Grit and the Screenings.
Fuel Price	means the prevailing price of diesel at Indian Oil Corporation or Hindustan Petroleum Corporation Limited's retail outlets in ***[Location]***, as determined on the 15th(fifteenth) day of a month.
Fundamental Change in Law	means any Change in Law that: (a) renders unenforceable, illegal, invalid or void any material right or material obligation of the Concessionaire under this Agreement; or (b) renders a material part of this Agreement invalid, illegal or unenforceable; or (c) results in the Concessionaire being deprived of the whole or a substantial part of the benefit of this Agreement.
GoI	means the Government of India.
Good Industry Practices	means the exercise of such degree of skill, diligence and prudence, and those practices, methods, specifications and standards of equipment, safety and performance, as may change from time to time and which would reasonably and ordinarily be expected to be used by a skilled and experienced developer engaged in construction, management, and maintenance of STP in India of the type and size similar to the Facilities.
Go*[XX]*	means the Government of ***[Name of the State of STP(s)/FSTP(s) Location]***.
Government Authority	means the GoI, any State Government (including the Go***[XX][6]***), any local government or any other ministry, governmental department, commission, board, body, bureau, agency, authority, instrumentality, inspectorate, statutory corporation or body corporate over which the GoI or the Go***[XX]*** exercises control, court, tribunal or other judicial or administrative body or official or person, having jurisdiction over the Concessionaire, the Site, the Project and the performance of obligations and exercise of the rights of the Parties in accordance with the this Agreement.
Grace Period	has the meaning ascribed to it in Clause 7.12(e).
Guaranteed Availability	has the meaning ascribed to it in Clause 8.12(a)(i).
Guaranteed Energy Consumption	means the maximum number of units of power (in kWh) per MLD quoted by the Selected Bidder in the Financial Proposal, which it expects to consume during the O&M Period (other than any units expected to be generated and consumed from the Power Plant), to operate and maintain the ***[Location]*** Facilities, at varying volumes and BOD of Sewage/Faecal Sludge/Septage. The Guaranteed Energy Consumption for any quarter during the O&M Period will be determined

[6]Name of the State Government

	on the basis of the number of units of power (in kWh) per MLD quoted by the Selected Bidder in the Financial Proposal for the average volume and BOD of Sewage and Faecal Sludge and Septage treated at the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) in such quarter (such average to be calculated in accordance with the KPI Adherence Report).
Hand-back Conditions	mean the condition in which the Site, the Facilities, and the Power Plant, if any, shall be handed back to ***[Executing Agency]*** or any entity nominated by ***[Executing Agency]*** on expiry or early termination of this Agreement, which is consistent with the due performance of the Concessionaire's obligations under this Agreement and are described in greater detail in the Technical Specifications.
Hand-back Requirements	means the obligations of the Concessionaire in relation to transfer of the Facilities upon expiry or early termination of the Project, as set out in Clause 19.3.
Indirect Political Force Majeure Events	has the meaning ascribed to it in Clause 14.1(b)(ii).
Influent Standards	means the permissible standards and characteristics for the incoming Sewage for each STP, and incoming Faecal Sludge/Septagefpr each FSTP, set out in the Technical Specifications.
Inlet Point	means the point mutually agreed to between ***[Executing Agency]*** and the Concessionaire at the ***[Location]*** STP and ***[Location]*** FSTP where: (a) the Sewage sample or Faecal Sludge/Septage sample, as the case may be, shall be drawn to test compliance with the Influent Standards; and (b) meters shall be installed for the purpose of determining the volume and concentration of the Sewage/Faecal Sludge/Septage, as the case may be, delivered at the ***[Location]*** Facilities.
Intellectual Property Rights	means patents, copyrights, database rights, design rights, trade-marks, service marks, trade names, domain names, rights in reputation, rights in undisclosed or confidential information (such as know-how, trade secrets and inventions, whether patentable or not), and other rights of a like nature (whether registered or unregistered) and all applications for such rights as may exist anywhere in the world.
Invoice	means an invoice for payment of: (a) the Construction Payments during the Construction Period; or (b) the Capex Annuity (along with interest), the O&M Charges and the Power Charges during the O&M Period, submitted by the Concessionaire to ***[Executing Agency]*** (with a copy to ***[Name of the State / National Level Agency, if any]***) in accordance with Article 9.
KPI Adherence Report	has the meaning ascribed to it in Clause 8.12(b)(vi).
KPIs	means the key performance indicators set out in Schedule 10, which the Facilities must achieve during the O&M Period.
Lead Member	[means the Member nominated by the Members of the Selected Bidder to act as the lead member in accordance with the RFP.][7]
Lenders	includes banks, financial institutions, funds and agents or trustees of debenture

[7] To be deleted if the Selected Bidder is not a Consortium.

	holders, including their successors and assignees, who have agreed to guarantee or provide Financial Assistance to the Concessionaire under the Financing Documents but does not include any shareholder or Associates of the Concessionaire who have provided any shareholder loans to the Concessionaire.
Liquidated Damages	means the Delay Liquidated Damages, the Availability Liquidated Damages, the Performance Liquidated Damages and the Power Consumption Liquidated Damages.
LOA	has the meaning ascribed to it in Recital F.
[Location] FSTP	means the FSTP of ***[Capacity of Proposed FSTP]*** MLD to be set up at the ***[Location]***Facilities Sites, as part of the Project.
[Location] STP	means the STP of ***[Capacity of Proposed STP]*** MLD to be set up at the ***[Location]***Facilities Sites, as part of the Project.
Material Adverse Effect	means the effect of any act or event, which materially and adversely affects the ability of any Party to exercise its rights or perform any of its obligations under and in accordance with this Agreement and which act or event causes a material financial burden or loss to any Party.
Member	[means, where the Selected Bidder is a Consortium, a member of the Selected Bidder.][8]
Milestone Completion Certificate	means, in respect of any Payment Milestone, a certificate issued by ***[Executing Agency]*** in accordance with Clause 7.13(a), to certify that such Payment Milestone has been achieved in accordance with the requirements of this Agreement.
Minimum Escrow Balance	has the meaning ascribed to it in Clause 9.5(b).
Minor Casualty	means any fire or other casualty that results in physical damage to the ***[Location]*** Facilities to the extent that the total cost (as estimated by the Project Engineer) of repairing and/or replacing the damaged portion of the ***[Location]*** Facilities as the case may be, to the same condition as previously existed would not exceed the amount of [INR 25, 00,000 (Rupees twenty five lakhs)].
MLD	means million liters per day.
Mobilization Advance	means an amount equivalent to 10% of the ***[Location]*** Facilities Bid Project Cost that is to be paid in advance to the Concessionaire for mobilization and execution of the construction works for the ***[Location]*** Facilities in accordance with Clause 9.3(d).
Mobilization Advance Guarantee	has the meaning ascribed to it in Clause 5.21.
Mobile Associated Infrastructure	Means and includes (but not limited to) the GPS-enabled vehicles, machinery, equipment and facilities for the extraction, door-to-door collection, containment, transportation, treatment, and disposal / re-use of Faecal Sludge/ Septage, which are movable assets and do not form part of the Hand-back Conditions and Hand-back Requirements.
Mo----	means the Ministry of --------[9]
Net Worth	means the net worth of a Company, which shall be determined as follows, in case

[8] To be deleted if the Selected Bidder is not a Consortium.

[9]To be deleted if not applicable.

	of a: (a) ***Company**, means* (i) subscribed and paid up equity share capital; and (ii) reserves **LESS** (iii) revaluation reserves; (iv) miscellaneous expenditure not written off; (v) reserves not available for distribution to equity shareholders; and (vi) aggregate value of accumulated losses. (b) ***trust** or **society**,*means the sum of available corpus and reserves; (c) ***partnership firm***, means the sum of the partners' capital account and undistributed profits; (d) ***limited liability partnership***, means the sum of partners' capital account and undistributed profits as per the 'Statement of Account' prepared as per Limited Liability Partnership Rules, 2009; (e) ***sole proprietorship***, means the value of all assets minus liabilities of the proprietorship but does not include the personal assets or liabilities of the sole proprietor; and (f) ***individual***,means the sum of the value of all unencumbered assets owned by the individual minus the sum of the value of all liabilities of the individual.
[Name of the State / National Level Agency, if any]	has the meaning ascribed to it in array of Parties.
[Name of the State / National Level Agency, if any] **Event of Default**	has the meaning ascribed to it in Clause 16.4.
[Name of the State / National Level Agency, if any] **Related Parties**	means any of the following: (a) an officer, servant, employee or agent of ***[Name of the State / National Level Agency, if any]***, acting in that capacity; (b) any contractor or subcontractor of ***[Name of the State / National Level Agency, if any]*** and their directors, officers, servants, employees or agents, acting in that capacity; or (c) any Person acting on behalf of ***[Name of the State / National Level Agency, if any]***. For the avoidance a doubt, '***[Name of the State / National Level Agency, if any]*** Related Parties' does not include the Concessionaire or ***[Executing Agency]***
[Name of the State / National Level Agency, if any]**'s Representative**	means any officer nominated by ***[Name of the State / National Level Agency, if any]***, from time to time, to act on its behalf and liaise with the Concessionaire and ***[Executing Agency]*** for the purposes of this Agreement and notified as such in writing to the Concessionaire and ***[Executing Agency]*** in accordance with Clause 7.9 (c).

Nominated FSTP Sub-Contractor[10]	means a sub-contractor nominated by the Concessionaire, in accordance with Clause 4.1(a)(F)(ii) and 4.1(b)(ii) of this RFP, for construction and operation and maintenance of FSTP(s) for the Project.
Nominated STP Sub-Contractor[11]	means a sub-contractor nominated by the Concessionaire, in accordance with Clause 4.1(a)(F)(ii) and 4.1(b)(ii) of this RFP, for construction and operation and maintenance of STP(s) for the Project.
Non-Political Force Majeure Event	has the meaning ascribed to it in Clause 14.1(b)(i).
Notice of Arbitration	has the meaning ascribed to it in Clause 21.2.1
Notice of Intent to Terminate	means a notice of intent to terminate issued by ***[Executing Agency]*** in case of a Concessionaire Event of Default (in accordance with Clause 16.2) or a notice of intent to terminate issued by the Concessionaire in case of a ***[Executing Agency]*** Event of Default or an ***[Name of the State / National Level Agency, if any]*** Event of Default (in accordance with Clause 16.5), stating its intention to terminate this Agreement.
O&M	means operation and maintenance.
O&M Charges	means the amount required by the Concessionaire per quarter to operate and maintain the ***[Location]*** Facilities, excluding the Power Charges, during the O&M Period. The O&M charges for the first quarter after the COD will be determined on the basis of the O&M charges quoted by the Selected Bidder (in the Financial Proposal) for the first month from the COD, which amount shall then be adjusted to reflect the variation in the O&M Price Index.
O&M Manual	means the manual, required to be prepared by the Concessionaire and approved by ***[Executing Agency]*** for the operation and maintenance of the Facilities in accordance with Clause 8.2.
O&M Payments	means, for each Facilities, collectively the: (a) Capex Annuity; (b) interest on the reducing balance of [60% (sixty per cent)] of the Completion Cost; (c) O&M Charges; and (d) Power Charges (subject to the cap of the Power Charges based on the ***[Location]*** Facilities Guaranteed Energy Consumption), to be paid by ***[Name of the State / National Level Agency, if any]*** to the Concessionaire during the O&M Period, in accordance with this Agreement.
O&M Period	means the period commencing from the COD and ending on the Expiry Date, during which the Concessionaire is required to operate and maintain the Facilities.
O&M Price Index	shall comprise: (a) 70% of CPI(IW); and (b) 30% of WPI, which constituents may be substituted by such alternative index or indices as the Parties may mutually agree.
O&M Security	has the meaning ascribed to it in Clause 5.5.
Online Monitoring System	means the monitoring system(s) to be set up by the Concessionaire as part of the Facilities for continuous monitoring of the volume, specifications and characteristics of the Sewage, Faecal Sludge/Septage and the Treated Effluent.

[10]To be deleted if not applicable

[11]To be deleted if not applicable

Outlet Point	means the outlet of the ***[Location]*** STP and ***[Location]*** FSTP where the sample of the Treated Effluent shall be drawn periodically to test compliance with the Discharge Standards.
Payment Certificate	has the meaning ascribed to it in Clause 9.3(e)(v) for Construction Payments and Clause 9.4(k) for O&M Payments.
Payment Milestones	means the milestones listed in Clause 9.3(e) for release of the Construction Payments to the Concessionaire, and 'Payment Milestone' shall mean any one of them, as the context may require.
Performance Liquidated Damages	means the liquidated damages payable by the Concessionaire to ***[Executing Agency]*** for a failure to meet the Discharge Standards, in accordance with Clause 8.12(b)(iii).
Performance Security	has the meaning ascribed to it in Clause 5.1.
Person	means any individual, company, corporation, partnership, joint venture, trust, society, sole proprietor, limited liability partnership, co-operative society, government company, unincorporated organization or any other legal entity.
Phase I Designs and Drawings	means: (a) the Basic Engineering Designs; (b) the Screening Report and (c) the detailed 'good for construction' designs and drawings, technical information, plans, samples, patterns, models and specifications for the works required for achieving the first Payment Milestone.
Phase II Designs and Drawings	means the detailed 'good for construction' designs and drawings, technical information, plans, samples, patterns, models and specifications for the works required for achieving the second, third and fourth Payment Milestones.
Power Charges	means the cost of the power consumed by the Concessionaire to operate and maintain the ***[Location]*** Facilities during the O&M Period, which will be calculated on the basis of the prevailing Power Unit Rate, the Fuel Price, to the extent applicable and such other applicable charges as per the guidelines of the relevant Government Authorities.
Power Consumption Liquidated Damages	has the meaning ascribed to it in Clause 9.4(g)(ii)(C).
Power Outage	means any interruption in the supply of electricity from the grid or any Diesel-Generators (DG) Sets maintained by the Concessionaire at the Site, which disrupts the continuous operation of any Facilities.
Power Plant	means a biogas power plant or a rooftop solar plant that the Concessionaire is decides to set up at the relevant Site as part of the Project, for production of clean energy.
Power Unit Rate	means the cost per unit of power drawn from the grid (through the relevant distribution licensee for the Site), which will be the prevailing tariff per unit of power charged by the relevant distribution licensee in the relevant month during the O&M Period.
PPP	means public private partnership.
Price Index	means, for the Construction Payments, the Construction Price Index, and for the O&M Payments, the O&M Price Index.
Price Index Multiple	means, the variation multiple in the Price Index occurring between the Reference Index Date preceding the Bid Due Date and the Reference Index Date preceding

	the date of the Invoice, which is calculated by dividing the Price Index on the Reference Index Date preceding the date of the Invoice by the Price Index on the Reference Index Date preceding the Bid Due Date. For the avoidance of doubt and by way of illustration, if (a) the Price Index on the Reference Index Date preceding the Bid Due Date, say 30 May, 2018, is 200; (b) the Invoice is submitted on 15 April, 2020; and (c) the Price Index as on 31 March, 2020 is 210, then the Price Index Multiple for determination of the amount due in respect of such Invoice shall be 1.05.
Project	has the meaning ascribed to it in Recital C.
Project Engineer	means the engineering firm appointed by ***[Name of the State / National Level Agency, if any]*** in accordance with Article 6 of this agreement.
Proposed Technology	means the proven technology(ies) proposed to be used by the Concessionaire to develop the ***[Location]*** STP(s) and ***[Location]*** FSTP(s), as specified by the Concessionaire in its Designs and Drawings.
Qualifying Change in Law	means any Change in Law, which: (a) is directly applicable to the Project; (b) impacts the Cost or time for undertaking the Project; and (c) which was not reasonably foreseeable by the Concessionaire as on the Bid Due Date.
Reference Index Date	means, in respect of a specified date, the last date of the preceding month with reference to which the Construction Price Index or the O&M Price Index is revised.
Residual Grit	means the grit which is obtained as residual matter after the treatment of the Sewage at the ***[Location]*** STP(s) and ***[Location]*** FSTP(s).
RFP	has the meaning ascribed to it in Recital E.
Rupee or **Rs.** or **INR**	means Indian National Rupee.
Safeguard Documents	has the meaning ascribed to it in Clause 7.4(c)(i)
Safety Documents	has the meaning ascribed to it in Clause 7.4(c)(ii)
SBI MCLR	means the prevailing marginal cost of fund-based lending rate for a tenor of 1 year, notified by the State Bank of India.
Schedule	means a schedule of this Agreement.
Scheduled Bank	means a bank as defined under section 2(e) of the Reserve Bank of India Act, 1934, as amended from time to time.
Scheduled COD	means the date which is 3 (three) months from the Construction Completion Date of the ***[Location]*** Facilities, by which the Concessionaire is required to achieve the COD.
Scheduled Construction Completion Date	means the date which is 21 (twenty one) months from the Effective Date, by which the Concessionaire is required to complete the construction of the Facilities.
Scheduled Maintenance	means a planned maintenance of any Facilities that: (a) has been scheduled and allowed by ***[Executing Agency]*** in accordance with the Scheduled Maintenance Programme; and (b) is for inspection, testing, preventive and corrective maintenance, repairs,

	replacement or improvement of such Facilities, as the case may be.
Scheduled Maintenance Programme	means, for each year of the O&M Period, the schedule for undertaking preventive and corrective maintenance of the Facilities, as prepared by the Concessionaire and approved by ***[Executing Agency]*** in accordance with Clause 8.11(f).
Scheduled Payment Milestone Completion Date	means the scheduled date of completion of the construction work corresponding to the relevant Payment Milestone.
Scope of Work	means the scope of work for construction and O&M of the Facilities as set out in Schedule 1.
Screening Report	means, for each Facilities, the environmental and social design safeguards screening report prepared by the Concessionaire and submitted to the Executing Agency for its review as part of the Phase I Designs and Drawings, in the format set out in Part 6 of Schedule 9.
Screenings	means solids such as fibres, plastic and other products or things, which need to be removed from the Sewage and Faecal Sludge/Septage, prior to the treatment of Sewage at the ***[Location]*** STP(s) and ***[Location]*** FSTP(s).
Second Breach	has the meaning ascribed to it in Clause 8.12(b)(iii)(B).
Second Breach Notice	has the meaning ascribed to it in Clause 8.12(b)(iii)(B).
Security	means andincludes any Encumbrance, or any other agreement or arrangement having substantially the same economic effect.
Selected Bidder	means the Bidder selected by ***[Executing Agency]*** for award of the Project.
Septage	means the liquid and solid material that is pumped from a septic tank, cesspool, or such onsite treatment Facilities after it has accumulated over a period of time. Usually, septic tank retains 60% - 70% of the solids, oil, and grease that enter it. The scum accumulates on the top and the sludge settles to the bottom comprising 20% - 50% of the total septic tank volume when pumped. Offensive odour and appearance are the most prominent characteristics of Septage. It is a host of many disease-causing organisms along with the contamination of significant level of grease, grit, hair, and debris. Septage is the combination of scum, sludge, and liquid that accumulates in septic tanks. The effluent from the septic tank can be collected in a network of drains and/or sewers and treated in a treatment plant designed appropriately. The accumulating sludge at the bottom of the septic tank however, has to be also removed and treated once it has reached the designed depth or at the end of the designed desludging frequency whichever occurs earlier. Such a removal is possible only by trucks. While sucking out the sludge, the liquid in the septic tank will also be sucked out. Such a mixture is referred to as septage.
Sewage	means the sewage that is in liquid, solid or semi-solid form and brought for treatment to the Facilities.
Site	(or the ***[Location]***Facilities Sites) means the location for the ***[Location]*** Facilities, admeasuring ***[Area Available for Construction of STP/FSTP Facilities]*** in ***[Location]***, as set out in more detail in the ***[Location]*** Project Information Memorandum provided.
Sq. ft.	means square feet.

STP	means a sewage treatment plant.
STP By-Products	means the by-products of the treatment process after the Sewage has passed through the Facilities comprising the Digested Sludge, the Residual Grit and the Screenings.
Subcontract	means a contract entered into by the Concessionaire to subcontract any part of its scope of work in relation to the Project under this Agreement.
Subcontractor	means the Concessionaire's counterparty under any Subcontract.
Subordinated Debt	the aggregate of the following sums expressed in Indian Rupees or in the currency of debt, as the case may be, outstanding as on the Transfer Date: (a) the principal amount of debt provided by lenders or the Concessionaire's shareholders for meeting the Total Project Cost and subordinated to the financial assistance provided by the Senior Lenders; and (b) all accrued interest on the debt referred to in sub-Article (a) above but restricted to the lesser of actual interest rate and a rate equal to [5% (five per cent)] above the Bank Rate in case of loans denominated in Indian Rupees and lesser of the actual interest rate and [6 (six) month] LIBOR (London Inter-Bank Offer Rate) plus [2% (two per cent)] in case of loans denominated in foreign currency, but does not include any interest that had fallen due 1 (one) year prior to the Transfer Date; provided that if all or any part of the Subordinated Debt is convertible into Equity at the option of the lenders and/or the Concessionaire's shareholders, it shall for the purposes of this Agreement be deemed to be Subordinated Debt even after such conversion and the principal thereof shall be dealt with as if such conversion had not been undertaken;
Sub-contractor Undertaking[12]	means an irrevocable and duly notarized undertaking submitted by the Nominated STP / FSTP Sub-Contractor on a stamp paper, submitted as part of the Bid.
Substitution Agreement	means the substitution agreement to be executed by ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]***, the Concessionaire and the Lenders, in the format set out in Schedule 2.
Supporting Infrastructure	means the supporting infrastructure facilities required for the operation of the ***[Location]*** Facilities, which will be provided, operated and maintained by ***[Executing Agency]*** during the Term.
Taxes	means all taxes, levies, imposts, cesses, duties and other forms of taxation, including (but without limitation) income tax, sales tax, goods and service tax, value added tax, service tax, octroi, entry tax, corporation profits tax, advance corporation tax, capital gains tax, residential and property tax, customs and other import and export duties, excise duties, stamp duty or capital duty, and any interest, surcharge, penalty or fine in connection therewith which may be payable by the Concessionaire or the Subcontractors and the term **Tax** shall be construed accordingly.

[12]To be deleted if not applicable

Technical Capacity	means the technical capacity and experience of the ***[Selected Bidder/Member(s)]***[13] determined in accordance with the RFP.
Technical Specifications	means the technical specifications for design, construction, operation and maintenance of the Facilities, as set out in Schedule 12.
Technology Performance Security[14]	has the meaning ascribed to it in Clause 5.24
Term	has the meaning ascribed to it in Clause 3.7.
Termination Compensation	means the compensation payable by ***[Name of the State / National Level Agency, if any]*** upon termination of this Agreement, in accordance with Article 18.
Third Breach	has the meaning ascribed to it in Clause 8.12(b)(iii)(C).
Third Breach Notice	has the meaning ascribed to it in Clause 8.12(b)(iii)(C).
Threshold Limit	has the meaning ascribed to it in Clause 13.2(e)(i).
Total Casualty	means any fire or other casualty that results in physical damage to the ***[Location]*** Facilities, to the extent that the total cost of repairing, replacing or restoring the damaged portion of the ***[Location]*** Facilities (as determined by the Project Engineer), to the same condition as existed previously, would be more than 25% (twenty five per cent)of the total replacement cost of the Facilities.
Treated Effluent	means the water which is obtained after the treatment of the Sewage at the ***[Location]*** STP.
Trial Operations	means the operation of the ***[Location]*** Facilities on a trial basis for a period of 3 (three) months from the Construction Completion Date or such longer period as may be determined in accordance with Clause 7.14.
Trial Operations Completion Certificate	means the certificate issued by ***[Executing Agency]*** to the Concessionaire upon successful completion of the Trial Operations of the ***[Location]*** Facilities.
Trial Operation Procedures	means the procedures for conducting the Trial Operations, as set out in the Technical Specifications, Schedule 12.
Unscheduled Outage	means an interruption of or a reduction in the Availability of any Facilities that is not the result of a Forced Unavailability.
***[Name of State of STP Location]* Act**	***[Name of Act of State of STP Location]*** as may be amended from time to time.
Variation	means any alteration in the Scope of Work, Technical Specifications or the Designs and Drawings, as instructed by ***[Executing Agency]*** or proposed by the Concessionaire, in accordance with Article 20.
Variation Order	means an order issued by ***[Executing Agency]*** certifying its approval of a proposed Variation and recording the terms and condition on which the proposed Variation is required to be implemented.
Waste Disposal Site	means the site identified by ***[Executing Agency]*** for disposal of the STP By-Products, FSTP By-Products, and other waste material (including silt) from the ***[Location]*** STP.

[13] Delete Member(s) if the Selected Bidder is a single entity.

[14] To be deleted if not applicable

Website	means the web portal of ***[Executing Agency]***, available at the url: http://---------
Wilful Misconduct	means an intentional or reckless breach or disregard by a Party of any of its obligations under this Agreement.
WPI	means the Wholesale Price Index for all commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month.

1.2 Rules of Interpretation

In this Agreement, unless the context otherwise requires:

(a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.

(b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.

(c) Headings in this Agreement are for convenience of reference only.

(d) The references to the word 'include' or 'including' or to the phrase 'in particular', shall be construed without limitation.

(e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.

(f) The references to any agreement, deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.

(g) Unless otherwise provided, any late payment charges to be calculated and payable under this Agreement shall accrue *pro rata* on a monthly basis and from the respective due dates as provided for in this Agreement.

(h) A requirement that a payment be made on a day which is not a Business Day shall be construed as a requirement that the payment be made on the next Business Day.

(i) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any Person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing and the words 'notify', 'endorse', 'approve', 'permit', 'certify' or 'determine' shall be construed accordingly. Where any notice, consent or approval is to be given by any Party, the notice, consent or approval shall be given on their behalf only by any

authorized persons.

(j) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.

(k) The terms of the RFP form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement. In the event of any discrepancy between this Agreement and the RFP, the provisions set out in this Agreement shall prevail.

(l) The provisions of the Articles, Clauses and the Schedules of this Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the Articles, Clauses and the Schedules.

(m) In the event of any ambiguities or discrepancies within this Agreement, the following shall apply:

(i) between two Clauses of this Agreement, the provisions of the specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;
(ii) between the requirements of two or more Schedules of this Agreement, the provisions of the specific Schedule relevant to the issue under consideration shall prevail over the more general; and
(iii) between the Clauses and the Schedules, unless specified otherwise, the Clauses shall prevail over the Schedules.

(n) In the event of any discrepancy between various documents issued by or provided to ***[Executing Agency]*** as a part of the Bid Process, the following order of priority shall apply:

(i) this Concession Agreement;
(ii) the Schedules to the Concession Agreement;
(iii) the Financial Proposal submitted by the Selected Bidder;
(iv) the LOA issued to the Selected Bidder;
(v) the written clarifications, if any, issued to the bidders; and
(vi) the RFP.

(o) Subject to the provisions of this Agreement, the Concessionaire shall be responsible to and indemnify, ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** for the acts and omissions of the Concessionaire Related Parties as if they were the acts and omissions of the Concessionaire and ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** shall be responsible to and indemnify the Concessionaire for the acts and omissions of ***[Executing Agency]*** Related Parties and the ***[Name of the State / National Level Agency, if any]*** Related Parties, respectively, as if they were the acts and omissions of ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]***, as the case may be.

(p) Neither the giving of any approval or consent, the review, knowledge or acknowledgement of the terms of any document by or on behalf of ***[Executing***

Agency]or ***[Name of the State / National Level Agency, if any]***, nor the failure to do so, shall, unless expressly stated in this Agreement, relieve the Concessionaire of any of its obligations under this Agreement or of any duty which it may have under this Agreement to ensure the correctness, accuracy or suitability of the matter or thing which is the subject of the approval, consent, review, knowledge or acknowledgement.

(q) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Agreement.

(r) The Parties acknowledge that damages for specific defaults prescribed under this Agreement (including the Delay Liquidated Damages, the Performance Liquidated Damages, the Availability Liquidated Damages, and the Power Consumption Liquidated Damages) are a genuine pre-estimate of and reasonable compensation for the loss and damage that shall be suffered by the non-defaulting Party due to failure of the defaulting Party to perform its obligations in accordance with this Agreement, and are not in the nature of a penalty.

1.3 Units of Measurement

All measurements and calculations shall be in the metric system and calculations done to 4 decimal places, with the 5^{th} digit of 5 or above being rounded up and below being rounded down.

ARTICLE 2
SCOPE OF THE PROJECT AND GRANT OF THE CONCESSION

2.1 Scope of the Project

The scope of the Project shall be as set out in Schedule 1 and shall include:

(a) designing, part-financing, constructing and completing the Facilities by the Scheduled Construction Completion Date, in accordance with Applicable Laws, Applicable Permits, Technical Specifications, Designs and Drawings, the Construction Plan, the ESHS Documents and Good Industry Practices;

(b) operating and maintaining the Facilities in accordance with Applicable Laws, Applicable Permits, Technical Specifications, Designs and Drawings, the O&M Manual, the ESHS Documents and Good Industry Practices to ensure compliance with the KPIs;

(c) disposal/sale of by-products and treated effluent; and

(d) hand-back of the Facilities (excluding the Mobile Associated Infrastructure) upon expiry or early termination of this Agreement in accordance with the Hand-back Conditions and the Hand-back Requirements.

2.2 Grant of Concession

(a) On and from the Effective Date and subject to the terms of this Agreement, Applicable Laws and Applicable Permits, ***[Executing Agency]*** grants to the Concessionaire the exclusive right to:

(i) design, part-finance, construct and complete the Facilities; and

(ii) upon completion of construction of the Facilities, operate and maintain the Facilities during the O&M Period.

Notwithstanding anything contained herein, to the extent of applicability of Clause 7.1, the Concessionaire shall be entitled to access the Site prior to the Effective Date.

(b) The grant of the concession set out in Clause 2.2(a) shall oblige or entitle the Concessionaire, as the case may be, to the following:

(i) access to the Site from the Effective Date, for the sole purpose of implementing the Project, provided, however, to the extent of applicability of Clause 7.1, the Concessionaire shall be entitled to access the Site prior to the Effective Date;

(ii) apply for and obtain all the Concessionaire Applicable Permits and utilities required to undertake the Project;

(iii) raise funds (through both debt and equity financing) to finance [60% (sixty per

cent)] of the Bid Project Cost;

(iv) complete the construction of the Facilities on or before the Scheduled Construction Completion Date;

(v) upon completion of construction of the Facilities, undertake Trial Operations;

(vi) upon successful completion of the Trial Operations, operate and maintain the Facilities until Expiry Date;

(vii) receive, treat and process Sewage up to the Design Capacity;

(viii) store, treat, market, sell or dispose of the STP By-Products and FSTP By-Products subject to and in accordance with this Agreement;

(ix) store, treat or dispose of the Treated Effluent subject to and in accordance with this Agreement;

(x) transfer the Facilities (excluding the Mobile Associated Infrastructure) to ***[Executing Agency]*** upon the expiry of the Term or termination of this Agreement, after rectification of any defects in the Facilities, in accordance with the Hand-back Conditions and the Hand-back Requirements;

(xi) receive the Construction Payments during the Construction Period and the O&M Payments during the O&M Period, subject to compliance with the terms and performance of the obligations under this Agreement;

(xii) appoint Subcontractors, agents, advisors and consultants and enter into Subcontracts to undertake the Project, with the prior approval of ***[Executing Agency]***;

(xiii) [construct a biogas Power Plant at ***[Location]***Facilities Sites.][15]

(xiv) [construct a solar rooftop Power Plant at the ***[Location]***Facilities Sites, at its sole option and discretion];

(xv) develop, operate and maintain faecal sludge collection and transportation system, including vehicles, contractors, human resources, complaint centre and helpline, etc.;

(xvi) collect nominal user fee as mutually decided between the Concessionaire and the ***[Executing Agency]***for extraction/suction/clearing of septic tanks of households, offices, commercial spaces, etc., on call/complaint basis.

2.3 Description of the Facilities

[15] Delete if not applicable

(a) The Facilities shall include the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) along with the Associated Infrastructure, the Online Monitoring Systems, the on-site testing laboratory facilities, temporary storage facilities for the Digested Sludge and all other such facilities necessary or associated with the STP and FSTP for treatment, processing and disposal of the Sewage and Faecal Sludge/Septage, as the case may be, as described in greater detail in Schedule 1 (*Scope of Work*) and Schedule 12 (*Technical Specifications*).

(b) The Concessionaire shall operate the Facilities and treat the Sewage and the Faecal Sludge/Septage in a manner such that the KPIs are achieved, and the Treated Effluent and Digested Sludge comply with the Discharge Standards.

(c) The STP By-Products and FSTP By-Products will be bifurcated into the Screenings, the Digested Sludge and the Residual Grit. The Concessionaire will be required to dispose the STP By-Products and FSTP By-Products and silt as follows:

(i) the Residual Grit, the Screenings, and the silt will be disposed at the relevant Waste Disposal Site to be identified by ***[Executing Agency]*** within a radius of 10 km from the relevant Site, in accordance with the Technical Specifications; and

(ii) The Concessionaire shall dry the Digested Sludge at a sludge handling Facilities available at or to be provided by the Concessionaire at the relevant Site. The Concessionaire shall, subject to compliance with Applicable Laws and Applicable Permits, be free to sell the Digested Sludge, at such price and to such Persons as it may deem fit or dispose the Digested Sludge at the Waste Disposal Sites. Provided that if the Concessionaire sells the Digested Sludge to any third party, the Concessionaire shall be required to share 10% (ten per cent) of the revenues from such sale with***[Executing Agency]***.

(d) The Concessionaire shall transfer the Treated Effluent to the Discharge Point, for discharge in to the ----------[16], sale to third parties or utilization for irrigation purposes. Provided that if the Concessionaire sells the Treated Effluent to any third party, the Concessionaire shall be required to share [10% (ten per cent)] of the revenues from such sale with ***[Executing Agency]***.

2.4 Use of Proposed Technology

(a) The Concessionaire shall design and develop the ***[Location]*** STP(s) and the ***[Location]*** FSTP(s) on the basis of the Proposed Technology, approved by ***[Executing Agency]*** as part of the Designs and Drawings.

(b) If the Selected Bidder is the owner of the Proposed Technology, then the Concessionaire shall enter into a technology license agreement with the Selected Bidder, under which the Selected Bidder will grant to the Concessionaire an irrevocable, perpetual, assignable, non-exclusive and royalty-free license to use the

[16]Name of the water body/source if any.Otherwise to be suitably modified.

Proposed Technology to develop and operate the Facilities.

(c) If the Selected Bidder does not own the Proposed Technology, then the Concessionaire shall, at its own cost, enter into a technology license agreement with the technology provider, under which the technology provider will grant to the Concessionaire an irrevocable, perpetual, assignable and royalty-free license to use the Proposed Technology. At no point will ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** be obliged to make any payments to the Concessionaire towards the licensing and use of the Proposed Technology.

In the event of the Selected Bidder opting for a technology other than those mentioned in the Central Public Health and Environmental Engineering Organisation (CPHEEO)Manual on Sewerage and Sewage Treatment Systems, in accordance with Clause 4.1(a)(F)(ix) of the RFP, the technology provider shall have submitted to ***[Executing Agency]***, prior to the Appointed Date, the Technology Performance Security of 5% (five per cent) of the Aggregate Bid Project Cost, which shall remain valid until 2 years from the COD. If the technology provider leaves the project before the completion of 2 years, the Technology Performance Security shall be liable to be forfeited by ***[Executing Agency]***. Any modification required to make the plant operational in the absence of the technology provider, as suggested and approved by ***[Executing Agency]***, shall be undertaken by the Selected Bidder at his own risk. Any failure to meet the requirements as mentioned in the Clause shall be considered as a Concessionaire Event of Default.

(d) Upon the expiry or early termination of this Agreement, the Concessionaire shall assign the license and related rights to use the Proposed Technology for the sole purpose of operating and maintaining the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) to ***[Executing Agency]*** at no additional cost to ***[Executing Agency]***.

(e) The Concessionaire shall indemnify ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** for any claims, losses, damages and costs suffered by ***[Executing Agency]*** and/or ***[Name of the State / National Level Agency, if any]*** as a result of an infringement of any third party's Intellectual Property Rights caused by the operation and use of the ***[Location]*** STP(s) and the ***[Location]*** FSTP(s).

ARTICLE 3
CONDITIONS PRECEDENT, EFFECTIVENESS AND TERM

3.1 Effectiveness

(a) The day on which all of the Conditions Precedent have been satisfied in accordance with this Article 3 shall be the effective date (the **"Effective Date"**).

(b) Articles 2.1, 2.2, 3, 5, 6, 10, 11.1, 12, 13, 14, 21, 22 and 23 and the related Schedules, shall come into full force and effect and be binding on the Parties on and from the Appointed Date and continue until such time as this Agreement expires or is terminated in accordance with its terms. The other provisions of this Agreement shall come into full force and effect and be binding on the Parties on and from the Effective Date and continue until such time as this Agreement expires or is terminated in accordance with its terms.

3.2 Conditions Precedent to be satisfied by the Concessionaire

The Concessionaire shall satisfy the following Conditions Precedent (if not already fulfilled on the Appointed Date):

(a) submit the Phase I Designs and Drawings to ***[Executing Agency]*** for its approval in accordance with Clause 7.2;

(b) prepare the Construction Plan within 30 (thirty) days from the Appointed Date and submit the Construction Plan to ***[Executing Agency]*** for its approval in accordance with Clause 7.3;

(c) prepare the ESHS Documents within 45 (forty-five) days from the Appointed Date and submit the ESHS Documents to ***[Executing Agency]*** for its approval in accordance with Clause 7.4;

(d) obtain all Concessionaire Applicable Permits that are required for achieving Financial Close and for commencement of construction of the Facilities at its own cost and expense and if such Concessionaire Applicable Permits are subject to any conditions, then, to the extent relevant, comply with all such conditions, such that the Concessionaire Applicable Permits are and shall be kept in full force and effect for the entire Construction Period, or such longer period as may be required under Applicable Laws;

(e) execute and provide a copy to ***[Executing Agency]*** of the technology license agreement(s) executed with the Selected Bidder or the third party technology supplier for setting up the ***[Location]*** STP(s) and the ***[Location]*** FSTP(s).

(f) submit to ***[Executing Agency]*** certified true copies of all resolutions adopted by the board of directors of the Concessionaire authorising execution, delivery and performance of this Agreement, Substitution Agreement and the Escrow Agreement by the Concessionaire;

(g) execute the Substitution Agreement with ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]*** and the Lenders in the agreed form set out in Schedule 2;

(h) achieve Financial Close and submit a copy of the Financing Documents and the Financial Package to ***[Executing Agency]***, duly certified by a director of the Concessionaire;

(i) [execute a shareholders' agreement amongst the shareholders of the Concessionaire, and deliver to ***[Executing Agency]*** a certified true copy of the shareholders' agreement (attested by a director of the Concessionaire);][17]

(j) execute the Escrow Agreement with ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]***, and the Escrow Bank in the agreed form set out in Schedule 3;

(k) submit to ***[Executing Agency]*** certified true copies of the constitutional documents of the Concessionaire;

(l) submit to ***[Executing Agency]*** a legal opinion stating that: (i) this Agreement, the Substitution Agreement and the Escrow Agreement have been duly executed and are legally valid, binding and enforceable in accordance with their terms against the Concessionaire; and (ii) all actions, conditions and things required by Applicable Laws to be taken, fulfilled and done (including the obtaining of any necessary Concessionaire Applicable Permits and resolutions of the board of directors) in order for the Concessionaire to enter into and comply with its obligations under this Agreement, the Substitution Agreement and the Escrow Agreement have been taken, fulfilled or done;

(m) submit to ***[Executing Agency]*** a certificate, duly attested by a director, certifying the shareholding pattern of the Concessionaire.

3.3 Conditions Precedent to be satisfied by *[Executing Agency]*

[Executing Agency] shall satisfy the following Conditions Precedent (if not already fulfilled on the Appointed Date):

(a) grant access to the ***[Location]***Facilities Sites and all necessary rights of way to the ***[Location]***Facilities Sites to the Concessionaire, free of Encumbrances and encroachments;

(b) to the extent relevant, obtain any change in land use permission from the relevant Government Authority to enable the Concessionaire to undertake the Project at the Site;

(c) subject to Clause 3.2(a), review and approve the Phase I Designs and Drawings in accordance with Clause 7.2;

[17] This Condition Precedent to be deleted if the Selected Bidder is not a Consortium.

(d) subject to Clause 3.2(b), review and approve the Construction Plan in accordance with Clause 7.3;

(e) subject to Clause 3.2(c), review and approve the ESHS Documents in accordance with Clause 7.4;

(f) obtain all approvals and consents, including ***[Executing Agency]*** Applicable Permits and any approvals under Applicable Laws required for ***[Executing Agency]*** to enter into this Agreement and undertake the Project;

(g) provide access road(s) to the ***[Location]***Facilities Sites, which are capable of being used for transportation of equipment and material to the ***[Location]***Facilities Sites for the construction of the Facilities;

(h) provide adequate Supporting Infrastructure and facilitate the Concessionaire in obtaining utilities, such as water and electricity connections to commence construction of the ***[Location]*** Facilities;

(i) execute the Substitution Agreement with the Concessionaire, ***[Name of the State / National Level Agency, if any]*** and the Lenders in the agreed form set out in Schedule 2; and

(j) execute the Escrow Agreement with the Concessionaire, ***[Name of the State / National Level Agency, if any]*** and the Escrow Bank in the agreed form set out in Schedule 3.

3.4 Conditions Precedent to be satisfied by *[Name of the State / National Level Agency, if any]*[18]

[Name of the State / National Level Agency, if any] shall satisfy the following Conditions Precedent (if not already fulfilled on the Appointed Date):

(a) obtain all approvals and consents that may be required for ***[Name of the State / National Level Agency, if any]*** to enter into this Agreement and undertake the Project;

(b) appoint the Project Engineer in accordance with Article 6;

(c) execute the Substitution Agreement with the Concessionaire, ***[Executing Agency]*** and the Lenders in the agreed form set out at Schedule 2; and

(d) execute the Escrow Agreement with the Concessionaire, ***[Executing Agency],*** and the Escrow Bank in the agreed form set out at Schedule 3 and open the Escrow Account with the Escrow Bank.

[18]If there is no State/National level agency involved in the Project, the conditions mentioned here in shall be added to the Conditions Precedent of the Executing Agency.

3.5 Satisfaction of Conditions Precedent

(a) Unless otherwise specified, each Party shall satisfy or procure the satisfaction of the Conditions Precedent that it is responsible for, within 120 (one hundred and twenty) days from the Appointed Date (the **"CP Long-stop Date"**).

(b) If any Party fails to satisfy any Condition Precedent that it is required to fulfil by the CP Long-stop Date due to:

(i) a Force Majeure Event;

(ii) a Qualifying Change in Law;

(iii) in case of the Concessionaire, undue delay by the relevant Government Authority in granting any Concessionaire Applicable Permit, despite the Concessionaire having applied for such Concessionaire Applicable Permit within the specified timelines, on payment of the prescribed fees and having complied with the requirements of Applicable Laws in making such application; or

(iv) delay by the other Parties in fulfilling any Condition Precedent required to be satisfied by them or in performing any other obligation under this Agreement, which impacts its ability to satisfy its Conditions Precedent,

then the CP Long-stop Date shall be extended on a day-for-day basis for the period of such delay, provided that the CP Long-stop Date shall not be extended beyond the date which is 6 (six) months from the Appointed Date.

(c) Each Party shall cooperate and use its reasonable efforts to assist the other Parties in satisfying the Conditions Precedent.

(d) Upon request in writing by either Party, the other Party may grant waiver from satisfaction of any Condition Precedent and to the extent of such waiver, that Condition Precedent shall be deemed to be fulfilled for the purposes of this Article 3.

3.6 Consequences of failure to satisfy Conditions Precedent

(a) Subject to this Clause 3.6:

(i) If the Concessionaire fails to satisfy any of the Conditions Precedent that it is required to fulfill by the CP Long-stop Date, as may be extended in accordance with Clause 3.5(b), non-defaulting party may claim prescribed damages from the other party or may terminate this Agreement forthwith by issuing a notice to the other Parties.

(ii) If either ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if***

any][19] fails to satisfy any of the Conditions Precedent that they are required to fulfill by the CP Long-stop Date, as may be extended in accordance with Clause 3.5(b), any Party may terminate this Agreement forthwith by issuing a notice to the other Parties.

(b) If the Concessionaire has failed to satisfy any of the Conditions Precedent required to be satisfied by it other than due to the reasons set out in Clause 3.5(b) and this Agreement is terminated in accordance with this Clause 3.6, then:

(i) ***[Executing Agency]*** shall be entitled to forfeit the Performance Securities up to the extent of Bid Security as a genuine pre-estimate of and reasonable compensation for loss and damage caused to ***[Executing Agency]*** as a result of the Concessionaire's failure to satisfy any of the Conditions Precedent and the consequent termination of this Agreement;

(ii) the Concessionaire shall not be entitled to receive any payment or compensation from ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** for the costs and expenses incurred by the Concessionaire in performing any of its obligations under this Agreement (including preparing any Phase I Designs and Drawings, the Construction Plan and the ESHS Documents) prior to the termination of this Agreement;

(iii) the Concessionaire shall hand over to ***[Executing Agency]*** all documents, designs, plans, data and any Confidential Information provided by ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** to the Concessionaire prior to termination of this Agreement;

(iv) ***[Executing Agency]*** shall hand over to the Concessionaire the Phase I Designs and Drawings, the Construction Plan, the ESHS Documents and any other document and Confidential Information submitted by the Concessionaire to ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** prior to termination of this Agreement; and

(v) if the access to any part of the Site has been granted to the Concessionaire prior to termination of this Agreement, then upon termination of this Agreement, the Concessionaire shall clear the Site and remove all debris, hazardous materials, construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site, and thereafter, the Site will be deemed to automatically vest with ***[Executing Agency]***, free from all Encumbrances.

(c) If ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** has failed to satisfy any of the Conditions Precedent required to be satisfied by it or the Concessionaire has failed to satisfy any of the Conditions Precedent required to be satisfied by it due to the reasons set out in Clause 3.5(b), and this Agreement is terminated in accordance with this Clause 3.6, then:

[19]Delete if not applicable.

(i) ***[Executing Agency]*** shall return the Performance Security, O&M Security and the ESHS Performance Security submitted by the Concessionaire;

(ii) the Concessionaire shall hand over to ***[Executing Agency]*** all documents, designs, plans, data and any Confidential Information provided by ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** to the Concessionaire prior to termination of this Agreement;

(iii) ***[Executing Agency]*** shall hand over to the Concessionaire the Phase I Designs and Drawings, the Construction Plan, the ESHS Documents and any other document and Confidential Information submitted by the Concessionaire to ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** prior to termination of this Agreement; and

(iv) if the access to any part of the Site has been granted to the Concessionaire prior to termination of this Agreement, then upon termination of this Agreement, the Concessionaire shall clear the Site and remove all debris, hazardous materials, surplus construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site, and thereafter, the Site will be deemed to automatically vest with ***[Executing Agency]***, free from all Encumbrances.

(d) Upon termination of this Agreement pursuant to this Clause 3.6, other than to the extent specified in this Clause 3.6, no Party shall have any liability to the other Parties in connection with this Agreement and the Concessionaire shall not be entitled to receive any termination compensation from ***[Name of the State / National Level Agency, if any]*** or ***[Executing Agency]***.

3.7 Term

(a) Subject to early termination in accordance with Article 14 (Force Majeure) or Article 16 (Events of Default), this Agreement shall come into full force and effect on the Effective Date and remain in full force and effect until the Expiry Date (the "**Term"**).

(b) **[Extension of Term**

The Authority may in its sole discretion, in the event the Concessionaire does not commit any Event of Default during the last [5 (five) years] of the Term, agree to extend the Concession after the expiry of the Term on same [or modified] terms and conditions.

Provided that any such extension shall also lead to an extension of License Agreement(s) for an equal period so as to make the License Agreement co-terminus with extended Term.]

ARTICLE 4
SITE AND ASSET OWNERSHIP

4.1 Grant of License over the Site

(a) ***[Executing Agency]*** shall grant the Concessionaire a license over the ***[Location]***Facilities Sites along with all necessary rights of way, to enter upon, access and occupy the ***[Location]***Facilities Sites, free of all Encumbrances in accordance with this Clause 4.1, Applicable Laws, and Applicable Permits. The license granted to the Concessionaire shall include the exclusive right to:

(i) design, construct and commission the Facilities at the Site;

(ii) operate and maintain the Facilities during the O&M Period;

(iii) install, operate, use, maintain, and remove such equipment, devices or other structures and improvements on, over, or under the Site, as may be necessary or appropriate for the operations and activities required or permitted under this Agreement;

(iv) use access roads, gates, fences and utilities at or about the Site;

(v) discharge, store, treat and manage the STP By-Products, FSTP By-Products and the Treated Effluent produced by the Facilities; and

(vi) construct, use, operate, maintain, replace and repair electric lines, telecommunication lines, water supply networks and other utilities required to undertake the Project at the Site.

(b) On and from the Effective Date and subject to the provisions of this Agreement, ***[Executing Agency]*** shall grant the Concessionaire: (i) a license over the ***[Location]***Facilities Sites including the exclusive right to occupy and use the ***[Location]***Facilities Sites to construct the Facilities; and (ii) all necessary rights of way to the ***[Location]***Facilities Sites. Any charges payable for obtaining the right of way will be paid directly by ***[Executing Agency]***.

Notwithstanding anything contained herein, to the extent of applicability of Clause 7.1, the Concessionaire shall be entitled to access the Site prior to the Effective Date.

(c) ***[Executing Agency]*** shall provide the ***[Location]***Facilities Sites to the Concessionaire free of Encumbrances and encroachments as a Condition Precedent. If the Concessionaire discovers any hazardous substances at the time of handover of the ***[Location]***Facilities Sites by ***[Executing Agency]***, ***[Executing Agency]*** will remove such hazardous substances at its own cost and expense. The Concessionaire's acceptance of the site(s) at the time of ***[Executing Agency]***'s handover/giving access to the site(s) shall be deemed to be unconditional acceptance and that there were no hazardous substance or any possible form of obstruction to the project at the time of handover of site(s) and concessionaire shall be barred from raising any such issues,

whatsoever, after the handover or having access to the site(s).

(d) The Concessionaire shall not without the prior written consent or approval of ***[Executing Agency]*** use the Site for any purpose other than to undertake the Project and purposes incidental thereto, as permitted under this Agreement or as may be otherwise approved by ***[Executing Agency]***.

(e) The full ownership and title over the Site shall vest with ***[Executing Agency]*** for the entire Term.

(f) ***[Executing Agency]*** warrants that the Concessionaire shall, subject to complying with the terms and conditions of this Agreement, occupy the Site, from such time that access is granted to the Concessionaire and until the expiry of the Term or early termination of this Agreement. If the Concessionaire is obstructed by any Person claiming any right, title or interest in or over the Site or any part thereof or in the event of any enforcement action including any attachment, distraint, appointment of receiver or liquidator being initiated by any Person claiming to have a charge on the Site or any part thereof, ***[Executing Agency]*** shall, if called upon by the Concessionaire, defend such claims and proceedings.

(g) Subject to any substitution rights exercised by the Lenders, the license granted by ***[Executing Agency]*** shall automatically terminate upon termination of this Agreement or expiry of the Term.

(h) The Concessionaire hereby irrevocably appoints the ***[Executing Agency]*** (or its nominee) to be its true and lawful attorney, to execute and sign in the name of the Concessionaire a transfer or surrender of the rights granted hereunder at any time after the Term has expired or has been Terminated in terms hereof, whichever is earlier, a sufficient proof of which shall be the declaration of any duly authorised officer of the ***[Executing Agency]***, and the Concessionaire consents to it being registered for this purpose.

4.2 Ownership, Right, Title and Interest in the Facilities

(a) Without prejudice and subject to the Agreement, the ownership of the Facilities, including all improvements made therein by the Concessionaire during the Term shall at all times remain as mentioned below:

(i) That of all the immovable assets including Site and civil structures created for the Facilities shall remain with the ***[Executing Agency]***,

(ii) That of the Mobile Associated Infrastructure shall remain with the Concessionaire and in accordance with the Financing Documents and first prior charge to Senior Lenders privileges.

(b) The full ownership, rights and title to the Facilities constructed or installed by the Concessionaire pursuant to this Agreement shall vest with ***[Executing Agency]*** during the entire Term and thereafter. The Concessionaire shall have the right to enter upon the

Site, access and operate the Facilities during the Term, to exercise its rights and fulfil its obligations under this Agreement.

(c) Except as otherwise provided inthis Agreement, the Concessionaire shall not:

(iii) sell or otherwise dispose or create any Security over the Facilities or any part thereof;
(iv) dispose any assets forming part of the Facilities, other than for the purposes of replacement due to normal wear and tear; or
(v) transfer, assign or novate all of its rights and obligations under this Agreement, without the prior written consent of ***[Executing Agency]*** (such consent not being unreasonably withheld or delayed).

4.3 Site Data and Verification

(a) ***[Executing Agency]*** has made available to the Concessionaire, the layout plans, load flow studies and all other relevant data, studies and reports in ***[Executing Agency]***'s possession in connection with the Site and the Facilities.

(b) The Concessionaire shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the implementation of the Project at the Site.

(c) The Concessionaire shall also be deemed to have inspected and examined the Site and its surroundings, analysed and verified the accuracy and reliability of the studies, reports and data provided by ***[Executing Agency]*** and any other information available with respect to the Facilities and the Site and to have satisfied itself as to all the relevant matters including:

(i) the nature of the Site, including the subsurface, hydrological, climatic and general physical conditions of the Site;

(ii) the suitability of the Site for undertaking the construction and operation of the Facilities;

(iii) the condition of the utilities available till the battery limits of the Site;

(iv) the extent, nature and availability of labour, material, transport, accommodation, storage facilities and other facilities and resources necessary to undertake the Project;

(v) the nature of design, construction work and O&M services necessary for the performance of its obligations under this Agreement;

(vi) Applicable Laws and Applicable Permits required to be obtained and maintained to undertake the Project;

(vii) the risk of injury or damage to Adjoining Property and to the occupiers of such

property or any other risk;

(viii) the suitability and adequacy of any access roads to the Site and other utilities and facilities to be provided by the relevant Government Authority; and

(ix) all other matters that may affect the performance of its obligations under this Agreement.

The Concessionaire acknowledges and agrees that if any error or discrepancy is subsequently discovered in the data made available by ***[Executing Agency]***, then, such error or discrepancy shall not entitle the Concessionaire to any extension of the Scheduled Payment Milestone Completion Date, the Scheduled Construction Completion Date and/or compensation for additional costs incurred nor shall it be open to the Concessionaire to justify any default or delay on the ground of the Concessionaire having not visited or acquitted itself with the site and Site conditions in any manner whatsoever. Further, any misinterpretation of the data, studies and reports provided by ***[Executing Agency]*** shall not relieve the Concessionaire from the performance of its obligations under this Agreement on the ground that it could not reasonably be expected to have foreseen any of the matters listed in Clause 4.3(c) (i) to (ix) above, which affect or may affect the Project or the performance of any of its obligations under this Agreement.

4.4 Unforeseen Site Conditions

Without prejudice to Clause 4.3 above, if during the execution of the Project, the Concessionaire encounters any adverse physical conditions, which could not have been reasonably foreseen by acting in accordance with Good Industry Practices, the Concessionaire may seek a Variation in accordance with Clause 20.3. Upon receipt of a request for a Variation due to unforeseen Site conditions, if, in the opinion and sole discretion of ***[Executing Agency]***, such conditions could not have been reasonably foreseen by a prudent developer acting in accordance with Good Industry Practices, then ***[Executing Agency]*** shall issue a Variation Order in accordance with Article 20. Any decision of ***[Executing Agency]*** regarding the existence of any unforeseen Site conditions shall be final and binding.

4.5 Site Related Covenants

The Concessionaire agrees and undertakes that:

(a) the Concessionaire shall not transfer, alienate, assign, dispose of, sub-license or create any Security over any part of the Site or its rights and interest in the Site, other than as specifically permitted under this Agreement;

(b) the Concessionaire shall not allow any encroachment on, or unauthorized occupation of any part of the Site and in the event of any encroachment or unauthorized occupation, the Concessionaire shall immediately cause such encroachment or any unauthorized occupants to be removed from the Site. The Concessionaire shall not be entitled to any extension of time or costs incurred in removal of any encroachment or any unauthorized occupants from the Site;

(c) the grant of any rights to a Subcontractor or any other third party shall not interfere with or hinder the performance of the Concessionaire's obligations under this Agreement;

(d) the Concessionaire shall be wholly responsible for safety at and security of the Site and the Facilities;

(e) the Concessionaire shall take all necessary measures to confine its operations, personnel and equipment to the Site and not encroach on any Adjoining Property;

(f) all minerals, fossils, articles of value or antiquity, structures and other remains or things of geological or archaeological interest and other objects with historic, antique or monetary value discovered at, on or under the Site shall be dealt with in accordance with Applicable Laws and the Concessionaire shall take all necessary precautions to prevent its or its Subcontractor's personnel from removing or damaging any such article or thing. Further, immediately upon the discovery of any such article or thing of value, the Concessionaire shall inform ***[Executing Agency]*** of such discovery and carry out the instructions of ***[Executing Agency]*** in this regard;

(g) the Concessionaire shall make good any damage to any roads, footpaths, conduits, and other works on any Adjoining Property, which is caused by the Concessionaire or the Concessionaire Related Parties;

(h) the Concessionaire shall not to do or permit to be done anything which might:

(i) cause destruction, scarring or defacing of natural surroundings in the vicinity of the Site;
(ii) be or become a danger or nuisance or give rise to liability in tort to any owners or occupiers of the Adjoining Property or to members of the public; or
(iii) cause any contamination or damage to any Adjoining Property,

and the Concessionaire shall, at its own expense, take all reasonable measures and precautions to avoid any such danger, nuisance, tort, damage or interference and shall make good any damage so caused.

If the construction works and/or the O&M services cannot be carried out without interfering with the rights of the owner or occupier of any Adjoining Property, the Concessionaire shall promptly and at its own cost obtain all necessary third party consents and/or the approval of any Government Authority to undertake such construction works and/or the O&M services. ***[Executing Agency]*** shall provide all assistance to the Concessionaire for procuring such approvals.

4.6 Access to *[Executing Agency]* Related Parties, *[Name of the State / National Level Agency, if any]* Related Parties and Government Authorities

The Concessionaire shall ensure that ***[Executing Agency]*** Related Parties, the ***[Name of the State / National Level Agency, if any]***Related Parties and the relevant Government Authorities have access to the Site and the license granted to the Concessionaire over the Site shall always be subject to:

(a) the rights of ***[Executing Agency]***, ***[Executing Agency]***'s Representative, ***[Name of the State / National Level Agency, if any]***'s Representative, the Project Engineer, and other ***[Executing Agency]*** Related Parties and ***[Name of the State / National Level Agency, if any]*** Related Parties to enter upon and access the Site to inspect and monitor the progress of the Project, and for the exercise of their rights and the performance of their obligations under this Agreement, provided that ***[Executing Agency]*** and/or ***[Name of the State / National Level Agency, if any]*** shall ensure that the exercise of the inspection or monitoring rights do not impede or obstruct the construction and/or operation of the Facilities in any manner whatsoever; and

(b) the rights of the Government Authorities or other utility providers to enter upon and access the Site for laying or installing telegraph lines, electric lines or for any other public purpose.

If any physical damage is caused to the Site or the Facilities as a result of such access and use of the Site by ***[Executing Agency]***, the Project Engineer, ***[Executing Agency]*** Related Parties, the ***[Name of the State / National Level Agency, if any]*** Related Parties, Government Authorities then ***[Executing Agency]*** shall bear the costs of remedying such damage and restoring the Site and the Facilities.

ARTICLE 5
PERFORMANCE SECURITIES, ESHS PERFORMANCE SECURITIES, O&M SECURITIES AND MOBILIZATION ADVANCE GUARANTEES

5.1 The Concessionaire [and/or Nominated STP/FSTP Sub-Contractor][20]shall have submitted to *[Executing Agency]*, prior to the Appointed Date:

(a) an unconditional and irrevocable bank guarantee for an amount equal to INR [_____] (Rupees [_____]), corresponding to [9% (nine per cent)] of the Bid Project Cost (the "**Performance Security"**);

(b) an unconditional and irrevocable bank guarantee for an amount equal to INR [_____] (Rupees [_____]), corresponding to [1% (one per cent)] of the Bid Project Cost (the "**ESHS Performance Security"**);

[Provided, if the experience of the Nominated STP/FSTP Sub-Contractor has been claimed for qualification in the Project, then both the Nominated STP/FSTP Sub-Contractor and the Concessionaire shall each submit 50% (fifty per cent) of the Performance Securities as mentioned in (a) above.][21]

5.2 The Performance Security shall remain valid until 25 (twenty) months from the Effective Date or one month from the COD, whichever is later.

5.3 The Performance Security or the amount retained by ***[Executing Agency]*** as cash security under Clause 5.10 shall be returned after the expiry of 30 (thirty) days from the COD, unless this Agreement is terminated earlier, in which case the Performance Security will be returned within 30 (thirty) days from the date of termination, subject to ***[Executing Agency]***'s right to receive any amounts from the Concessionaire under this Agreement.

5.4 The ESHS Performance Security shall be valid until the Expiry Date or Termination of the Agreement, whichever is earlier. The ESHS Security shall have an initial validity period till COD, which must thereafter be renewed on a year-on-year basis, before the expiry of the 11th (eleventh) month of the relevant year, until the expiry of the O&M Period. If any of the ESHS Security is not renewed by the expiry of the 11th (eleventh) month of the relevant year, then ***[Executing Agency]*** shall be entitled to drawdown the total amount available under the ESHS Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the ESHS Security.

5.5 As conditions precedent to the COD, within 60 (sixty) days of the Construction Completion Date, or 30 (thirty) days before COD, whichever is earlier, the Concessionaire *[*and Nominated STP/FSTP Sub-Contractor][22]an unconditional and irrevocable bank guarantee to ***[Executing Agency]*** for an amount equal to O&M Security, for an amount equal to INR [_____]] (Rupees [_____]), corresponding to 4% (four per cent) of the ***[Location]*** Facilities Bid Project Cost.[Provided, if the experience of the Nominated

[20] To be deleted if not applicable. If applicable, the Concessionaire shall ensure that the Nominated STP Sub-Contractor submits performance security and ESHS performance security.

[21] To be deleted if not applicable

[22] To be deleted if not applicable

STP/FSTP Sub-Contractor has been claimed for qualification in the Project, then both the Nominated STP/FSTP Sub-Contractor and the Concessionaire shall each submit 50% (fifty per cent) of the O&M Securities as mentioned above.][23]

5.6 The Concessionaire [and Nominated STP/FSTP Sub-Contractor][24]shall furnish the O&M Security in the same format as provided for the Performance Security in the RFP, with necessary modifications. The Concessionaire [and/ or Nominated STP/FSTP Sub-Contractor][25]shall maintain the O&M Securities in full force and effect until the expiry of the O&M Period. The O&M Securities shall have an initial validity period of 1 (one) year, which must be renewed on a year-on-year basis, before the expiry of the 11th (eleventh) month of the relevant year, until the Expiry Date or Termination of the Concession Agreement, whichever is earlier.

5.7 The ESHS Performance Security shall secure the due performance of the Concessionaire's ESHS obligations during the Construction Period and the O&M Period, as set out in the approved ESHS Documents.

5.8 The Performance Security shall secure the due performance of all the Concessionaire's obligations during the Construction Period and the O&M Security shall secure the due performance of all the Concessionaire's obligations during the O&M Period.

5.9 The cost of procuring the Performance Security, the ESHS Performance Security and the O&M Security shall be borne solely by the Concessionaire.

5.10 If the Performance Security is scheduled to expire before the COD, then the Concessionaire shall arrange for an extension of the Performance Security at least 30 (thirty) days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, ***[Executing Agency]*** shall be entitled to drawdown the total amount available under the Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the Performance Security, that is scheduled to expire.

5.11 If the ESHS Performance Security is scheduled to expire before the expiry of the O&M Period, the Concessionaire shall replace or arrange for an extension of the ESHS Performance Security at least 30(thirty) days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, ***[Executing Agency]*** shall be entitled to drawdown the total amount available under the ESHS Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the ESHS Performance Security.

5.12 If any O&M Security is not renewed by the expiry of the 11th (eleventh) month of the relevant year of the O&M Period, then ***[Executing Agency]*** shall be entitled to drawdown the total amount available under the O&M Security and retain such amount as cash security until such

[23]To be deleted if not applicable. If applicable, the Concessionaire shall ensure that the Nominated STPSub-Contractor submits O&M performance security.

[24] To be deleted if not applicable. If applicable, the Concessionaire shall ensure that the Nominated STPSub-Contractor submits O&M performance security.

[25] To be deleted if not applicable

time that the Concessionaire submits an extension or replacement of the O&M Security.

5.13 ***[Executing Agency]*** shall be entitled to utilize such retained amount in the same manner as it would utilise the Performance Security, the ESHS Performance Security or the O&M Security, as the case may be.

(a) Upon receipt of a renewed or replacement Performance Security or within 30 (thirty) days of the COD or expiry / termination of the Agreement, ***[Executing Agency]*** shall return the unutilized cash security amount for the Performance Security to the Concessionaire.

(b) Upon receipt of a renewed or replacement ESHS Performance Security or within 30 (thirty) days of the expiry / termination of the Term, ***[Executing Agency]*** shall return the unutilized cash security amount for the ESHS Performance Security to the Concessionaire.

(c) Upon receipt of a renewed or replacement O&M Security or within 30 (thirty) days of the expiry / termination of the O&M Term, ***[Executing Agency]*** shall return the unutilized cash security amount for the O&M Security to the Concessionaire.

(d) The interest earned on any retained amounts on cash security shall be the property of ***[Executing Agency]*** and ***[Executing Agency]*** shall not be required to account to the Concessionaire for any such interest.

5.14 ***[Executing Agency]*** shall have the right to draw on the Performance Securities and claim up to the amount guaranteed upon the Concessionaire's failure to satisfy any Condition Precedent or honour any of its obligations, responsibilities or commitments during the Construction Period, or any amount due and payable by the Concessionaire to ***[Executing Agency]*** (including any Delay Liquidated Damages), in accordance with this Agreement.

5.15 ***[Executing Agency]*** shall have the right to draw on the O&M Securities and claim up to the amount guaranteed upon the Concessionaire's failure to honour any of its obligations, responsibilities or commitments during the O&M Period, or any amount due and payable by the Concessionaire to ***[Executing Agency]*** (including any Availability Liquidated Damages, Performance Liquidated Damages, Termination Compensation and any amounts the Concessionaire is liable to pay under Clause 19.2), in accordance with this Agreement.

5.16 Without prejudice to its right to draw on the Performance Securities or, as the case may be, the O&M Securities, ***[Executing Agency]*** shall have the right to draw on the ESHS Performance Securities and claim up to the amount guaranteed upon the Concessionaire's failure to honour any of its ESHS related obligations, responsibilities or commitments during the Construction Period or the O&M Period, as set out in the approved ESHS Documents, in accordance with this Agreement.

5.17 ***[Executing Agency]*** shall not be required to give any prior notice to the Concessionaire of its intention to make a demand under the Performance Securities, the ESHS Performance Securities or the O&M Securities, as the case may be. However, ***[Executing Agency]*** shall provide the Concessionaire with a copy of any demand notice issued by ***[Executing***

Agency]under the Performance Securities, the ESHS Performance Securities or the O&M Securities, simultaneously with the issuance of the demand notice to the Scheduled Bank that has issued the relevant Performance Security, ESHS Performance Security or the O&M Security.

5.18 If ***[Executing Agency]*** makes a demand under any Performance Security and/or ESHS Performance Security and/or O&M Security, in part or in full, the Concessionaire shall immediately and in no event later than 15 (fifteen) days of such demand, restore the value of such Performance Security, ESHS Performance Security or O&M Security to the amount stated in Clause 5.1 or Clause 5.5.

5.19 Within 30 (thirty)days from the COD or the termination of this Agreement, whichever is earlier, the Performance Securities or, as the case may be, the amount retained by ***[Executing Agency]*** as cash security under Clause 5.10, shall be released to the Concessionaire after the expiry of 30 (thirty)days from the COD or termination of this Agreement, subject to ***[Executing Agency]***'s right to receive any amounts from the Concessionaire before or upon COD or termination of this Agreement.

5.20 Upon the expiry of the O&M Period or the termination of this Agreement, whichever is earlier, the O&M Securities, the ESHS Performance Securities or, as the case may be, the amount retained by ***[Executing Agency]*** as cash security under Clause 5.11 or Clause 5.12, shall be released to the Concessionaire after the expiry of 30 (thirty) days from the Expiry Date or termination of this Agreement, subject to ***[Executing Agency]***'s right to receive any amounts from the Concessionaire before or upon such expiry or termination of this Agreement.

5.21 Mobilization Advance Guarantee

(a) Within 30 (thirty) days of the Effective Date, the Concessionaire shall submit to ***[Executing Agency]***: (i) an unconditional and irrevocable bank guarantee for an amount equal to 110% (one hundred and ten per cent) of the Mobilization Advance for the ***[Location]*** Facilities in the form set out at Schedule 4 (the "***[Location]*** **Facilities Mobilization Advance Guarantee"**); and the Mobilization Advance Guarantee shall secure the Mobilization Advance paid to the Concessionaire in accordance with Clause 9.3(d). The cost of procuring the Mobilization Advance Guarantees shall be borne solely by the Concessionaire.

(b) The Mobilization Advance Guarantee shall remain valid until the entire Mobilization Advance secured by such Mobilization Advance Guarantee has been adjusted against the Construction Payments. However, the Concessionaire may, at its discretion, progressively reduce the value of the relevant Mobilization Advance Guarantee by the amount of the Mobilization Advance adjusted against each of the 4 (four) instalments of the Construction Payments, in accordance with Clause 9.3(d). For this purpose, the Concessionaire shall be required to furnish a replacement Mobilization Advance Guarantee of the reduced amount within 15 (fifteen) days of receipt of a Payment Certificate from ***[Executing Agency]*** on successful completion of the relevant Payment Milestone. ***[Executing Agency]*** shall return the relevant existing Mobilization Advance

Guarantee upon receipt of a replacement Mobilization Advance Guarantee from the Concessionaire.

(c) If any Mobilization Advance Guarantee is scheduled to expire before the entire Mobilization Advance has been adjusted, then the Concessionaire shall arrange for an extension of the relevant Mobilization Advance Guarantee at least 30 (thirty) days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, ***[Executing Agency]*** shall be entitled to drawdown the total amount available under such Mobilization Advance Guarantee and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the Mobilization Advance Guarantee.

(d) ***[Executing Agency]*** shall be entitled to utilize such retained amount in the same manner as it would utilize the Mobilization Advance Guarantee. Upon receipt of an extension or replacement Mobilization Advance Guarantee or on adjustment of the entire Mobilization Advance, ***[Executing Agency]*** shall return the unutilized cash security amount to the Concessionaire.

The interest earned on any retained amounts or cash security shall be the property of ***[Executing Agency]*** and ***[Executing Agency]*** shall not be required to account to the Concessionaire for any such interest.

(e) ***[Executing Agency]*** shall have the right to draw on the Mobilization Advance Guarantees in the event of the inadequate adjustment of the Mobilization Advance in accordance with Clause 9.3(d), prior to the Construction Completion Date.

(f) ***[Executing Agency]*** shall not be required to give any prior notice to the Concessionaire of its intention to make a demand under any Mobilization Advance Guarantee. However, ***[Executing Agency]*** shall provide the Concessionaire with a copy of any demand notice issued by ***[Executing Agency]*** under a Mobilization Advance Guarantee, simultaneously with the issuance of the demand notice to the Scheduled Bank that has issued the Mobilization Advance Guarantee.

5.22 Additional Performance Security

(a) In the event of the Selected Bidder having submitted Additional Performance Security in accordance with the RFP document, then such Additional Performance Security shall be in force till the end of Construction period if the Bid Project Cost is found to be unreasonable, and till the end of the Concession Period if O&M Charges are found to be unreasonable. Notwithstanding anything contained herein, the Additional Performance Security shall be liable to be forfeited either fully or partially by ***[Executing Agency]*** as it deems fit for the reasons mentioned in Clause 16.1 of the Concession agreement. The Additional Performance Security for the unreasonable Bid Project Cost shall be returned 30 (thirty) days after COD and the Additional Performance Security for O&M Charges shall be returned at the end of Concession Period.

(b) Change in Ownership in accordance with Clause 12 of the Concession Agreement shall be subject to the fulfillment of the requirements of Additional Performance Security as per the Clause 5.22(a) above, by the incoming Consortium Partner/Single Entity.

5.23 [If the Nominated STP/FSTP Sub-Contractor, nominated under the Sub-contractor Undertaking, ceases to be associated with the Concessionaire before the completion of 2 (two) years from the COD, then, with prior approval of ***[Executing Agency]*** and/ or ***[Name of the State / National Level Agency, if any]***, the Concessionaire shall propose to substitute such entity with another sub-contractor who shall meet the qualification criteria set out in Clause 4.1(a)(B), 4.1(a)(F)(ii) and 4.1(b)(ii) of the RFP. Also, the substituted sub-contractor shall submit the Performance Securities and/or O&M Securities as per Clause 5.1 and 5.5 of this Concession Agreement.][26]

5.24 [The Concessionaire shall have submitted to ***[Executing Agency]***, prior to the Appointed Date, an unconditional and irrevocable bank guarantee to the ***[Executing Agency]***, issued by the Technology Provider, for an amount equal to INR [_____] (Rupees [_____]), corresponding to 5% (five per cent) of the Aggregate Bid Project Cost (the Technology Performance Security)][27]

[26] To be deleted if not applicable
[27] To be deleted if not applicable

ARTTICLE 6
PROJECT ENGINEER

6.1 ***[Name of the State / National Level Agency, if any]*** or the ***[Executing Agency]*** shall appoint a third-party engineering firm with requisite technical expertise, knowledge and experience in the design, engineering and construction of STP/FSTP as the engineer for the Project (the "**Project Engineer"**). The Project Engineer shall assist ***[Executing Agency]*** in supervising the construction/renovation, operation and maintenance of the Facilities and shall support ***[Executing Agency]*** to monitor compliance with the KPIs during the O&M period. The detailed scope of work of the Project Engineer is set out in **Schedule 6**.

6.2 All fees, costs, charges and expenses payable to the Project Engineer shall be borne by ***[Name of the State / National Level Agency, if any]*** or ***[Executing Agency]***.

The Concessionaire may request ***[Name of the State / National Level Agency, if any]*** or ***[Executing Agency]*** to replace the Project Engineer if the Concessionaire believes that the Project Engineer is not performing its duties in accordance with this Agreement or is **otherwise** impeding the performance of the Concessionaire's obligations under this Agreement.

[Name of the State / National Level Agency, if any] or ***[Executing Agency]***may replace the Project Engineer in any of the following circumstances:

(a) if it has reason to believe that the Project Engineer has not discharged its duties in accordance with this Article 6 and/or Schedule 6; or
(b) has received a formal complaint from the Concessionaire. In such a case ***[Name of the State / National Level Agency, if any]*** or ***[Executing Agency]*** will make necessary investigations and it is established that the Project Engineer has not discharged its duties in accordance with this Article 6 and/or Schedule 6; or
(c) if the Project Engineer submits its resignation.

6.3 In appointing any replacement of the Project Engineer, ***[Name of the State / National Level Agency, if any]*** or ***[Executing Agency]*** shall comply with this Article 6 and Schedule 6.

6.4 The Project Engineer shall be required to act independently, reasonably, fairly and expeditiously to ensure: (a) the timely completion of construction of the Facilities on or before the Scheduled Construction Completion Date and (b) compliance with the KPIs during the O&M Period.

6.5 During the Construction Period, the Project Engineer shall inspect the Facilities at least once a month and prepare an inspection report, setting out the progress of the construction of the Facilities, defects or deficiencies, if any, and status of compliance with the Construction Plan, Technical Specifications and Designs and Drawings. The Project Engineer shall send the report to ***[Executing Agency]*** and the Concessionaire within 7 (seven) days of such inspection, pursuant to which, the Concessionaire shall be required to rectify the defects or deficiencies, if any, identified by the Project Engineer.

6.6 During the O&M Period, the Project Engineer shall inspect the Facilities at least once a

month and prepare an inspection report, setting out the defects or deficiencies, if any, and status of compliance with the KPIs (including specifically, the Influent Standards and the Discharge Standards). The Project Engineer shall send the report to ***[Executing Agency]*** and the Concessionaire within 7 (seven) days of such inspection, pursuant to which, the Concessionaire shall be required to rectify the defects or deficiencies, if any, identified by the Project Engineer. The Project Engineer shall also have the right to verify the results of the tests undertaken by the Concessionaire at any time during the O&M Period at the Inlet Point and the Outlet Point to determine the standard of the Sewage/Faecal Sludge/Septage, the STP By-Products, the FSTP By-Products, and the Treated Effluent.

6.7 Except as specifically provided in this Agreement, the Project Engineer shall have no authority, whether express or implied, to amend, vary or curtail any of the rights or obligations of the Parties.

6.8 The Project Engineer shall at all times during the Term have the right to enter upon and access the Site. The Concessionaire shall have the right to accompany the Project Engineer during its inspection of the Facilities.

6.9 The Project Engineer shall, at all times, have the right to attend any meetings held by the Concessionaire to review the progress of the construction or O&M of the Facilities, and to provide its comments/suggestions regarding the progress as well as the manner in which the construction works, or O&M services is being undertaken. Neither any comments/suggestions provided by the Project Engineer nor any failure to provide comments/suggestions shall be deemed to be an acceptance of the construction works or the O&M services or a waiver of the Concessionaire's obligations to implement the Project, in accordance with this Agreement, the Technical Specifications, the Designs and Drawings, the ESHS Documents, and all Applicable Laws and Applicable Permits.

6.10 The Concessionaire agrees that notwithstanding any review by the Project Engineer of any or all of the construction works or O&M services, the Concessionaire shall bear all risk, responsibility and liability for the quality, adequacy and suitability of the Facilities.

ARTICLE 7
CONSTRUCTION PERIOD

7.1 Commencement and Duration

The period for construction of the Facilities shall commence on and from the Effective Date and shall continue until the Construction Completion Date (the "**Construction Period"**).

Notwithstanding anything to the contrary in this Agreement, the Concessionaire shall, prior to the Effective Date, be entitled to commence:

(a) soil or geophysical investigation or testing at the Site; and

(b) appointment of Subcontractors for the construction works for the Facilities, with the prior approval of ***[Executing Agency]*****.**

7.2 Designs and Drawings

(a) Phase I Designs and Drawings

(i) *Basic Engineering Designs*

(A) The Concessionaire shall prepare the Basic Engineering Designs in accordance with the Technical Specifications, Applicable Laws and Applicable Permits. If the Concessionaire proposes to set up the Power Plant, the Concessionaire shall also submit the Basic Engineering Designs for the Power Plant. The Basic Engineering Designs shall be drawn to scale, with accurate dimensions, to minimize construction delays, disputes and cost overruns and to ensure smooth construction of the Facilities. The Facilities should be designed in a manner such that the Concessionaire can obtain consent to operate from the ***[State Pollution Control Board]*** for the operation of the Facilities. The Basic Engineering Designs should also specify the Proposed Technology for the ***[Location]*** STP(s) and ***[Location]*** FSTP(s).

(B) Within 30 (thirty) days from the Appointed Date, the Concessionaire shall submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the draft Basic Engineering Designs to ***[Executing Agency]*** for its review and approval.

(C) ***[Executing Agency]*** shall forward the Basic Engineering Designs to the Project Engineer and the Indian Institute of Technology (IIT)/ an institute with equivalent repute and credibility, for their review and comments.

(D) ***[Executing Agency]*** shall provide comments if any, on the draft Basic Engineering Designs (including any comments from IIT and the Project Engineer) to the Concessionaire or notify the Concessionaire of its approval of the draft Basic Engineering Designs within 20 (twenty) days from the date of receipt of the draft Basic Engineering Designs. ***[Executing Agency]*** may require the Concessionaire to amend or modify the draft Basic Engineering Designs if ***[Executing Agency]***, IIT/other institute, or the Project Engineer

identifies any deficiencies, inaccuracies or shortcomings in the draft Basic Engineering Designs. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Basic Engineering Designs from ***[Executing Agency]***, then the Concessionaire shall modify the draft Basic Engineering Designs to correct any such shortcomings, inaccuracies or deficiencies and/or address, in writing, ***[Executing Agency]***'s/ IIT's (or other institute's)/ the Project Engineer's comments on the draft Basic Engineering Designs and submit the revised Basic Engineering Designs to ***[Executing Agency]*** for its approval within 10 (ten) days of receipt of comments. The process set out in this Clause 7.2(a)(i) shall continue until the Basic Engineering Designs are certified by IIT/ other institute and are approved by ***[Executing Agency]*** in accordance with this Clause 7.2(a)(i)(C) and Clause 7.2(a)(i)(D).For the avoidance of doubt, approval of Basic Engineering Designs by the ***[Executing Agency]***/ IIT (or other institute)/ the Project Engineer shall not relieve the Concessionaire of its obligations to prepare the Basic Engineering Design in accordance with Technical Specifications, Applicable Laws and Applicable Permits.

(ii) *Screening Report*

(A) The Concessionaire shall prepare the Screening Report in accordance with the ESMF and as per the format set out in Schedule 8.

(B) Within 30 (thirty) days from the Appointed Date, the Concessionaire shall submit 4 hard copies and 1 soft copy of the draft Screening Report on a compact disc to the Executing Agency for its review and approval.

(C) The ***[Executing Agency]*** shall forward the draft Screening Report to the Project Engineer for its review and comments.

(D) The ***[Executing Agency]*** shall provide comments if any, on the draft Screening Report (including any comments from the Project Engineer) to the Concessionaire or notify the Concessionaire of its approval of the draft Screening Report within 20 (twenty) days from the date of receipt of the draft Screening Report. The ***[Executing Agency]*** may require the Concessionaire to amend or modify the draft Screening Report if the ***[Executing Agency]*** identifies any deficiencies, inaccuracies or shortcomings in the draft Screening Report. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Screening Report from the ***[Executing Agency]***, then the Concessionaire shall modify the draft Screening Report to correct any such shortcomings, inaccuracies or deficiencies and/or address, in writing, the ***[Executing Agency]***'s /Bank's comments on the draft Screening Report and submit the revised Screening Report to the ***[Executing Agency]*** for its approval within 10 (ten) days of receipt of comments. The process set out in this Clause 7.2(a)(ii)(D) shall continue until the Screening Report is approved by the ***[Executing Agency]*** in accordance with this Clause 7.2(a)(ii)(D).

(iii) Within 30 (thirty) days from the approval of the Basic Engineering Designs, the Concessionaire shall prepare the balance Phase I Designs and Drawings based on

the approved Basic Engineering Designs and submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the balance Phase I Designs and Drawings to ***[Executing Agency]*** for its review and approval. The process set out in Clause 7.2(a)(i)(C) and Clause 7.2(a)(i)(D) will apply for approval of the balance Phase I Designs and Drawings.

(b) Phase II Designs and Drawings

(i) At least 2 (two) months prior to the commencement of work for the second Payment Milestone for the Facilities, the Concessionaire shall submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the Phase II Designs and Drawings for the works corresponding to the second Payment Milestone for the Facilities. The process set out in Clause 7.2(a)(i)(C) and Clause 7.2(a)(i)(D) will apply for approval of the Phase II Designs and Drawings for the works corresponding to the second Payment Milestone.

(ii) The process set out in Clause 7.2(a)(iii) above shall apply to the submission and approval of the Phase II Designs and Drawings for the work corresponding to the second Payment Milestone, and thereafter, each subsequent Payment Milestone for the Facilities.

(c) The Concessionaire shall construct the Facilities strictly in accordance with the approved Designs and Drawings. If there are any errors or deficiencies in the Technical Specifications, the Designs and Drawings shall take into account, address or rectify such errors or deficiencies. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Designs and Drawings without the prior written approval of ***[Executing Agency]***. The Concessionaire shall not commence construction of any part of the Facilities prior to approval of the Designs and Drawings in accordance with this Clause 7.2. If the Concessionaire undertakes any construction work for the Facilities prior to the approval of the Designs and Drawings, it shall do so at its own risk and ***[Executing Agency]*** shall have the right to reject any such construction work that does not comply with the approved Designs and Drawings.

(d) Notwithstanding any approval of the Designs and Drawings by ***[Executing Agency]***, the Concessionaire shall bear all risk, responsibility and liability for the suitability, accuracy, adequacy and practicality of the Designs and Drawings. Subject to Clause 3.5 and Clause 7.11(b), the Concessionaire shall not be entitled to any extension of time and/or costs incurred in the preparation of the Designs and Drawings and complying with the requirements of this Clause 7.2.

7.3 Construction Plan

(a) Within 30 (thirty) days from the Appointed Date, the Concessionaire shall prepare and submit to ***[Executing Agency]*** a detailed Construction Plan. The Construction Plan shall set out:

(i) The detailed plan for completing the construction of the ***[Location]*** Facilities by the Scheduled Construction Completion Date; specific activities and extent of

construction work to be performed by the Concessionaire to achieve each of the 4 (four) ***[Location]*** Facilities Payment Milestones; and

(ii) the order in which the Concessionaire proposes to execute the construction of the Facilities.

(b) ***[Executing Agency]*** shall review and provide comments, if any, on the draft Construction Plan to the Concessionaire or notify the Concessionaire of its approval of the draft Construction Plan within 30 (thirty) days from the date of receipt of the draft Construction Plan from the Concessionaire. ***[Executing Agency]*** may require the Concessionaire to amend or modify the draft Construction Plan if ***[Executing Agency]*** identifies any deficiencies or shortcomings in the draft Construction Plan. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Construction Plan from ***[Executing Agency],*** then the Concessionaire shall incorporate the suggestions made by ***[Executing Agency]*** and modify the draft Construction Plan to address any such comments, shortcomings or deficiencies identified by ***[Executing Agency]***. Thereafter, the Concessionaire shall submit the revised Construction Plan to ***[Executing Agency]*** for its approval. The process set out in this Clause 7.3(b) shall continue until the Construction Plan is approved by ***[Executing Agency]*** in accordance with this Clause 7.3(b).

(c) The Concessionaire shall construct the Facilities strictly in accordance with the approved Construction Plan. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Construction Plan without the prior written approval of ***[Executing Agency].*** The Concessionaire shall not commence construction of any part of the Facilities prior to approval of the Construction Plan in accordance with this Clause 7.3.

(d) Notwithstanding any approval of the Construction Plan by ***[Executing Agency]***, the Concessionaire shall, subject to Clause 7.11(b), be solely liable for completing the construction of the Facilities by the Scheduled Construction Completion Date.

(e) The Concessionaire shall submit a consolidated Construction Plan for the ***[Location]*** Facilities.

7.4 ESHS Documents

(a) Within 45 (forty five) days from the Appointed Date, the Concessionaire shall prepare and submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the ESHS Documentsto ***[Executing Agency]***.

(b) The ESHS Documents shall set out the Facilities Specific health, safety and environment policies, guidelines and procedures to be followed by the Concessionaire in undertaking the Project, developed in accordance with the ESMF, this Agreement (including, specifically, Schedule 9), Applicable Laws, Applicable Permits, and Good Industry Practices.

(c) The ESHS Documents shall comprise the following:

(i) Safeguard Documents

As part of the Safeguard Documents, the Concessionaire shall be required to:

(A) submit an update of the environment and social impact assessment report (the **"ESIA"**), which has been prepared by ***[Executing Agency]*** and shall be provided to the Concessionaire along with the RFP; and

(B) prepare the environmental management plan (the **"EMP**").

Or

(C) in case of unavailability of such existing document, create ESIA and prepare the EMP

(ii) Safety Documents

As part of the Security Documents, the Concessionaire shall be required to prepare the following:

(A) environment, social, health and safety management plan (the **"ESHSMP"**);

(B) environmental, social, health and safety management strategies and implementation plan (the **"ESHS-MSIP"**) – The ESHS-MSIP shall be prepared on the basis of the requirements set out in Schedule 9. The ESHS-MSIP shall include the following, for the purposes of managing the key ESHS risks in relation to the Project:

(I) traffic management plan to ensure safety of local communities from construction traffic;

(II) water resource protection plan to prevent contamination of drinking water;

(III) boundary marking and protection strategy for mobilization and construction to prevent offsite adverse impacts; and

(IV) strategy for obtaining Concessionaire Applicable Permits prior to the start of relevant works [such as opening a quarry or borrow pit].

(iii) Code of Conduct

The Code of Conduct shall be prepared on the basis of the requirements set out in Schedule 9. The Code of Conduct shall apply to the Concessionaire's employees and subcontractors and shall set out the ESHS obligations of the Concessionaire under the Agreement relating to risks associated with labor influx, spread of communicable diseases, sexual harassment, gender-based violence, illicit behaviour and crime, and maintaining a safe environment etc. The Code of Conduct shall also set out the manner in which the Code of Conduct will be implemented, including how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Concessionaire proposes to deal with any breaches.

(iv) In the ESHS, the Concessionaire shall also be required to provide details of the core team of 3 people for implementation of the Concessionaire's ESHS obligations, comprising: (A) health expert and safety specialist; (B) an environmental specialist; and (C) social specialist, who meet the minimum qualification requirements specified in Schedule 9.

(v) Within 30 (thirty) days from the appointed date, the Concessionaire shall prepare and submit 4 (four) hard copies and 1 (one) soft copy of Labour Influx and Workers Camp Management Plan to ***[Executing Agency]*** that addresses specific activities that will be undertaken to minimize the impact on the local community, including elements such as worker codes of conduct, training programs on HIV/AIDS, etc. A Workers' Camp Management Plan addresses specific aspects of the establishment and operation of workers' camps.

This Labor Influx and Workers' Camp Management Plan will include:

(A) mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
(B) informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
(C) introducing a Worker Code of Conduct as part of the employment contract, and including sanctions for non-compliance (e.g., termination), manual scavenging, engagement with local residents, child labor, nondiscrimination, harassment of coworkers including women and those belonging to SC and STs and other minority social groups,
(D) contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.
(E) training programs on HIV/AIDS and other communicable diseases,
(F) workers' Camp Management Plan addressing specific aspects of the establishment and operation of workers' camps provided the ULB/ ***[Executing Agency]*** is unable to cater to the demand for affordable housing for this additional workforce in terms of rentals, hostels, apartments etc. ; and
(G) compliant handling Mechanism at the project level

(d) ***[Executing Agency]*** shall forward a copy of the draft ESHS Documents to the Project Engineer and ***[Name of the State / National Level Agency, if any]*** for its review and comments.

(e) ***[Executing Agency]*** shall provide comments, if any, on the draft ESHS Documents (including any comments from the Project Engineer and ***[Name of the State / National Level Agency, if any]***)[28] to the Concessionaire or notify the Concessionaire of its approval of the draft ESHS Documents within 30 (thirty) days from the date of receipt of the draft ESHS Documents from the Concessionaire. ***[Executing Agency]*** may require the Concessionaire to amend or modify the draft ESHS Documents if ***[Executing Agency]*** or the Project Engineer or ***[Name of the State / National Level***

[28]To be deleted wherever it is not applicable.

Agency, if any] identifies any deficiencies or shortcomings in the draft ESHS Documents. If the Concessionaire receives any comments, suggestions or instructions to modify the draft ESHS Documents from ***[Executing Agency]***, then the Concessionaire shall modify the draft ESHS Documents to address any such comments, shortcomings or deficiencies identified by ***[Executing Agency]***. Thereafter, the Concessionaire shall submit the revised ESHS Documents to ***[Executing Agency]*** for its approval. The process set out in this Clause 7.4(e) shall continue until the ESHS Documents are approved by ***[Executing Agency]*** in accordance with this Clause 7.4(e).

(f) The Concessionaire shall ensure that its Subcontractors comply with and conform in all aspects of the ESHS Documents, approved in accordance with this Clause 7.4, in executing the Project. Any failure of the Concessionaire or the Subcontractors to comply with the ESHS Documents shall constitute a Concessionaire Event of Default. The Concessionaire shall indemnify ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** against all costs, expenses, penalties and liabilities incurred/suffered by ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** due to the Concessionaire's or any Subcontractor's failure to comply with the ESHS Documents in the course of execution of the Project. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved ESHS Documents without the prior written approval of ***[Executing Agency].***

(g) Neither any approval of the ESHS Documents by ***[Executing Agency]***, nor any failure to review and provide comments on the ESHS Documents shall excuse any failure by the Concessionaire to adopt proper and recognized safety and environment friendly practices during the execution of the Project. The Concessionaire shall bear all risk, responsibility and liability for the accuracy and adequacy of the final ESHS Documents in ensuring compliance with the ESMF, this Agreement (including specifically, Schedule 9), Applicable Laws, Applicable Permits and Good Industry Practices in the execution of the Project. The Concessionaire shall not be entitled to any extension of time and/or costs incurred in preparation of the ESHS Documents and complying with the requirements of this Clause 7.4.

7.5 Subcontracting

(a) The Concessionaire may enter into Subcontracts to perform any part of its Scope of Work during the Construction Period, with the prior intimation to the ***[Executing Agency]***.

(b) The Concessionaire shall provide a copy of each proposed Subcontract, along with details of the relevant Subcontractor, for the record to the ***[Executing Agency]***, which should set out the precise Scope of Work to be Sub-contracted to such Subcontractor and should be consistent with the terms of this Agreement.

(c) The Concessionaire shall be responsible for the supervision and monitoring of the performance of any work or services by the Subcontractor.

(d) If the Concessionaire proposes to novate or replace a Subcontract after submission of

details as required under sub-clause (b) above, then such novation or replacement shall also be intimated to the ***[Executing Agency]***.

(e) The Concessionaire shall be and remain liable under this Agreement for all work and services subcontracted under this Agreement and for all acts, omissions or defaults of any Subcontractor. No default under any Subcontract shall excuse the Concessionaire from its obligations or liabilities under this Agreement. All references in this Agreement to any act, default, omission, breach or negligence of the Concessionaire shall be construed to include any such act, default, omission, breach or negligence of the Subcontractors.

(f) The Project Engineer and Authority have the right to access of information and audit the Subcontractor files with regards to the Concession Agreement.

7.6 Concessionaire's Construction Obligations

The Concessionaire shall design, finance, construct and complete the Facilities and achieve the COD in accordance with Applicable Laws, Applicable Permits, Good Industry Practice, the Technical Specifications, the ESHS Documents, the Designs and Drawings, the Construction Plan and other provisions of this Agreement.

For this purpose, during the Construction Period, the Concessionaire shall:

(a) complete the work corresponding to each Payment Milestone by the Scheduled Payment Milestone Completion Date and complete the construction of the relevant Facilities by the relevant Scheduled Construction Completion Date, in a manner that:

(i) is in compliance with the Technical Specifications, the Designs and Drawings, the Construction Plan, the ESHS Documents, Applicable Laws, Applicable Permits and Good Industry Practices. For the avoidance of doubt, if there arises any ambiguity or conflict between the Technical Specifications and any Applicable Laws, then the one setting out the more stringent requirements or specifications shall prevail;

(ii) the Facilities are fabricated, erected, installed and completed in accordance with the final Designs and Drawings;

(iii) the Facilities are free from all defects in design, materials, and workmanship;

(iv) the Facilities are safe, reliable and fit for purpose;

(v) the ***[Location]*** FSTP(s) shall be capable of treating Faecal Sludge/Septage up to their respective Design Capacity; and

(vi) the***[Location]*** STP(s) shall be capable of treating Sewage up to their respective Design Capacity.

(b) maintain and comply with the conditions of all Applicable Permits in undertaking

theconstruction of the Facilities;

(c) within 30 (thirty) days of the Effective Date, and in any event, prior to the commencement of any construction of the Facilities, appoint a Person with sufficient skill and expertise to act as the Concessionaire's Representative. The Concessionaire's Representative shall monitor, coordinate and supervise the completion of the Facilities, and liaise with ***[Executing Agency]***'s Representative, ***[Name of the State / National Level Agency, if any]***'s Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Term, the Concessionaire may replace the Concessionaire's Representative with prior written notice to ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]***;

(d) provide all necessary assistance to the Project Engineer, ***[Name of the State / National Level Agency, if any]***, and ***[Executing Agency]*** in undertaking inspection of the Facilities, and in performing its other obligations and duties under this Agreement;

(e) ensure that none of its employees, consultants, service providers, suppliers, or sub-contractors, who may be engaged in future, shall be engaged in corrupt, fraudulent, collusive, coercive or obstructive practice, as defined in Clause 23.18;

(f) reasonably consider and act upon the comments/suggestions made by the Project Engineer and ***[Executing Agency]*** during any meetings with the Concessionaire;

(g) rectify any defects and/or deficiencies in the Facilities, including any defects and/or deficiencies identified by the Project Engineer or ***[Executing Agency]***;

(h) take all necessary measures to maintain the safety and security of personnel, material and property at the Site and the Adjoining Properties, in accordance with the approved ESHS Documents and all Applicable Laws;

(i) ensure that all excavated materials, earthworks, waste materials and hazardous substances are stored and/or disposed in accordance with the ESHS Documents, Applicable Laws and Applicable Permits;

(j) submit monthly reports to the Project Engineer (with a copy to ***[Executing Agency]***), no later than 10 (ten) days after the end of each month, which should set out the following:

(i) extent of progress of construction activities performed by the Concessionaire for the Facilities;

(ii) comparison of actual progress against the planned progress of construction works, reasons for delay, if any and steps taken by the Concessionaire to mitigate the delay;

(iii) details of any accident or hazardous incident at the Site and the steps taken by the Concessionaire to mitigate the consequences of such accident or hazardous incident; and

(iv) status of rectification of defects and/or deficiencies discovered by the Project Engineer or ***[Executing Agency]***;

(k) ensure that an adequate number of suitably skilled and experienced contractors, architects, workmen and other personnel are engaged to undertake the Project. The Concessionaire shall be solely responsible for the work performed by any staff and labour engaged by it to execute the Project and for payment of all applicable labour charges, fees, cess payable under Applicable Laws (including labour welfare legislations) in connection with the skilled and unskilled manpower employed for the Project, including specifically the 'Building and Other Construction Workers Welfare Cess Act, 1996'. The Concessionaire shall ensure that its Subcontractors provide all necessary amenities and welfare facilities for the staff and labour engaged by them at the Site and comply with all applicable labour laws. The Concessionaire shall indemnify and hold harmless ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** from and against all claims, liabilities, expenses, costs and losses suffered or incurred by ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** due to the Concessionaire's or any Subcontractor's failure to comply with any Applicable Laws (including labour welfare legislations);

(l) arrange for all equipment, machinery, tools and other resources required to undertake the Project and be solely responsible for such equipment, machinery, tools and resources;

(m) take all reasonable measures to ensure that the transportation of any of the Concessionaire's or the Subcontractors' personnel or equipment, to or from the Site, does not interfere with local traffic in the vicinity of the Site;

(n) maintain accurate and systematic accounts and records of goods and material utilized and other costs and expenses incurred in connection with the construction works for the Facilities, including all invoices, receipts, *challans*, vouchers, quotations and other records and documents with respect to the Facilities in accordance with Applicable Laws;

(o) obtain and maintain adequate insurances as per this Agreement; and

(p) prepare and keep up-to-date, "as-built" records of the execution of the construction work for the Facilities, showing the exact as-built locations, sizes and details of the works executed. The "as-built" records shall be kept on the Site and be made available to the Project Engineer and ***[Executing Agency]*** for review and verification. The Concessionaire shall provide 4 (four) hard copies and 1 (one) soft copy on a compact disc, of the complete set of "as-built" drawings for the Facilities to ***[Executing Agency]*** as a condition precedent to the issuance of the Construction Completion Certificate.

(q) The Concessionaire shall not be ordinarily entitled to additional land beyond the quoted land in the Financial Proposal for the Construction of the Project. However, under unavoidable circumstances and in the interest of the Project, ***[Executing Agency]*** based on availability, may consider to allocate additional land for the construction of the

Project upon the request of the Concessionaire and such allocation shall be subject to the payment of [150% (one hundred and fifty percent)] of the [circle rate] of the land, for each additional acres of land and part thereof. If the additional land requirement changes position of the Selected Bidder vis-à-vis the second preferred bidder, then the Concessionaire shall pay to ***[Executing Agency]***, a sum of equivalent to: (a) 150% (one hundred and fifty percent) of the [circle rate] of the landfor each additional acres of land and part there of; or (b) the difference between Bid Price of second preferred bidder and the revised Bid Price of the Selected Bidder/Concessionaire; whichever is higher.

7.7 [Power Plant

(a) The Concessionaire may construct a biogas power plantat the ***[Location]*** Facilities Sites to utilise the biogas generated from the treatment of the Sewage/Faecal Sludge/Septage at the ***[Location]*** STP(s) and the ***[Location]*** FSTP(s) to produce clean energy. The Concessionaire may also construct a rooftop solar power plant or employ any other technology at the ***[Location]*** Facilities to produce clean energy. The Concessionaire shall utilise the energy produced by the power plant to operate the relevant Facilities and sell any excess energy to third party consumers during the Term, in accordance with all Applicable Laws.

(b) [If the Concessionaire chooses to construct a power plant at the Site, the Concessionaire shall undertake such construction of power plant at the Site in accordance with all Applicable Laws and after obtaining all necessary approvals and consents to construct the power plant at the Site.]

(c) The Concessionaire shall not be entitled to any additional land, Construction Payments, or an extension of the Scheduled Construction Completion Date for construction of the power plant.

(d) The Concessionaire shall not be entitled to any additional O&M Payments for operating the power plant.

(e) In case the Concessionaire sets up a power plant***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** shall not be liable to the Concessionaire in any manner whatsoever if the quality or quantity of Sewage, Faecal Sludge/Septage delivered to the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) is not adequate or appropriate to produce sufficient energy to operate the power plant at the ***[Location]*** Facilities Sites.

(f) The ownership, rights and title to the power plant constructed by the Concessionaire shall vest with ***[Executing Agency]*** during the entire Term and thereafter.

(g) It shall be the Concessionaire's obligation to obtain all required clearances and approval for purposes of setting up, operating and maintaining the power plant.]

7.8 *[Executing Agency]*'s Rights and Obligations

During the Construction Period, ***[Executing Agency]*** shall:

(a) to the extent applicable, comply with all its obligations under Applicable Laws (including, specifically the ***[Act applicable in the State]*** Act) and ***[Executing Agency]*** Applicable Permits;

(b) make reasonable endeavors to assist the Concessionaire in obtaining the Applicable Permits from the relevant Government Authorities, provided that the Concessionaire has complied with all the requirements as per Applicable Laws for applying for such Applicable Permits;

(c) maintain the Supporting Infrastructure to enable the delivery of Sewage/Faecal Sludge/Septage at the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) and disposal of the Treated Effluent from the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) during the Trial Operations;

(d) within 30 (thirty) days of the Effective Date, and in any event, prior to the commencement of any construction for the Facilities, appoint a Person with sufficient skill and expertise to act as ***[Executing Agency]***'s Representative. ***[Executing Agency]***'s Representative shall liaise with the Concessionaire's Representative, ***[Name of the State / National Level Agency, if any]***'s Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Term, ***[Executing Agency]*** may replace ***[Executing Agency]***'s Representative with prior written notice to the Concessionaire and ***[Name of the State / National Level Agency, if any]***;

(e) cause the Project Engineer to carry out timely inspection of the Facilities, and perform its other obligations and duties under this Agreement;

(f) upon progressive completion of construction works for the Facilities in accordance with the Technical Specifications, Designs and Drawings, Construction Plan and other provisions of this Agreement, as certified by the Project Engineer, issue the Milestone Completion Certificates and the Construction Completion Certificate to the Concessionaire; and

(g) ensure that the Concessionaire enjoys peaceful access to the Site and shall not assign, transfer, or otherwise dispose its rights, title, and interest in the Site or create any Encumbrance over any part of the Site, which may adversely impact the exercise of the Concessionaire's rights and duties under this Agreement.

7.9 *[Name of the State / National Level Agency, if any]*'s[29] Rights and Obligations

During the Construction Period, ***[Name of the State / National Level Agency, if any]*** shall:

(a) comply with all its obligations under the Applicable Laws;

(b) make the Construction Payments, on satisfactory completion of the relevant Payment

[29]If not applicable the rights & obligations mentioned under this Clause has to be merged with the rights and obligations of the Executing Agency under Clause 7.8.

Milestone, in accordance with Clause 9.3;

(c) within 30 (thirty) days of the Effective Date, and in any event, prior to the commencement of any construction for the Facilities, appoint a Person with sufficient skill and expertise to act as the ***[Name of the State / National Level Agency, if any]***'s Representative. ***[Name of the State / National Level Agency, if any]***'s Representative shall liaise with the Concessionaire's Representative, ***[Executing Agency]***'s Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Term, ***[Name of the State / National Level Agency, if any]*** may replace the ***[Name of the State / National Level Agency, if any]*** Representative with prior written notice to ***[Executing Agency]*** and the Concessionaire; and

(d) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

7.10 Utilities

(a) The Concessionaire shall obtain install and maintain at its cost, all utilities necessary for undertaking the construction of the Facilities, including all temporary power and water connections, lighting facilities, telephone connections, internet connections, etc. at the Site. The Concessionaire shall bear the cost of all power, water, and other utilities consumed by it during the Construction Period, and the Concessionaire shall not be entitled to claim any reimbursement from ***[Executing Agency]*** or ***[Name of the State / National Level Agency, if any]*** in this regard.

(b) The Concessionaire shall not be entitled to any extension of time or costs to comply with its obligations in Clause 7.10(a) and Clause 7.10(b) above.

(c) ***[Executing Agency]*** shall provide any reasonable assistance required by the Concessionaire to obtain the utilities for the construction of the Facilities.

7.11 Construction Timelines

(a) The Concessionaire shall comply with the Construction Plan, the Designs and Drawings and the Technical Specifications and complete the construction of the Facilities on or before the Scheduled Construction Completion Date.

(b) Subject to Clause 7.11(c) below, the Concessionaire shall be entitled to a day-for-day extension of the relevant Scheduled Payment Milestone Completion Date or as the case may be, the Scheduled Construction Completion Date, if the completion of construction of the Facilities is delayed due to any of the following reasons (each such event, a **"Delay Event"**):

(i) occurrence of a Force Majeure Event, provided that the requirements of Article 14 have been complied with;

(ii) a Qualifying Change in Law;

(iii) undue delay by the relevant Government Authority in granting or renewing any Applicable Permit, despite the Concessionaire having applied for such grant or renewal expeditiously and having complied with the requirements of Applicable Laws in making such application;

(iv) undue delay by the relevant Government Authority in providing any utility connection, despite the Concessionaire having applied for such utility connection expeditiously and having complied with the requirements of Applicable Laws in making such application;

(v) any delay attributable to unforeseen site conditions in accordance with Clause 4.4;

(vi) delay by ***[Executing Agency]*** in approval of the Phase II Designs and Drawings in accordance with Clause 7.2;

(vii) delay by ***[Executing Agency]*** in approval of the O&M Manual in accordance with Clause 8.2;

(viii) delay by ***[Executing Agency]*** in approval of the ESHS document in accordance with Article 7.4;

(ix) delay by ***[Executing Agency]*** in issuance of a Milestone Completion Certificate in accordance with Clause 7.13(a);

(x) any variation proposed by ***[Executing Agency]*** in the Technical Specifications or the Designs and Drawings in accordance with Article 20; or

(xi) delay caused in complying with any instructions of ***[Executing Agency]*** or the Project Engineer, which instructions are not attributable to any default of the Concessionaire.

The Concessionaire shall promptly provide ***[Executing Agency]*** (with a copy to the Project Engineer and ***[Name of the State / National Level Agency, if any]***) with a notice upon becoming aware of any Delay Event listed at Clause 7.11(b) above. The notice should specify the nature of the Delay Event, the extent of delay suffered or likely to be suffered by the Concessionaire and mitigation measures being taken by the Concessionaire.

The issuance of the notice under this Clause 7.11(b), within 7 days from the date the Concessionaire became aware of the Delay Event, shall be a condition precedent to the Concessionaire's entitlement to an extension under Clause 7.11(b).

(c) Without prejudice to the Concessionaire's obligations to notify ***[Executing Agency]*** regarding the occurrence of a Delay Event above, the Concessionaire shall: (i) keep and maintain records as reasonably necessary to substantiate and establish claims for extensions under Clause 7.11(b); and (ii) give ***[Executing Agency]*** and the Project Engineer access to such records and documents or provide ***[Executing Agency]*** and the

Project Engineer with copies, if so requested.

(d) If the Concessionaire claims an extension of time in accordance with Clause 7.11(b) and ***[Executing Agency]*** is of the opinion that such delay was caused or materially contributed to by any concurrent or interacting cause or causes of delay not listed in Clause 7.11(b) but solely attributable to the Concessionaire, then the Concessionaire shall not be entitled to any extension of time for the concurrent period of delay.

(e) If two or more of the Delay Events listed in Clause 7.11(b) occur concurrently, then such concurrent period shall not be counted twice in determining an extension under Clause 7.11(b).

(f) Except as provided in Clause 7.11(b), the Concessionaire shall not be entitled to any extension of time for any reason whatsoever, including due to:

(i) delay caused in complying with any instructions of ***[Executing Agency]*** or the Project Engineer which are attributable to any act or omission of the Concessionaire;

(ii) failure of any Subcontractor to commence or carry out any work within the prescribed timelines;

(iii) unavailability or shortage of equipment, materials, or any other resources;

(iv) any delay in approving the drafts of the Designs and Drawings, the Construction Plan, the ESHS Documents or any other document submitted by the Concessionaire due to any deficiencies or shortcomings in such drafts of the Designs and Drawings, the Construction Plan, the ESHS Documents or other documents, as the case may be; or

(v) ***[Location]*** the construction of Power Plant at the Site

(g) Any Dispute between the Parties with respect to the occurrence, length of subsistence or consequence of any of the Delay Event shall be settled in a final and binding manner in accordance with Article 21.

7.12 Delay Liquidated Damages and Bonus

(a) Subject to Clause 7.11(b), if the Concessionaire fails to complete the work corresponding to any Payment Milestone by the relevant Scheduled Payment Milestone Completion Date or fails to complete the construction of the Facilities by the Scheduled Construction Completion Date, then ***[Executing Agency]*** shall be entitled to liquidated damages for each day of delay beyond the Scheduled Payment Milestone Completion Date, or, as the case may be, the Scheduled Construction Completion Date, at the rate of 0.1% (zero point one per cent) of the ***[Location]*** Facilities Performance Security (in case of a delay in achieving a ***[Location]*** Facilities Payment Milestone or completing the ***[Location]*** Facilities by the Scheduled Construction Completion Date) for each day of delay up to 6 (six) months from the Scheduled Payment Milestone Completion Date,

or the Scheduled Construction Completion Date as the case may be (the **"Delay Liquidated Damages"**).

The Delay Liquidated Damages will be payable until the work for the relevant Payment Milestone is completed or, as the case may be, the construction of the Facilities is completed, as certified by ***[Executing Agency]*** in accordance with Clause 7.13.

If the Concessionaire completes the construction of the Facilities by the Scheduled Construction Completion Date, the aggregate Delay Liquidated Damages recovered by ***[Executing Agency]*** under this Clause 7.12(a) for a delay in achieving any Payment Milestone shall be refunded by ***[Executing Agency]*** to the Concessionaire, without any interest.

(b) ***[Executing Agency]*** shall be entitled to deduct the Delay Liquidated Damages from the amount payable to the Concessionaire for any Payment Milestone, and if such amounts are insufficient, ***[Executing Agency]*** shall have a right to invoke the Performance Securities to the extent of the Delay Liquidated Damages.

(c) The Parties acknowledge that the Delay Liquidated Damages are a genuine pre-estimation of and reasonable compensation for the loss that shall be suffered by ***[Executing Agency]*** as a result of the delay in the completion of the Facilities, and not as penalty.

(d) If, for any reason, the above paragraphs relating to the payment of Delay Liquidated Damages are void, invalid or otherwise inoperative so as to disentitle ***[Executing Agency]*** from claiming any Delay Liquidated Damages, then ***[Executing Agency]*** will be entitled to claim against the Concessionaire for general damages for delay in completing the works for the relevant Payment Milestone by the Scheduled Payment Milestone Completion Date, or for the delay in completing the construction of the Facilities by the Scheduled Construction Completion Date.

(e) If the Concessionaire fails to complete the works for a Payment Milestone within 6 (six) months of the Scheduled Payment Milestone Completion Date or if the Concessionaire fails to complete the construction of the Facilities within 6 (six) months from the Scheduled Construction Completion Date, other than on account of any Delay Event (the "**Grace Period"**), then such failure shall be deemed to be a Concessionaire Event of Default in accordance with Clause 16.1.

(f) The payment or deduction of Delay Liquidated Damages shall not relieve the Concessionaire from its obligations to complete the construction of the Facilities, or from any of its other duties, obligations or responsibilities under the Agreement. The Concessionaire shall use and continue to use its best endeavors to avoid or reduce further delay in completing the Facilities.

(g) Bonus on early completion

If the Construction Completion Date for a Facilities occurs prior to the Scheduled Construction Completion Date, the Concessionaire shall be entitled to a bonus equal to

0.05% (zero point zero five per cent) of the relevant Performance Security for each day by which the Construction Completion Date precedes the Scheduled Construction Completion Date.

7.13 Completion of Works

(a) Completion of Payment Milestones

(i) Upon completion of the works corresponding to each Payment Milestone, as specified in the Construction Plan, the Concessionaire shall issue a notice to ***[Executing Agency]***, with a copy to the Project Engineer and ***[Name of the State / National Level Agency, if any]***, requiring ***[Executing Agency]*** to inspect (or cause the Project Engineer to inspect) the completed works covered by the relevant Payment Milestone. The purpose of such inspection shall be to determine whether the works corresponding to the relevant Payment Milestone have been completed in accordance with the requirements of Clause 7.6.

(ii) If ***[Executing Agency]*** is satisfied that the works for the relevant Payment Milestone have been completed in accordance with the requirements of Clause 7.6, then, subject to Clause 7.13(a)(v) below, ***[Executing Agency]*** shall issue a Milestone Completion Certificate to the Concessionaire for such completed Payment Milestone, with a copy to ***[Name of the State / National Level Agency, if any]***, within 7(seven) Business Days from the date of inspection of the works covered by such Payment Milestone.

(iii) If ***[Executing Agency]*** is of the view that the works for the relevant Payment Milestone do not satisfy the requirements of Clause 7.6, then ***[Executing Agency]*** shall have the right to provide any comments, suggestions and/or instruct the Concessionaire to carry out necessary modifications, to ensure that the works comply with the requirements of Clause 7.6. Upon receipt of such comments, suggestions or instructions from ***[Executing Agency]***, the Concessionaire shall make necessary modifications to the works to remedy any defects or deficiencies and re-issue a notice to ***[Executing Agency]***. The Concessionaire shall bear all costs of remedying the defects and deficiencies in the works and shall not be entitled to any extension of time for remedying such defects or deficiencies. This process shall be repeated until ***[Executing Agency]*** is satisfied that the works for the relevant Payment Milestone have been completed in accordance with the requirements of Clause 7.6 and issues a Milestone Completion Certificate in accordance with this Clause 7.13(a).

(iv) If ***[Executing Agency]*** fails to:

(A) inspect the completed portion of the works covered by the relevant Payment Milestone, within 7 (seven) Business Days from the date of receipt of a notice from the Concessionaire under Clause 7.13(a)(i) above;

(B) provide any comments or suggestions or notify the Concessionaire of any defects or deficiencies in the completed portion of the works covered by the relevant Payment Milestone, within 7 (seven) Business Days from the date

of inspection of such completed portion of the works; or

(C) issue the Milestone Completion Certificate, within 7 (seven) Business Days from the date of inspection of the completed portion of the works covered by the relevant Payment Milestone,

then, such delay shall be treated as a Delay Event, which will entitle the Concessionaire to a day for day extension in the Scheduled Payment Milestone Completion Date or the Scheduled Construction Completion Date, as the case may be, beyond the 7 (seven) Business Days period.

(v) ***[Executing Agency]*** may exercise its rights to review and certify the completion of works for any Payment Milestone either itself or through the Project Engineer. If ***[Executing Agency]*** instructs the Project Engineer to undertake a review of the works, then the Concessionaire shall cooperate with the Project Engineer to facilitate such review and rectify any defects or deficiencies identified by the Project Engineer in the works. Provided that, in all instances, ***[Executing Agency]*** shall finally approve the works and issue the Milestone Completion Certificates.

(b) Testing and Commissioning of the Facilities

(i) Upon completion of construction of each Facilities, in accordance with the requirements set out in this Agreement, the Concessionaire shall issue a notice to ***[Executing Agency]***, with a copy to ***[Name of the State / National Level Agency, if any]***, requiring it to be present at the Site on the date specified in such notice to undertake a final inspection of the completed Facilities and conduct any tests required to ensure that the Facilities complies with the Technical Specifications, the Designs and Drawings, Applicable Laws and Applicable Permits.

(ii) Within 5 days from the date of receipt of a notice under Clause 7.13(b)(i) above, ***[Executing Agency]*** may request the Concessionaire to vary the date of the final inspection and tests and the Concessionaire shall accommodate such request, provided that, such date shall be no later than 7 (seven) days from the date specified in the notice received from the Concessionaire under Clause 7.13(b)(i) above.

(iii) The Concessionaire shall, on the date specified in the notice issued under Clause 7.13(b)(i) or on such other date as may be agreed with ***[Executing Agency]***, carry out the tests in accordance with the instructions and under the supervision of ***[Executing Agency]***, to demonstrate that the Facilities complies with the requirements of Clause 7.6.

(iv) If ***[Executing Agency]*** is not satisfied with the results of the tests or inspection, then the Concessionaire shall remedy any defects or deficiencies in the Facilities, identified by ***[Executing Agency]*** or revealed through the tests and the Facilities shall be tested again upon rectification of such defects or deficiencies. This process shall be repeated until such time that ***[Executing Agency]*** is satisfied that

the Facilities has been completed in accordance with Clause 7.6 and is safe and fit for purpose. The Concessionaire shall bear all costs of remedying the defects and deficiencies and retesting the Facilities and shall not be entitled to any extension of time for remedying such defects or deficiencies or for retesting the Facilities.

(v) If ***[Executing Agency]*** is satisfied with the results of the tests and inspection of the Facilities, ***[Executing Agency]*** shall issue the Milestone Completion Certificate in respect of the last Payment Milestone to the Concessionaire, with a copy to ***[Name of the State / National Level Agency, if any]***, within 7 (seven) days from the date of inspection and testing of the completed Facilities. The issue of the Milestone Completion Certificate for the last Payment Milestone shall certify that the Facilities has been completed in accordance with this Agreement, the Technical Specifications, the Designs and Drawings, Applicable Laws and Applicable Permits and the Facilities is safe and fit for purpose.

(vi) If ***[Executing Agency]*** fails to:

(A) inspect or witness the testing of the Facilities within 14 (fourteen) Business Days from the date of receipt of notice from the Concessionaire issued under Clause 7.13(b)(i) or such other date as may be agreed with the Concessionaire;

(B) notify the Concessionaire of any defects or deficiencies in the Facilities within 7 (seven) Business Days from the date of inspection and testing of the Facilities; or

(C) issue the Milestone Completion Certificate for the last Payment Milestone within 7 (seven) Business Days from the date of inspection and testing of the Facilities,

then, such delay shall be treated as a Delay Event, which will entitle the Concessionaire to a day for day extension in the Scheduled Payment Milestone Completion Date and the Scheduled Construction Completion Date.

(c) Issue of Construction Completion Certificate

(i) Within 7 (seven) Business Days from the date of issuance of the Milestone Completion Certificate for the last Payment Milestone, ***[Executing Agency]*** shall issue the Construction Completion Certificate for the Facilities to the Concessionaire, with a copy to ***[Name of the State / National Level Agency, if any]***, subject to the following conditions having been fulfilled by the Concessionaire:

(A) the submission of 4 (four) hard copies and 1 (one) soft copy on a compact disc of complete sets of the 'as-built' drawings of the Facilities;

(B) the Concessionaire having obtained all Applicable Permits necessary for

commencement of the O&M services (including specifically, the consent to operate from the ***[State Pollution Control Board]*** for the operation of the Facilities);

(C) the Concessionaire having obtained adequate insurance for the O&M Period in accordance with Clause 11.2;

(D) the Concessionaire having engaged sufficient number of adequately skilled O&M personnel to perform the services during the O&M Period; and

(E) the O&M Manual having been approved by ***[Executing Agency]***; and

(F) the Concessionaire having cleared the Site and removed all debris, hazardous materials, surplus construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site.

(ii) If ***[Executing Agency]*** fails to issue the Construction Completion Certificate for the Facilities to the Concessionaire within 7 (seven) Business Days from the date of satisfaction of the conditions set out in Clause 7.13(c)(i)(A) to (F) above and fails to notify the Concessionaire of any reasons for the failure to issue the Construction Completion Certificate for the Facilities, then, the Construction Completion Certificate for the Facilities shall be deemed to have been issued to the Concessionaire upon the expiry of the 7 (seven) Business Days period.

(iii) The date of the issuance or deemed issuance of the Construction Completion Certificate shall be the Construction Completion Date for the Facilities.

7.14 Trial Operations

(a) Subject to Clause 7.14(c) below, within [1 (one)] day of the issuance or deemed issuance of the Construction Completion Certificate for the Facilities to the Concessionaire, the Concessionaire shall commence the Trial Operations of the Facilities in accordance with the Trial Operation Procedures to determine whether the Facilities meets the KPIs on a continuous basis and is fit and ready to be placed into commercial operations for treatment and disposal of Sewage/Faecal Sludge/Septage in accordance with this Agreement.

(b) ***[Executing Agency]*** shall ensure that adequate quantity of Sewage/Faecal Sludge/Septage is delivered to the Facilities during the Trial Operations to enable the Concessionaire to demonstrate that the Facilities meets the Technical Specifications and the KPIs.

(c) If the Concessionaire fails to commence or continue the Trial Operations, due to the inadequate quantity or inferior quality of the Sewage/Faecal Sludge/Septage delivered to the relevant Facilities, then the Concessionaire shall promptly notify ***[Executing Agency]***. If in the opinion of ***[Executing Agency]***, the quantity or quality of Sewage/Faecal Sludge/Septage is not adequate to undertake Trial Operations, then

[Executing Agency] shall extend the time period for the Trial Operations. In such case, the Scheduled COD will also be extended on a day-for-day basis, provided that the Scheduled COD shall not be extended beyond the date which is 6 (six) months from the Construction Completion Date.

(d) During the Trial Operations, ***[Executing Agency]*** shall or shall cause the Project Engineer to monitor the performance of the Facilities on a regular basis and shall have the right to test the compliance of the incoming Sewage/Faecal Sludge/Septage with the Influent Standards and test the compliance of the STP By-Products, FSTP By-Products and the Treated Effluent with the Discharge Standards every 7 (seven) days to ensure that the Facilities meets the Technical Specifications.

(e) If ***[Executing Agency]***, or, as the case may be, the Project Engineer is of the view that: (i) the Trial Operations are not being conducted in accordance with the Trial Operations Procedure; or (ii) there are any defects or deficiencies in the Facilities, ***[Executing Agency]*** shall instruct the Concessionaire to follow the Trial Operation Procedures and/or rectify the defects and deficiencies to ensure compliance with the KPIs.

It is clarified that no Availability Liquidated Damages or Performance Liquidated Damages are payable by the Concessionaire during the Trial Operations period for a failure to achieve the KPIs. However, for the Trial Operations to be successfully concluded, the Concessionaire must demonstrate that the Facilities consistently and continuously meets the KPIs during the last 20 (twenty) days of the 3 (three) months Trial Operations period, as may be extended in accordance with Clause 7.14(c) above. If the Facilities fails to achieve the KPIs on a continuous basis during the last 20 (twenty) days of the initial 3 (three) months Trial Operations period (as extended in accordance with Clause 7.14(c), then the Trial Operations period shall be extended by another 20 days. Subject to Clause 7.14(e)(i), the Trial Operations shall continue until the Concessionaire can demonstrate that the Facilities consistently achieves the KPIs for 20 (twenty) consecutive days.

(f) If the Concessionaire has been able to consistently achieve the KPIs for 20 (twenty) consecutive days (as supported by daily reports), the Concessionaire shall issue a notice to ***[Executing Agency]*** requiring ***[Executing Agency]*** to undertake a final inspection of the Facilities. ***[Executing Agency]*** shall have the right to undertake such final inspection within 5 (five) Business Days of a notice being issued by the Concessionaire.

(g) If, upon final inspection, ***[Executing Agency]*** is satisfied that the Facilities meets the KPIs and the Technical Specifications, and are capable of safe and reliable operations, then, ***[Executing Agency]*** shall issue the Trial Operations Completion Certificate for the Facilities to the Concessionaire within 7 (seven) days of ***[Executing Agency]*** undertaking a final inspection of the Facilities pursuant to Clause 7.14(e) above.

(h) If, upon final inspection, ***[Executing Agency]*** believes that the Facilities does not comply with the KPIs and/or Technical Specifications, other than due to: (i) volume of Sewage/Faecal Sludge/Septage being inadequate to conduct the Trial Operations; or (ii) the quality or characteristics of the Sewage/Faecal Sludge/Septage being beyond the Influent Standards, then ***[Executing Agency]*** shall reject the Facilities and terminate

this Agreement. Upon termination of this Agreement, in accordance with this Clause 7.14(g), the consequences set out in Article 16 shall follow.

(i) If ***[Executing Agency]***: (i) does not undertake a final inspection of the Facilities within 5 (five) Business Days of receipt of a notice from the Concessionaire under Clause 7.14(e); or (ii) fails to notify the Concessionaire of any defects in the Facilities within 7 (seven) days of undertaking a final inspection; or (iii) fails to issue a Trial Operations Completion Certificate within 7 (seven) Business Days from the date of the final inspection, then the Trial Operations shall be deemed to have been successfully completed for Facilities and the Trial Operations Completion Certificate will be deemed to have been issued to the Concessionaire upon the expiry of the 5 (five) Business Days period (in case of (i)) and upon the expiry of the 7 (seven) Business Days period (in case of (ii) and (iii)).

(j) If the Trial Operations are not successfully completed and/or the Concessionaire fails to issue a notice to ***[Executing Agency]*** under Clause 7.14(e) above on or prior to the Scheduled COD, as may be extended in accordance with Clause 7.14(c), for any Facilities, then such failure shall be treated as a Concessionaire Event of Default and the consequences set out at Article 16 shall follow.

(k) Notwithstanding anything contained in Clause 7.14(h), if the Concessionaire fails to successfully complete the Trial Operations for the Facilities on or prior to the Scheduled COD, as may be extended in accordance with Clause 7.14(c), due to the: (i) volume of Sewage/Faecal Sludge/Septage being inadequate to conduct the Trial Operations; or (ii) quality or characteristics of the Sewage/Faecal Sludge/Septage being beyond the Influent Standards, for any Facilities, then such failure will be treated as a ***[Executing Agency]*** Event of Default, and the consequences set out at Article 16 shall follow.

(l) The Concessionaire will not be entitled to any O&M Payments or any other payment for conducting the Trial Operations, which shall be carried out solely at the cost and risk of the Concessionaire.

7.15 Commercial Operations Date

(a) Within 7 (seven) Business Days from the date of issuance or deemed issuance of the Trial Operations Completion Certificates for the ***[Location]*** Facilities, ***[Executing Agency]*** shall issue the COD Certificate, with a copy to ***[Name of the State / National Level Agency, if any]***, subject to the following conditions having been fulfilled by the Concessionaire:

(i) the Concessionaire having received the Construction Completion Certificate
(ii) the Concessionaire having submitted to ***[Executing Agency]*** the Scheduled Maintenance Programme for the first-year post COD; and
(iii) the O&M Manual having been approved by ***[Executing Agency]***
(iv) the Concessionaire having submitted the ***[Location]*** Facilities O&M Security to ***[Executing Agency]***.

(b) If ***[Executing Agency]*** fails to issue the COD Certificate to the Concessionaire within 7 (seven) Business Days from the date of satisfaction of the conditions set out in Clause 7.15 (a) above and fails to notify the Concessionaire of any reasons for the failure to issue the COD Certificate, then, the COD Certificate shall be deemed to have been issued to the Concessionaire upon the expiry of the 7 (seven) Business Days period.

(c) The date on which the COD Certificate is issued or deemed to have been issued to the Concessionaire shall be the Commercial Operations Date of the Facilities.

ARTICLE 8
OPERATIONS AND MAINTENANCE PERIOD

8.1 Commencement and Duration

The period for the operation and maintenance of the Facilities shall commence on and from COD and shall continue until the Expiry Date (the **"O&M Period"**), unless the Agreement is terminated earlier in accordance with Article 16.

8.2 O&M Manual

(a) The Concessionaire shall prepare a detailed O&M Manual for the Facilities based on the Proposed Technology and in accordance with the Technical Specifications, the ESHS Documents, Applicable Laws and Applicable Permits. The O&M Manual shall specify the operation procedures (separately for each component of the Facilities) and maintenance procedures. In case of any errors or deficiencies in the Technical Specifications, the O&M Manual shall take in account, address or rectify such errors or deficiencies. The Language of the O&M Manual shall be English.

(b) At least 30 (thirty) days prior to the Scheduled Construction Completion Date, the Concessionaire shall submit 4 (four) hard copies and 1 (one) soft copy on a compact disc of the draft O&M Manual to ***[Executing Agency]*** for its review and approval.

(c) ***[Executing Agency]*** shall review and provide comments, if any, on the draft O&M Manual to the Concessionaire or notify the Concessionaire of its approval of the draft O&M Manual within 20 (twenty) days from the date of receipt of the draft O&M Manual from the Concessionaire. ***[Executing Agency]*** may require the Concessionaire to amend or modify the draft O&M Manual if ***[Executing Agency]*** identifies any deficiencies, inaccuracies or shortcomings in the draft O&M Manual. If the Concessionaire receives any comments, suggestions or instructions to modify the draft O&M Manual from ***[Executing Agency]***, then the Concessionaire shall modify the draft O&M Manual to correct any shortcomings, inaccuracies or deficiencies identified by ***[Executing Agency]*** and/or address, in writing, ***[Executing Agency]***'s comments on the draft O&M Manual and submit the revised O&M Manual to ***[Executing Agency]*** within 10 days of having received ***[Executing Agency]***'s response, for its approval. The process set out in this Clause 8.2(c) shall continue until the O&M Manual is approved by ***[Executing Agency]*** in accordance with this Clause 8.2(c).

(d) The Concessionaire shall revise the O&M Manual as and when the Concessionaire thinks it necessary to do so and in such case the provisions of Clause 8.2(c) will apply as is to the approval of the revised manual.

(e) The Concessionaire shall undertake the O&M of the Facilities strictly in accordance with the approved O&M Manual. The Concessionaire shall not deviate from or make any amendment to the approved O&M Manual without the prior written approval of ***[Executing Agency]***. The Concessionaire shall not commence operation of the Facilities prior to approval of the O&M Manual in accordance with this Clause 8.2.

(f) Notwithstanding any approval of the O&M Manual by ***[Executing Agency],*** the Concessionaire shall bear all risk, responsibility and liability for the suitability, accuracy, adequacy and practicality of the O&M Manual. The Concessionaire shall not be entitled to any extension of time and/or costs incurred in the preparation of or updating the O&M Manual and complying with the requirements of this Clause 8.2.

(g) The Concessionaire shall submit a consolidated O&M Manual for the [Location] Facilities.

8.3 Subcontracting

(a) The Concessionaire may enter into Subcontracts to perform any part of its scope of work during the O&M Period, with the prior written consent of ***[Executing Agency]*.**

(b) The Concessionaire shall provide a copy of each proposed Subcontract, along with details of the relevant Subcontractor, to ***[Executing Agency]*** for its approval, which should set out the precise scope of work to be subcontracted to such Subcontractor and should be consistent with the terms of this Agreement.

(c) Within 15 (fifteen) days of receipt of a draft Subcontract under Clause 8.3(b) above, ***[Executing Agency]*** shall notify the Concessionaire of its approval or rejection (along with reasons) of the Subcontractor.

(d) The approval of any Subcontractor and the corresponding Subcontract by ***[Executing Agency]*** shall be subject to the following conditions:

(i) the Subcontractor appointed by the Concessionaire possesses the requisite skill, expertise and capability to perform the relevant obligations of the Concessionaire during the O&M Period;

(ii) the Subcontract is on terms consistent with this Agreement;

(iii) the Subcontract contains provisions that provide, at ***[Executing Agency]***'s option, for the Subcontract to be novated or assigned to ***[Executing Agency]*** or its nominee without any further consent or the approval from the Concessionaire or the Subcontractor or entitle ***[Executing Agency]*** or its nominee to step into such Subcontract, in substitution of the Concessionaire, if this Agreement is terminated due to a Concessionaire Event of Default. However, the step-in rights of ***[Executing Agency]*** shall always be subject to the substitution rights of the Lenders under this Agreement or the Substitution Agreement; and

(iv) the Concessionaire shall be responsible for the supervision and monitoring of the performance of any work or services by the Subcontractors.

(e) If ***[Executing Agency]*** does not notify its approval or rejection of any Subcontract to the Concessionaire within 15 (fifteen) days of the receipt of the draft Subcontract, then such Subcontract will be deemed to be approved by ***[Executing Agency]***.

(f) Within 7 (seven) days of the execution of an amendment to any approved Subcontract, the Concessionaire shall submit a copy of such amendment to ***[Executing Agency]*** for its records.

(g) If the Concessionaire proposes to novate an approved Subcontract and/or replace an approved Subcontractor, then such novation or replacement shall be with prior approval of ***[Executing Agency]*** and the process set out in this Clause 8.3 shall apply in such case.

(h) Notwithstanding the approval of any Subcontractor by ***[Executing Agency],*** the Concessionaire shall be and remain liable under this Agreement for all work and services subcontracted under this Agreement and for all acts, omissions or defaults of any Subcontractor. No default under any Subcontract shall excuse the Concessionaire from its obligations or liabilities under this Agreement. All references in this Agreement to any act, default, omission, breach or negligence of the Concessionaire shall be construed to include any such act, default, omission, breach or negligence of the Subcontractors.

8.4 Concessionaire's rights and obligations

(a) The Concessionaire shall operate and maintain the Facilities in a manner that:

(i) is in compliance with the Technical Specifications, Applicable Laws, Applicable Permits and Good Industry Practice;
(ii) results in the Facilities achieving the KPIs;
(iii) ensures that each of the ***[Location]*** STP is capable of treating Sewage up to its Design Capacity on a daily basis
(iv) ensures that each of the ***[Location]*** FSTP is capable of treating Faecal Sludge/Septage up to its Design Capacity on a daily basis
(v) ensures efficient treatment of Sewage/Faecal Sludge/Septage ensures that each of the ***[Location]*** STP and ***[Location]*** FSTP is capable of treating Sewage/Faecal Sludge/Septage up to its Design Capacity on a daily basis
(vi) and handling and disposal of STP By-Products, FSTP By-Products and the Treated Effluent;
(vii) is safe and reliable, subject to normal wear and tear of the Facilities;
(viii) is in compliance with the technology license agreement(s) executed by the Concessionaire for the technology, processes, know-how and systems used or incorporated into the Facilities
(ix) maintains the safety and security of personnel, material and property at the Site, in accordance with the approved ESHS Documents, Applicable Laws and Applicable Permits; and
(x) ensures that all waste materials and hazardous substances are stored and/or disposed in accordance with the ESHS Documents, Applicable Laws and Applicable Permits
(xi) rectify, cure, remedy all defects, deficiencies, defaults, damage etc. with all of the facilities at its own cost and risk.

(b) The Concessionaire shall provide adequate power backup at the Site (including through installation of DG Sets) to ensure continuous supply of power (even during any interruption(s) in the supply of power from the grid) for the uninterrupted operations of the Facilities during the O&M Period.

(c) The Concessionaire shall provide all necessary assistance to the Project Engineer, ***[Name of the State / National Level Agency, if any]***, and ***[Executing Agency]*** in undertaking inspection and monitoring of the operation and maintenance of the Facilities.

(d) The Concessionaire shall reasonably consider and act upon the comments/suggestions made by the Project Engineer and ***[Executing Agency]*** during any meetings of the Concessionaire with its Subcontractors.

(e) The Concessionaire shall provide ***[Executing Agency]*** and the Project Engineer with reasonable access to the Site during office hours to monitor and inspect the Facilities.

(f) The Concessionaire shall arrange for all equipment, machinery, tools and other resources required to undertake the O&M of the Facilities and shall take all reasonable measures to ensure that the transportation of any of the Concessionaire's or the Subcontractors' personnel or equipment, to or from the Site, does not interfere with local traffic in the vicinity of the Site.

(g) The Concessionaire shall develop and implement a safety and surveillance programme for the Facilities and for handling and disposal of the STP By-Products, FSTP By-Products and the Treated Effluent and adopt appropriate measures and safeguards for security of the environment, life, and property at the Site.

(h) The Concessionaire shall ensure that none of its employees, consultants, service providers, suppliers, or Subcontractors, including any O&M contractor appointed by the Concessionaire, shall engage in any corrupt, fraudulent, collusive, coercive or obstructive practice, as defined in Article 23.18.

8.5 *[Executing Agency]*'s rights and obligations

During the O&M Period, ***[Executing Agency]*** shall:

(a) to the extent applicable, comply with all its obligations under Applicable Laws (including, specifically the ***[ACT APPLICABLE IN THE STATE]*** Act) and ***[Executing Agency]*** Applicable Permits;

(b) monitor and review the operations and performance of the Facilities, including disposal of the STP By-Products, FSTP By-Products and the Treated Effluent. This includes the right to access the Facilities, and review the records and reports that the Concessionaire is required to maintain, during normal working hours;

(c) review the Scheduled Maintenance Programme and all other plans and documents submitted by the Concessionaire in an expeditious manner, in accordance with this

Agreement; and

(d) ensure that the Concessionaire continues to enjoy peaceful access to the Site and shall not assign, transfer, or otherwise dispose of its rights, title, and interest in the Site or create any Encumbrance over any part of the Site, which may adversely impact the exercise of the Concessionaire's rights and duties under this Agreement.

8.6 *[Name of the State / National Level Agency, if any]*'s[30] rights and obligations

During the O&M Period, ***[Name of the State / National Level Agency, if any]*** shall:

(a) comply with all its obligations under the Applicable Laws;

(b) make the O&M Payments in accordance with Clause 9.4; and

(c) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

8.7 Utilities

(a) The Concessionaire shall apply for and obtain the power connection (at the battery limit of the relevant Site) for the operation of the Facilities, in its name, at least 30 (thirty) days prior to the Scheduled Construction Completion Date. The ***[Executing Agency]***shall provide all necessary assistance to the Concessionaire in procuring the power connection, including by providing all documents and information necessary to complete the application process.

(b) The Concessionaire shall install and maintain at its cost, all utilities necessary for the O&M of the Facilities, including water, telephone connections, internet connections, etc. at the Site. Specifically, to procure water for the O&M of the Facilities, the Concessionaire may dig bore wells at the Site after obtaining all Applicable Permits (including any no-objection certificates from the Central Ground Water Authority or the relevant state authority).

(c) The Concessionaire shall not be entitled to any additional costs to comply with its obligations in this Clause 8.7.

(d) ***[Executing Agency]*** shall provide any reasonable assistance required by the Concessionaire to obtain the utilities for the O&M of the Facilities.

8.8 Monitoring and Reporting

(a) Online Monitoring and Meters

(i) At ***[Location]*** STP/Pumping Stations, the Concessionaire shall install and maintain an online monitoring system, in accordance with the Technical

[30]If not applicable the rights & obligations mentioned under this Clause has to be merged with the rights and obligations of the Executing Agency under Clause 8.5

Specifications and Applicable Laws (including specifically, the EPA) to monitor the volume, specifications and characteristics of the incoming Sewage/Faecal Sludge/Septage ensures that each of the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) is capable of treating Sewage/Faecal Sludge/Septage up to its Design Capacity on a daily basis.

(ii) The online monitoring devices should be capable of measuring and analyzing:

(A) the flow rate and characteristics of the Sewage/Faecal Sludge/Septage at the Inlet Point and of the Treated Effluent at the Outlet Point.

(B) the sump level of the Pumping Station and the flow rate of the Sewage/Faecal Sludge/Septage at the Outlet Point of the Pumping Station

Apart from flow monitoring, record shall be maintained for equipment's historical running information, status, faults, and any other parameters required to judge its conditions. Such monitoring shall be conducted in accordance with Applicable Laws and Good Industry Practices.

(iii) As part of the online monitoring system, the Concessionaire shall also install flow measurement meters in accordance with Applicable Laws and Technical Specifications, at the rising mains, Inlet Point, the Outlet Point and at any other point set out in the Technical Requirements/ Specifications or required as per Applicable Laws, to measure the flow of Sewage/Faecal Sludge/Septage over the weir and the volume and concentration of Sewage/Faecal Sludge/Septage delivered to the Facilities, and the Treated Effluent discharged from the Facilities.

(iv) The Concessionaire shall record and transmit all data collected from the online monitoring systems and the meter reading of the grade, volume and characteristics of the incoming Sewage/Faecal Sludge/Septage and the Treated Effluent. The Concessionaire shall furnish a summary report for ***[Location]*** STP(s) and ***[Location]*** FSTP(s) to ***[Executing Agency]*** (with a copy to the Project Engineer) on a daily basis, which shall indicate: (A) the volume of the Sewage/Faecal Sludge/Septage received at the relevant ***[Location]*** STP(s) and ***[Location]*** FSTP(s) and the volume of the Treated Effluent discharged from the relevant ***[Location]*** STP(s) and ***[Location]*** FSTP(s) during each hour of the relevant day; (B) the periods during which the volume of Sewage/Faecal Sludge/Septage received at the relevant ***[Location]*** STP(s) and ***[Location]*** FSTP(s) exceeded its Design Capacity; (C) the quality of the incoming Sewage/Faecal Sludge/Septage was beyond the Influent Standards; (D) the quality of the Treated Effluent was beyond the Discharge Standards, (E) hourly sump level for each sewage pumping station (SPS); and (F) the hourly volume of Sewage discharged at each SPS.

(v) The Concessionaire shall also be required to upload the periodic reports from the online monitoring on the Central Pollution Control Board's website.

(vi) The Concessionaire shall maintain the online monitoring systems and meters at its own cost and expense for the entire O&M Period.

(i) At ***[Location]*** STP(s) and ***[Location]*** FSTP(s), the Concessionaire shall also install meters and gauges at the DG Sets to measure the total number of energy units (in kWh) consumed from the DG Sets in each month of the O&M Period.

(ii) If the Concessionaire sets up a Power Plant, then the Concessionaire shall install meters at the Power Plant to measure the total number of energy units (in kWh) generated from the Power Plant in each month of the O&M Period.

(iii) The meters shall be calibrated once every year during the O&M Period in accordance with Good Industry Practices and the meters shall be jointly tested by ***[Executing Agency]*** and the Concessionaire to ensure the accuracy of the meters installed by the Concessionaire.

(b) Records and Reporting Requirements

(i) The Concessionaire shall maintain:

(A) records of the volume and characteristics of the Sewage/Faecal Sludge/Septage received at, and the STP By-Products, FSTP By-Products, and the Treated Effluent discharged from the ***[Location]*** STP(s) and ***[Location]*** FSTP(s); and

(B) records of the sump levels and volume of the Sewage/Faecal Sludge/Septage discharged from the relevant location's SPSs; and

(C) books of accounts recording all payments received from ***[Name of the State / National Level Agency, if any]*** and other revenues derived/collected by it from the Facilities or resulting from its use,separately for ***[Location]*** STP(s) and ***[Location]*** FSTP(s).

(ii) The Concessionaire shall provide to ***[Executing Agency]***, 2 (two) copies of its audited financial statements along with a report from its statutory auditors, within 90 (ninety) days of the close of each Financial Year.

(iii) For***[Location]*** STP(s) and ***[Location]*** FSTP(s), the Concessionaire shall deliver to ***[Executing Agency]***, with a copy to the Project Engineer, the following during the O&M Period within the specified timelines:

(A) reports relating to any activity, problem, incident or circumstance that threatens or may threaten public health, safety, the environment or the safety and security of the Facilities, and any action taken to mitigate the effect of such incident or problem, as soon as reasonably practicable but no later than 12 hours after the occurrence of such event or circumstance;

(B) reports on any critical breakdowns or failures in the Facilities, within 12 hours of such occurrence;

(C) reports on accidents or other incidents in relation to the O&M personnel or any third party, along with statements on actions taken to minimize

recurrence, within 2 (two) days of such occurrence;

(D) daily reports with the data collected from the monitoring and metering system, the online monitoring system and the tests conducted by the Concessionaire in accordance with Clause 8.10 on the characteristics and volume of Sewage/Faecal Sludge/Septage treated at the Facilities, the STP By-Products, FSTP By-Products and the Treated Effluent discharged from the Facilities, at the end of each day (i.e., on or before 1500 hours every day);

(E) monthly progress reports relating to the performance of O&M services (including on compliance with the KPIs, details of disposal or sale, as the case may be, of the STP By-Products, FSTP By-Products and the Treated Effluent, and details of any Emergency during the relevant month), on or before the 7th(seventh) day of the following month. The monthly progress report must be certified by the Project Engineer before it is submitted to ***[Executing Agency]***;

(F) copies of any reports, notices or responses submitted for compliance/non-compliance with Applicable Laws or Applicable Permits, within 2 (two) days of making such submissions to the relevant Government Authority; and

(G) reports on any material litigation, including any winding-up proceedings or notice to commence winding-up proceedings or material disputes to which the Concessionaire is a party, appointment of a receiver or administrator in relation to the business or assets of the Concessionaire and any adverse orders or judgments passed by any Government Authorities that affects or is likely to affect the performance of the O&M services, as soon as reasonably possible after the occurrence of any such event.

(c) It is clarified that the reports set out in this Clause 8.8 will be separately prepared and furnished for ***[Location]*** STP(s) and ***[Location]*** FSTP(s).

8.9 Design Capacity Utilization

(a) During each day of the O&M Period, the Concessionaire shall ensure that ***[Location]*** STP(s) and ***[Location]*** FSTP(s) can accept, treat, and process Sewage/Faecal Sludge/Septage up to its Design Capacity.

(b) The Concessionaire shall notify ***[Executing Agency]*** (with a copy to the Project Engineer) as soon as it becomes aware that the volume of Sewage/Faecal Sludge/Septage received at the relevant ***[Location]*** STP(s) and ***[Location]*** FSTP(s) is more than its Design Capacity.

(c) In such circumstances, if the Concessionaire is unable to accept and treat the excess Sewage/Faecal Sludge/Septage (i.e., over and above the Design Capacity) at the

relevant ***[Location]*** STP(s) and ***[Location]*** FSTP(s), then such failure shall be treated as a Forced Unavailability for which the Concessionaire shall not be liable, subject to the Concessionaire having notified ***[Executing Agency]*** in accordance with Clause 8.9(b) above. ***[Executing Agency]*** reserves the right to require the Project Engineer to verify the capacity utilization at any **[Location]** STP(s) and ***[Location]*** FSTP(s), at any time during the O&M Period.

8.10 Testing

(a) The Sewage/Faecal Sludge/Septage and the Treated Effluent will be tested at the Inlet Point and the Outlet Point, respectively in accordance with this Clause 8.10 and the Technical Specifications.

(b) The Concessionaire shall test the characteristics of the incoming Sewage/Faecal Sludge/Septage at the Inlet Point to determine if the incoming Sewage/Faecal Sludge/Septage meets the Influent Standards. The Concessionaire will be required to carry out such tests at the Inlet Point at the intervals specified in the Technical Specifications or at such other time interval as may be instructed by ***[Executing Agency]***.

(c) The Concessionaire shall test the characteristic of the Treated Effluent at the Outlet Point to determine if the Treated Effluent meets the Discharge Standards. The Concessionaire will be required to carry out such tests at the Outlet Point at the intervals specified in the Technical Specifications or such other time interval as may be instructed by ***[Executing Agency]***.

(d) The Concessionaire shall test the characteristics of the Digested Sludge after digestion of the raw Sewage/Faecal Sludge/Septage at the ***[Location]*** STP(s) and ***[Location]***FSTP(s) to assess the volatile suspended solids value of the Digested Sludge, in accordance with the Technical Specifications.

(e) The Concessionaire shall maintain proper records of the tests conducted at the Inlet Point, the Outlet Point or at any other point at the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) (for the Digested Sludge) and the test results shall be verified by the Project Engineer. Separately, the Project Engineer shall also have the right to take random samples of the incoming Sewage/Faecal Sludge/Septage, the Digested Sludge and the Treated Effluent at any time during the O&M Period to test compliance with the Influent Standards and the Discharge Standards.

(f) For ***[Location]*** STP(s) and ***[Location]*** FSTP(s), the Concessionaire shall prepare daily reports compiling the test reports for each day, which shall be submitted to ***[Executing Agency]***, after being duly certified by the Project Engineer.

8.11 Maintenance and Repair of the Facilities

(a) During the O&M Period, the Concessionaire shall, at its own cost, undertake the maintenance of the Facilities and repair any damage to the Facilities either by itself, or through an approved Subcontractor, such that the Facilities shall be:

(i) in good working condition (subject only to wear and tear and Force Majeure) and achieve their full useful economic life in accordance with the Designs and Drawings;

(ii) maintained in compliance with the Technical Specifications, O&M (iii) Manual, Scheduled Maintenance Programme, Applicable Laws, Applicable Permits, Good Industry Practice and the recommendations of the technology providers;

(iii) capable of meeting the KPIs.

(b) For the first year of the O&M Period, the Concessionaire shall submit its scheduled maintenance programme for the ***[Location]*** STP(s) and ***[Location]*** FSTP(s), specifying the Scheduled Maintenance periods for ***[Location]*** STP(s) and ***[Location]*** FSTP(s) and the impact of such Scheduled Maintenance periods on the Availability of each ***[Location]*** STP(s) and ***[Location]*** FSTP(s) (the **"Scheduled Maintenance Programme"**) to ***[Executing Agency]*** at least 1 (one) month before the Scheduled COD and for every subsequent year of the O&M Period, the Concessionaire shall submit the Scheduled Maintenance Programme, at least 1 (one) month prior to the beginning of the relevant year. The Scheduled Maintenance Programme for the first year will cover the period from the COD until the end of the calendar year in which the COD occurs. It is clarified that the Concessionaire shall submit a consolidated Scheduled Maintenance Programme for the Facilities.

(c) Within 15 (fifteen) days of receipt of the Scheduled Maintenance Programme, ***[Executing Agency]*** shall notify the Concessionaire of its approval of such schedule.

If ***[Executing Agency]*** does not accept any one or more of the requested Scheduled Maintenance periods or its impact on the Availability of a Facilities, ***[Executing Agency]*** shall advise the Concessionaire within 15 (fifteen) days of the receipt of the Scheduled Maintenance Programme on when any Scheduled Maintenance can be rescheduled or how its impact on the Availability of a Facilities may be minimised. The rescheduled time shall be as close as reasonably practicable to the requested time and shall be of equal duration as the requested period. If ***[Executing Agency]*** fails to object to any Scheduled Maintenance within the specified time period or fails to advise the Concessionaire of a substitute time, the Concessionaire may schedule the Scheduled Maintenance for such duration and at such time as initially requested.

(d) Notwithstanding the finalization of the Scheduled Maintenance Programme pursuant to this Clause 8.11, ***[Executing Agency]*** may require the Concessionaire to reschedule a Scheduled Maintenance in the Scheduled Maintenance Programme, provided that:

(i) ***[Executing Agency]*** has given the Concessionaire at least 30 (thirty) days' prior written notice of such re-scheduling;

(ii) ***[Executing Agency]*** shall not require such Scheduled Maintenance to be rescheduled for a period of shorter or longer duration;

(iii) ***[Executing Agency]*** shall not require that a single Scheduled Maintenance period

be split into two or more periods; and

(iv) ***[Executing Agency]*** shall not require that a Scheduled Maintenance be brought forward any earlier than 15 (fifteen) days from the date of such notice without the consent of the Concessionaire.

(e) Notwithstanding the finalization of the Scheduled Maintenance Programme pursuant to this Clause 8.11, the Concessionaire may request a rescheduling of any Scheduled Maintenance upon 60 (sixty) days' prior written notice to ***[Executing Agency]***. ***[Executing Agency]*** shall respond to such request within 10 (ten) days and shall not unreasonably withhold its permission for such re-scheduling.

(f) Within 5 (five) days of any re-scheduling of a Scheduled Maintenance in accordance with Clause 8.11(d) or Clause 8.11(e) above, the Concessionaire shall provide to ***[Executing Agency]***, the amended Scheduled Maintenance Programme, which shall then be the "**Scheduled Maintenance Programme**".

(g) During the O&M Period, the Concessionaire shall, at its own cost, replace any component or part of the Facilities that is damaged or worn out or in the Concessionaire's judgment becomes no longer practicable to repair as a result of normal wear and tear.

(h) If at any time during the O&M Period, a Facilities is damaged by a Minor Casualty, the Concessionaire shall, with reasonable diligence, proceed to process the claim with insurance providers and repair, replace, and restore the damaged portion of the Facilities to the same condition that it was in before the occurrence of such Minor Casualty. To the extent available, insurance proceeds shall be applied to such repair, replacement or restoration.

(i) If at any time during the O&M Period, a Facilities is damaged by a Total Casualty, then this Agreement shall be terminable at the option of the Concessionaire. If the Concessionaire elects to terminate the Agreement, then the consequences set out at Clause 14.7 will follow. If, however, the Concessionaire elects not to terminate the Agreement, then the Concessionaire shall repair, replace and restore the damaged Facilities to the same condition that it was in before the occurrence of such Total Casualty. To the extent available, insurance proceeds shall be applied to such repair, replacement or restoration.

8.12 Key Performance Indicators

(a) Availability

(i) The Concessionaire shall ensure that the Availability of each Facilities and Associated Infrastructure on every day during the O&M Period shall be 100% (one hundred per cent) (the **"Guaranteed Availability"**). Provided that during the period of a Scheduled Maintenance that is undertaken as per the approved Scheduled Maintenance Programme or as notified and approved in accordance with Clause 8.11 for the Facilities, the Concessionaire shall ensure that the

Guaranteed Availability of such Facilities and Associated Infrastructure is at least 95% (ninety five per cent).

The 'Availability' of each Facilitiesand Associated Infrastructure will be determined as a ratio of the number of hours in a day during which such Facilities was available to convey, pump, accept and treat the Sewage/Faecal Sludge/Septage up to its Design Capacity, to the total number of hours in a day, and the term 'Available' shall be construed accordingly.

(ii) In computing the Availability of each Facilities and Associated Infrastructure, the Concessionaire agrees that the Facilities will be deemed to be Available at all times, other than during the period of:

(A) an Unscheduled Outage affecting such Facilities and Associated Infrastructure;
(B) a Power Outage affecting such Facilities and Associated Infrastructure;
(C) suspension of the O&M services for such Facilities, for reasons attributable to the Concessionaire (in accordance with Clause 15.1 and 15.2); or an Emergency affecting such Facilities, attributable to the Concessionaire,
(D) during which the Facilities and Associated Infrastructure will be deemed to be not Available.

(iii) Notwithstanding anything to the contrary contained in this Agreement, during the period of a Forced Unavailability or a Force Majeure, the Facilitiesand Associated Infrastructure affected by such Forced Unavailability or a Force Majeure will be deemed to be Available.

(iv) If the Availability for a Facilities on any given day is less than the Guaranteed Availability, ***[Executing Agency]*** shall issue a notice to the Concessionaire requiring the Concessionaire to cure the default causing the reduction in Availability in [3 (three)] days. Any failure to cure the default and achieve the Guaranteed Availability within [3 (three)] days of receipt of the notice from ***[Executing Agency]*** shall constitute a Concessionaire Event of Default. The ***[Executing Agency]***may claim AvailabilityLiquidated Damages would be available till the default is cured or the Agreement is terminated.

(v) Availability Liquidated Damages

Without prejudice to Clause 8.12(a)(iv), if the Availability of any Facilitiesand Associated Infrastructure on any given day is less than the Guaranteed Availability, then the Concessionaire shall pay the liquidated damages set out in Schedule 7.

The aggregate Availability Liquidated Damages payable by the Concessionaire in any quarter of the O&M Period will be deducted from the O&M Payments due to the Concessionaire for such quarter. If the Availability Liquidated Damages for a quarter exceed the O&M Payments for such quarter, then the excess amounts shall, at the discretion of ***[Executing Agency]***, either be adjusted against the

O&M Payments for the subsequent quarter or recovered from the O&M Securities.

(b) Influent Standards and Discharge Standards

(i) The Concessionaire is required to receive, treat, and dispose all Sewage, Faecal Sludge/Septage delivered to the ***[Location]*** STP(s) and ***[Location]*** FSTP(s). If, however the Sewage/Faecal Sludge/Septage is beyond the Influent Standards as set out in Schedule 10, then the Concessionaire shall be required to treat such Sewage/Faecal Sludge/Septage but will not be liable for any Performance Liquidated Damages if the Treated Effluent and/or the Digested Sludge fails to meet the Discharge Standards

(ii) Subject to Clause 8.12(b)(i) above, the Concessionaire shall ensure that the Treated Effluent and Digested Sludge comply with the Discharge Standards set out in the Technical Specifications.

(iii) Subject to Clause 8.12(b)(iv) below, for each Facilities, if the Treated Effluent or the Digested Sludge does not comply with the Discharge Standards, then the process set out below shall follow:

(A) In the first instance of non-compliance of the Treated Effluent or the Digested Sludge with the Discharge Standards (**First Breach**), ***[Executing Agency]*** shall issue a notice to the Concessionaire on the first day of such non-compliance (**First Breach Notice**) requiring the Concessionaire to cure the First Breach within 20 days from the date of the First Breach Notice. If the First Breach is cured within 2 days of the First Breach Notice, then the Concessionaire shall not be liable to pay any Performance Liquidated Damages. If, however, the First Breach continues beyond 2 days of the First Breach Notice, then, the Concessionaire shall be liable to pay the Performance Liquidated Damages specified in Schedule 7, from the3rd day of the First Breach.

(B) If: (I) the First Breach continues for 20 (twenty) days from the date of the First Breach Notice; or (II) another instance of non-compliance with the Discharge Standards occurs within 6 (six) months of the First Breach, then such breach shall constitute the **Second Breach**. Upon occurrence of the Second Breach, ***[Executing Agency]*** shall issue a notice to the Concessionaire on the first day of the Second Breach (**Second Breach Notice**) requiring the Concessionaire to cure the Second Breach within 20 days from the date of the Second Breach Notice. If the Second Breach continues beyond 2 (two) days of the Second Breach Notice, then, the Concessionaire shall be liable to pay twice the amount of the Performance Liquidated Damages specified in Schedule 7, from the 1st day of the Second Breach. In case of (I) above, it is clarified that the Concessionaire will be liable to pay Performance Liquidated Damages at the rate specified in Schedule 6, for the first 2 days of a continuing breach from the date of the Second Breach Notice and twice the specified Performance Liquidated

Damages from the 3rd day of a continuing Second Breach.

(C) If: (I) the Second Breach continues for 20 (twenty) days from the date of the Second Breach Notice; or (II) another instance of non-compliance with the Discharge Standards occurs within 6 (six) months of the Second Breach, then such breach shall constitute the **Third Breach**. Upon occurrence of the Third Breach, ***[Executing Agency]*** shall issue a notice to the Concessionaire on the first day of the Third Breach (**Third Breach Notice**) requiring the Concessionaire to cure the Third Breach within 20 days from the date of the Third Breach Notice. If the Third Breach continues beyond 2 (two) days of the Third Breach Notice, then: (X) the Concessionaire shall be liable to pay thrice the amount of the Performance Liquidated Damages specified in Schedule 7, from the 1st(first) day of the Third Breach; and (Y) the Capex Annuity for the relevant quarter(s) will be reduced by an amount equal to the Capex Annuity for the relevant quarter/90 (ninety) days for each day that the Third Breach continues beyond the 1st(first)day of the Third Breach. In case of (I) above, it is clarified that the Concessionaire will be liable to pay twice the Performance Liquidated Damages specified in Schedule 7, for the first 2 (two) days of a continuing breach from the date of the Third Breach Notice and thrice the specified Performance Liquidated Damages from the 3rd(third) day of the Third Breach, in addition to the reduction in the Capex Annuity.

(D) If: (I) the Third Breach is not cured within 20 (twenty) days from the Third Breach Notice; or (II) a failure to comply with the Discharge Standards results in occurrence of a Third Breach more than 3 (three) times in a continuous 12 (twelve) month period, it will be treated as a Concessionaire Event of Default and the consequences set out at Article 16 shall apply.

(E) The Parties acknowledge that the Performance Liquidated Damages (including any escalation contemplated in this Clause 8.12(b)(iii) are a genuine pre-estimation of and reasonable compensation for the environmental damage that may be caused by the Concessionaire's continuing failure to comply with the Discharge Standards, and not as penalty. The payment of Performance Liquidated Damages will not absolve the Concessionaire from any other liability under Applicable Law, for causing any environmental pollution or health hazard due to its failure to comply with the Discharge Standards and/or Applicable Law.

(iv) If the Treated Effluent and/or the Digested Sludge does not meet the Discharge Standards on account of: (A) the characteristics of the Sewage/Faecal Sludge/Septage being beyond the permissible Influent Standards; or (B) the volume of the Sewage/Faecal Sludge/Septage being more than the Design Capacity of the relevant ***[Location]*** STP(s) and ***[Location]*** FSTP(s), then, the Concessionaire shall not be liable to pay any Performance Liquidated Damages for a failure to meet the Discharge Standards.

In the event of the actual volume of Sewage/Faecal Sludge/Septage being more

than the design capacity, the Concessionaire shall not be bound by the Guaranteed Energy Consumption limits and the payment of power charges shall be as per the actuals.

(v) The Performance Liquidated Damages payable by the Concessionaire in any quarter of the O&M Period will be deducted from the O&M Payments due to the Concessionaire for such quarter. If the Performance Liquidated Damages for a quarter exceed the O&M Payments for such quarter, then the excess amounts shall, at the discretion of ***[Executing Agency]***, either be adjusted against the O&M Payments for the subsequent quarter or recovered from the O&M Security.

(vi) Within 7 (seven) days from the end of each month, the Concessionaire shall be required to provide the monthly progress report for each Facilities (prepared in accordance with Clause 8.8(B)(iii)(E)above) on compliance of such Facilities with the KPIs, which should indicate the periods during which such Facilities did not meet the Guaranteed Availability or the Treated Effluent and/or the Digested Sludge did not meet the Discharge Standards and the reasons for such failure. The Project Engineer shall be required to certify each such monthly report before it is provided to ***[Executing Agency]***. Such certified report on compliance with KPIs shall be referred to as the KPI Adherence Report and shall form the basis for O&M Payments being made to the Concessionaire during the O&M Period.

8.13 Disposal of STP By-Products, FSTP By-Products and the Treated Effluent

The Concessionaire shall be required to store, handle and dispose the STP By-Products, FSTP By-Products and the Treated Effluent in the manner set out in this Clause 8.13 during the O&M Period:

(a) Waste Disposal Site

(i) Within 30 (thirty) days from the Effective Date, ***[Executing Agency]*** shall inform the Concessionaire of each Waste Disposal Site at which the Concessionaire shall be required to dispose the STP By-Products, FSTP By-Products resulting from the treatment of the Sewage/Faecal Sludge/Septage at the ***[Location]*** STP(s) and ***[Location]*** FSTP(s), and any other waste materials resulting from the construction of the Facilities during the Construction Period (including silt).

(ii) ***[Executing Agency]*** may shift any Waste Disposal Site from time to time during the O&M Period provided that, the Waste Disposal Sites will always be within a radius of 10 km (ten kilometers) from the boundary of the relevant Site and any shifting of a Waste Disposal Site will be with at least 30 (thirty) days' prior written notice to the Concessionaire.

(iii) If, at any time during the O&M Period, ***[Executing Agency]*** shifts a Waste Disposal Site to a location beyond a radius of 10 km (ten kilometers) from the boundary of the relevant Site, then, ***[Executing Agency]*** shall compensate the Concessionaire for any additional transportation costs incurred by the Concessionaire in transporting the STP By-Products, FSTP By-Products to such

Waste Disposal Site.

(iv) Any approval for disposal of the STP By-Products, , FSTP By-Products at the Waste Disposal Sites will be obtained by ***[Executing Agency]*** at its cost. Further, all costs and charges in connection with the setting up and maintaining the Waste Disposal Sites (including any tipping fee for the disposal of the STP By-Products and FSTP By-Products) will be borne by ***[Executing Agency]***. The Concessionaire shall only be responsible for transporting the STP By-Products, FSTP By-Products to the Waste Disposal Sites and subject to Clause 8.13(a) above, bearing the costs for transportation and unloading of the STP By-Products, FSTP By-Products at the Waste Disposal Sites.

(b) Disposal of Residual Grit and Screenings

(i) The Concessionaire shall, at its cost and expense, be required to transfer the Residual Grit and the Screenings to the relevant Waste Disposal Site and shall make adequate transportation arrangements for this purpose.

(ii) The Concessionaire shall ensure that the Residual Grit and the Screenings are neither disposed at any place on or about the Site, other than the Waste Disposal Sites, {nor discharged into the --------[31]}. The disposal of the Residual Grit and the Screenings at the Waste Disposal Sites must be strictly in accordance with all Applicable Laws. The Concessionaire shall indemnify ***[Executing Agency]*** against any costs or liabilities that may arise due to the Concessionaire's failure to comply with this Clause 8.13(b) and all Applicable Laws in disposal of the Residual Grit and the Screenings.

(c) Disposal of Digested Sludge

(i) As part of each Facilities, the Concessionaire shall be required to set up and maintain a sludge handling Facilities at the relevant Site, where the Concessionaire can dry the Digested Sludge during the O&M Period.

(ii) The Concessionaire shall, at its cost and expense, provide for a storageFacilities within the ***[Location]*** Site to temporarily store the dried Digested Sludge until such Digested Sludge is sold or disposed in accordance with this Agreement.

(iii) The Concessionaire shall, subject to compliance with Applicable Laws and Applicable Permits, be free to sell the Digested Sludge, at such price and to such Persons as it may deem fit or dispose the Digested Sludge at the Waste Disposal Sites. Provided that if the Concessionaire sells the digested sludge to any third party, the Concessionaire shall be required to share 10% of the revenues from such sale with ***[Executing Agency]***.

(iv) The Concessionaire shall maintain proper records of sale of any Digested Sludge generated from the Facilities (including the revenues earned by the

[31]Insert the name of the water body. Delete if not applicable.

Concessionaire from such sale) and make them available to ***[Executing Agency]*** for its review.

(v) The Concessionaire shall ensure that the Digested Sludge is neither disposed at any place on or about the Site, except the Waste Disposal Sites, {nor discharged into the -------}[32]. The Concessionaire shall indemnify ***[Executing Agency]*** against any costs or liabilities that may arise due to the Concessionaire's failure to comply with this Clause 8.13(c) and all Applicable Laws in disposal of the Digested Sludge.

(d) Disposal of Treated Effluent

(i) The Concessionaire is required to transfer the Treated Effluent through the Supporting Infrastructure to any discharge point(s) indicated by ***[Executing Agency]***.

(ii) The Concessionaire is permitted to divert, transfer or sell the Treated Effluent generated from the STP/FSTP to any third party, provided that if the Concessionaire sells the Treated Effluent to any third party, the Concessionaire shall be required to share 10% (ten per cent) of the revenues from such sale with ***[Executing Agency]***.

(iii) The Concessionaire shall maintain proper records of sale of any Treated Effluent generated from the Facilities (including the revenues earned by the Concessionaire from such sale) and make them available to ***[Executing Agency]*** for its review.

(iv) The Concessionaire shall indemnify ***[Executing Agency]*** against any costs or liabilities that may arise due to the Concessionaire's failure to comply with this Article 8.13(d) and all Applicable Laws in disposal of the Treated Effluent.

(e) Rights and interest in the STP By-Products, FSTP By-Products and the Treated Effluent

(i) Subject to the ***[Executing Agency]***'s right torevenue share,all rights and interest in the STP By-Products, FSTP By-Products discharged from the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) shall vest with the Concessionaire at all times during the O&M Period, unless transferred by the Concessionaire to a third party buyer/off-taker in accordance with this Agreement.

(ii) All rights and interest in the Treated Effluent discharged from the ***[Location]*** STP(s) and ***[Location]*** FSTP(s) shall vest with the Concessionaire at all times during the O&M Period, unless transferred by the Concessionaire to ***[Executing Agency]*** in accordance with this Agreement.

[32]Delete if not applicable.

8.14 Remedial Measures

If after the COD, the Concessionaire ceases to operate Facilities for a period of 48 consecutive hours other than due to a Forced Unavailability, Scheduled Maintenance, or a suspension pursuant to Clause 15.1 or Clause 15.2, which is not attributable to the Concessionaire, or a Force Majeure Event, without the prior written consent of ***[Executing Agency]***, then ***[Executing Agency]*** shall be entitled to step-in and undertake O&M of such Facilities until the Concessionaire demonstrates to the satisfaction of ***[Executing Agency]*** that it can and will resume normal operation and maintenance of the Facilities. The exercise of ***[Executing Agency]***'s rights under this Clause 8.14 shall be at the cost, risk and expense of the Concessionaire. The Concessionaire shall not be entitled to receive any O&M Charges for the duration that ***[Executing Agency]*** steps-in to operate and maintain the Facilities.

8.15 O&M Personnel

(a) The Concessionaire shall engage (either directly or through an approved Subcontractor) adequate number of suitably skilled and qualified personnel to undertake the O&M of the Facilities in accordance with the requirements set out in this Article 8.

(b) The Concessionaire shall be solely responsible for discharging all obligations in connection with the employment of the O&M personnel, including the payment of wages, salaries, Taxes, and retrenchment compensation and providing all amenities and benefits required under applicable laws.

(c) Subject to compliance with the Applicable Laws, the Concessionaire shall have full freedom to determine its internal human resources (HR) policies, including, the wages, benefits and salary structure of its employees, the conditions of service, the shifts of work, its hire and fire policy (whether for misconduct or other cause), and payment of severance or retrenchment compensation.

(d) ***[Executing Agency]*** is not and shall not be treated as the "principal employer" of or be deemed to have any contractual or other relationship with the O&M personnel. The Concessionaire shall hold harmless and indemnify ***[Executing Agency]*** against all losses, claims, costs and damages that ***[Executing Agency]*** may suffer due to the Concessionaire's or any of its Subcontractor's failure to comply with applicable laws.

ARTICLE 9
PAYMENT AND INVOICING

9.1 In consideration of the works and services required to be performed by the Concessionaire for designing, financing, constructing, operating and maintaining the Facilities in accordance with this Agreement, the Concessionaire shall be entitled to receive the Construction Payments and the O&M Payments from ***[Executing Agency]***and/or ***[Name of the State / National Level Agency, if any]***[33] in accordance with this Article 9.

9.2 The Concessionaire shall be deemed to have satisfied itself regarding the adequacy, accuracy and sufficiency of the Construction Payments and the O&M Payments. Except for any adjustment in accordance with Clause 8.13(a) and Clause 13.2, or any permitted Variation, the Construction Payments and the O&M Payments are the total consideration payable to the Concessionaire for undertaking the Project.

9.3 Construction Payments

(a) ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]*** shall deposit an amount equivalent to the first 2 (two) ***[Location]*** Facilities Payment Milestones in the Escrow Account in accordance with Clause 9.5 and the Escrow Agreement, prior to the Effective Date. From the Effective Date and during the Construction Period, ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]*** shall ensure that the Escrow Account is funded with an amount equivalent to the next 2 ***[Location]*** Facilities Payment Milestones for the ***[Location]*** Facilities.

(b) 10% of the Bid Project Cost for the Facilities shall be given to the Concessionaire as a Mobilization Advance in accordance with Clause 9.3(d), which will be adjusted against the Construction Payments to be paid by ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[34] to the Concessionaire in 4 instalments, in accordance with Clause 9.3(e). The Construction Payments will be paid to the Concessionaire upon completion of the work corresponding to the Payment Milestones and certification of completion of such Payment Milestones by ***[Executing Agency]*** in accordance with Clause 7.13.

(c) Adjustment in Construction Payments

(i) The Construction Payments shall be adjusted during the Construction Period to reflect the variation in the Construction Price Index occurring after the Reference Index Date immediately preceding the Bid Due Date.

(ii) All Invoices to be submitted by the Concessionaire to ***[Executing Agency]*** for any installment of the Construction Payments shall be the product of the relevant percentage of the Bid Project Cost and the Price Index Multiple applicable on the date of the Invoice.

[33] Delete whichever is not applicable
[34]Delete whichever is not applicable.

(d) Mobilization Advance

(i) 10% of the ***[Location]*** Facilities Bid Project Cost shall be payable to the Concessionaire as the Mobilization Advance, within 30 (thirty) days from the Effective Date, subject to the Concessionaire having submitted a Mobilization Advance Guarantee in accordance with Clause 5.21.

(ii) Subject to Article 9.3(d)(iv) below, ***[Location]*** Facilities Mobilization Advance shall be an interest free advance for mobilization and towards execution of the construction works for the ***[Location]*** Facilities.

(iii) The Mobilization Advance shall be deducted in equal instalments from the 4 instalments of the Construction Payments to be made to the Concessionaire upon progressive completion of the Payment Milestones.

(iv) However, the Concessionaire is liable to pay a simple interest at the rate of 8% on the Mobilization Advance, if the Payment Milestones are not achieved by the Concessionaire in accordance with the agreed Construction Plan and for the reasons attributed to the Concessionaire. The interest shall be payable for the period between the actual Payment Milestone and agreed Payment Milestone. The interest amount shall be deducted along with the Mobilization Advance from the Construction Payments.

(e) Milestone Construction Payments

(i) Subject to this Clause 9.3(e), for each Facilities, the Construction Payments will be paid by ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[35] to the Concessionaire in the following 4 (four) equal installments (**Payment Milestones**) (after adjusting the Mobilization Advance (and the interest payable if any as per Clause 9.3(d)(iii)):

(A) 1st (first) installment equal to [10% (ten per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 25% (twenty five per cent)physical progress, upon the issuance of the first Milestone Completion Certificate;

(B) 2nd (second) installment equal to [10% (ten per cent)]of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 50% (fifty per cent)physical progress, upon the issuance of the second Milestone Completion Certificate;

(C) 3rd (third) installment equal to [10% (ten per cent)] of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 75% (seventy five per cent)physical progress, upon the issuance of the third Milestone Completion Certificate; and

[35]Delete whichever is not applicable.

(D) 4th (fourth) installment equal to [10% (ten per cent)] of the Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, on achievement of 100% (hundred per cent) physical progress, upon the issuance of the Construction Completion Certificate.

(ii) For the Facilities, within 7 (seven) days of issuance of the Milestone Completion Certificate for a Payment Milestone, the Concessionaire shall submit an Invoice to ***[Executing Agency]*** for the amount of the Construction Payment linked to such Payment Milestone along with the KPI Adherence Report. Any Invoice raised by the Concessionaire for the Construction Payments shall be accompanied by a copy of the relevant Milestone Completion Certificate issued by ***[Executing Agency]***.

(iii) Within 10 (ten) days of receipt of an Invoice from the Concessionaire pursuant to Clause 9.3(e)(ii) above, ***[Executing Agency]*** shall verify and certify the amounts due and payable to the Concessionaire, and either:

(A) approve the Invoice and issue a certificate to the Escrow Bank (with a copy to ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]*** and the Concessionaire), conveying its approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with this Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws); or

(B) issue a notice to the Concessionaire disputing the Invoice and directing the Concessionaire to issue a revised Invoice, after rectifying the errors or discrepancies identified by ***[Executing Agency]***.

The Concessionaire shall submit a revised Invoice to ***[Executing Agency]*** after rectifying the errors or discrepancies identified by ***[Executing Agency]*** and this process will be repeated until ***[Executing Agency]*** approves the Invoice and issues a certificate to the Escrow Bank {with a copy to ***[Name of the State / National Level Agency, if any]***}[36] and the Concessionaire), conveying its approval for release of the amount specified in the Invoice.

(iv) Any dispute between the Parties in relation to a disputed Invoice will be settled in accordance with Article 21 (*Dispute Resolution*).

(v) A certificate issued by ***[Executing Agency]*** in accordance with Clause 9.3(e)(iii) shall be referred to as a **Payment Certificate.**

(vi) If, within 10 (ten) days from the date of receipt of an Invoice, ***[Executing Agency]*** does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by ***[Executing Agency],*** and the Concessionaire may issue instructions to the Escrow Bank{ (with a copy to ***[Executing Agency]*** and ***[Name***

[36]To be deleted if not applicable.

of the State / National Level Agency, if any])}[37] to release the amounts specified in the Invoice, upon the expiry of the 10-day period.

(vii) Immediately upon receipt of a Payment Certificate from ***[Executing Agency]*** in accordance with Clause 9.3(e)(iii) or upon receipt of instructions from the Concessionaire in accordance with Clause 9.3(e)(vi), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice, in accordance with the Escrow Agreement.

(viii) Notwithstanding anything to the contrary in this Agreement, ***[Executing Agency]*** shall have no obligation to issue a Payment Certificate unless:

(A) the Performance Securities remain valid and in effect;

(B) the insurances to be obtained by the Concessionaire in accordance with Clause 11.2 are valid and in effect;

(C) the Concessionaire Applicable Permits for construction of the Facilities are in full force and effect, unless the withdrawal or cancellation of any Applicable Permit is not attributable to the Concessionaire's failure to comply with Applicable Laws;

(D) the Concessionaire has complied with the ESHS Documents in undertaking the construction of the Facilities; and

(E) there is no subsisting Concessionaire Event of Default.

(F) the Concessionaire shall be paid the Construction Payments in Rupees. [However, if, in the Financial Proposal, the Selected Bidder specified any percentage of the Bid Project Cost which it would want to receive in a foreign currency during the Construction Period, then the Construction Payments corresponding to such percentage of the Bid Project Cost shall be paid to the Concessionaire in the relevant foreign currency. For the purpose of payment in a foreign currency, the exchange rate shall be [•]. It is clarified that the aggregate Construction Payments due to the Concessionaire shall not exceed 40% of the Bid Project Cost, as quoted by the Selected Bidder in Rupees and adjusted for inflation as per Clause 9.3(c), on account of a percentage of the Bid Project Cost being paid to the Concessionaire in foreign currencies][38].

9.4 O&M Payments

(a) During the O&M Period, ***[Name of the State / National Level Agency, if***

[37]To be deleted if not applicable.
[38]Applicable for Bank funded and other international proposals

any]/[Executing Agency][39]shall be required to make the O&M Payments in Rupees to the Concessionaire for each Facilities comprising the Capex Annuity, the interest on the reducing balance of 60% of the Completion Cost, the O&M Charges and the Power Charges, in accordance with this Clause 9.4.

(b) Calculation of Completion Cost

(i) The ***[Location]*** Completion Cost for the ***[Location]*** Facilities will be the aggregate of (A) – (D) below, for the Facilities:

(A) 25% of the Bid Project Cost for the relevant Facilities adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the first Payment Milestone;

(B) 25% of the Bid Project Cost for the relevant Facilities adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the second Payment Milestone;

(C) 25% of the Bid Project Cost for the relevant Facilities adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the third Payment Milestone; and

(D) 25% of the Bid Project Cost for the relevant Facilities adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the fourth Payment Milestone.

60% of the ***[Location]*** Completion Cost will be paid in quarterly instalments during the O&M Period as Capex Annuity.

(c) On and from the COD and during the O&M Period, ***[Name of the State / National Level Agency, if any]/ [Executing Agency]***[40] shall deposit the O&M Payments for each Facilities in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuity (along with interest), the O&M Charges and the estimated Power Charges for the next 2 years for the Facilities.

(d) Adjustment in O&M Charges

(i) The O&M Charges shall be adjusted during the O&M Period to reflect the variation in the O&M Price Index occurring after the Reference Index Date immediately preceding the Bid Due Date.

(ii) All Invoices to be submitted by the Concessionaire to ***[Executing Agency]*** for the quarterly O&M Charges shall be the product of the applicable O&M Charges for the relevant quarter and the Price Index Multiple applicable on the date of the Invoice.

[39]Delete whichever not applicable.
[40]Delete whichever not applicable.

(e) Capex Annuity

(i) The Capex Annuity shall be payable in 60 equal quarterly installments during the O&M Period.

(ii) Interest shall be payable on the reducing balance of 60% of the Completion Cost for the Facilities, at the rate of the SBI MCLR plus 3% per annum. Such interest shall be due and payable quarterly along with each instalment of the Capex Annuity. The Parties agree that such interest shall be calculated on the basis of the number of days for which the relevant rate of the SBI MCLR was applicable during the period of calculation.

By way of illustration, assuming that the balance Completion Cost to be paid to the Concessionaire on the date of payment of the 1st Capex Annuity installment is INR 50,00,00,000 (Rupees fifty crores), the applicable SBI MCLR for the first 50 (fifty) days is 8% and thereafter it is revised to 7.5% and remains unchanged till the date of payment of the 2nd Capex Annuity, the interest would be calculated as ((50*11%*50)/365)+((50*10.5%*40)/365). For the avoidance of doubt, the interest shall be calculated on simple interest basis and the interest shall not be compounded for the purpose of payment.

(f) O&M Charges

(i) The Authority shall pay to the Concessionaire, every [month/quarter] the amount required by the Concessionaire to operate and maintain the Facilities, excluding the Power Charges, during the O&M Period (the **"O&M Charges"**).

(ii) The O&M Charges shall be made for every MLD of Sewage treated and /Faecal Sludge collected and treated in the Project Area by the Concessionaire during the Post-COD period. It shall also include cost of infrastructure for door-to-door collection of Faecal Sludge.

(iii) The O&M Charges for the first [month/quarter] after COD will be calculated on the basis of the O&M Charges quoted by the Selected Bidder in the Financial Proposal for the first month from the COD, which amount shall be adjusted for the Price Index Multiple applicable on the Reference Index Date preceding the date of the first Invoice for the O&M Payments.

(iv) For each subsequent quarter of the O&M Period, the O&M Charges will be adjusted for the Price Index Multiple applicable on the Reference Index Date preceding the date of the relevant Invoice for the O&M Payments.

(g) Power Charges

(i) The Power Charges for the Facilities shall initially be borne by the Concessionaire, which shall be reimbursed by ***[Name of the State / National***

Level Agency, if any][Executing Agency][41] to the Concessionaire, subject to a cap of: (A) the Power Charges based on the ***[Location]*** Facilities Guaranteed Energy Consumption.

(ii) The Power Charges for any given quarter of the O&M Period will be calculated as follows:

(A) For the units of energy consumed from the grid (as evidenced by a copy of the bill issued by the distribution licensee), the Power Charges will be calculated by multiplying the number of units consumed in such quarter (subject to the Guaranteed Energy Consumption for the energy consumed by the relevant Facilities) with the Power Unit Rate.

If the Concessionaire procures power from outside ***[State of Location]***, then, the Power Unit Rate will be the prevalent power unit rate in ***[State of Location]*** or the tariff at which the Concessionaire procures power from outside ***[State of Location]***, whichever is lower.

(B) If there is any interruption in the supply of power from the grid, and the Concessionaire uses backup power supply from the DG Sets, then,

(I) the Concessionaire's Representative and ***[Executing Agency]*** shall jointly take readings from the meters installed at the DG Sets to determine the number of units of energy consumed from the DG Sets for O&M of the Facilities;

(II) the number of units of energy consumed from the DG Sets (determined as per (I) above) shall be adjusted such that the aggregate of the total number of units consumed from the grid and the total number of units consumed from the DG Sets shall not exceed the Guaranteed Energy Consumption for the Facilities (**Adjusted DG Set Units**);

(III) the quantity of diesel consumed to generate the Adjusted DG Set Units in the relevant quarter shall be calculated by ***[Executing Agency]*** based on the rated specific fuel consumption of the DG Sets specified by the manufacturers of the DG Sets; and

(IV) the Power Charges for the Adjusted DG Set Units will be calculated by multiplying the quantity of diesel consumed (determined as per (III) above) with the Fuel Price.

(C) For each Facilities, the Concessionaire shall be liable to pay liquidated damages to ***[Executing Agency]*** for any units of energy consumed beyond the Guaranteed Energy Consumption (whether from the grid or from the DG Sets) for such Facilities (**Power Consumption Liquidated Damages**),

[41]Delete whichever not applicable.

which will be calculated as follows:

(I) For excess power consumption up to 5% (five per cent) of the Guaranteed Energy Consumption of the Facilities:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant quarter – Guaranteed Energy Consumption for such quarter) * [Power Unit Rate] * 0.25

(II) For excess power consumption between 5% (five per cent) and 10% (ten per cent) of the Guaranteed Energy Consumption of the Facilities:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant quarter – Guaranteed Energy Consumption for such quarter) * [Power Unit Rate] * 0.5

(III) For excess power consumption above 10% (five per cent) of the Guaranteed Energy Consumption of the Facilities:
Power Consumption Liquidated Damages: (Number of power units consumed in the relevant quarter – Guaranteed Energy Consumption for such quarter) * [Power Unit Rate]

(D) The Power Consumption Liquidated Damages payable by the Concessionaire in any quarter of the O&M Period will be deducted from the O&M Charges for the Facilities payable to the Concessionaire for such quarter. If the Power Consumption Liquidated Damages for a quarter exceed the O&M Charges for the Facilities for such quarter, then the excess amounts shall, at the discretion of ***[Executing Agency]***, either be adjusted against the O&M Charges for the Facilities for the subsequent quarter or recovered from the O&M Security.

(h) The O&M Payments shall be paid by ***[Name of the State / National Level Agency, if any]*** / ***[Executing Agency]***[42] to the Concessionaire on a quarterly basis. For each Facilities, the Concessionaire shall submit an Invoice to ***[Executing Agency]*** for each quarter on or before the 7th(seventh) day of the first month of the following quarter, which should set out: (i) the Capex Annuity due to the Concessionaire in such quarter, along with interest in accordance with Clause 9.4(d)(ii) above; (ii) the O&M Charges due to the Concessionaire in such quarter; and (iii) the Power Charges incurred by the Concessionaire during such quarter for power drawn from the grid or the DG Sets, subject to the cap of the Power Charges based on the Guaranteed Energy Consumption for the Facilities. Any Invoice raised by the Concessionaire for O&M Payments shall be accompanied with a copy of the: (A) KPI Adherence Report for each month of the relevant quarter, duly certified by the Project Engineer; and (B) copy of the bill(s) issued by the state distribution utility for the Power Charges, and if relevant, copy of the joint meter reading for consumption of power from the DG Sets.

[42]Delete whichever not applicable.

If the Invoice is not accompanied with the supporting documents specified at (A) and (B) above, ***[Executing Agency]*** shall not be required to process such Invoice.

(i) Within 10 (ten) days of receipt of an Invoice from the Concessionaire pursuant to Clause 9.4(h) above, ***[Executing Agency]*** shall verify and certify the amounts due and payable to the Concessionaire, and either:

(i) Approve the invoice and issue a certificate to the Escrow Bank {(with a copy to ***[Name of the State / National Level Agency, if any]***}[43]and the Concessionaire), conveying its approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with this Agreement and/or Applicable Laws (including any statutory dues); or

(ii) issue a notice to the Concessionaire disputing the Invoice and directing the Concessionaire to issue a revised Invoice, after rectifying the errors or discrepancies identified by ***[Executing Agency]***.

The Concessionaire shall submit a revised Invoice to ***[Executing Agency]*** after rectifying the errors or discrepancies identified by ***[Executing Agency]*** and this process will be repeated until ***[Executing Agency]*** approves the Invoice and issues a certificate to the Escrow Bank {(with a copy to ***[Name of the State / National Level Agency, if any]***}[44] and the Concessionaire), conveying its approval for release of the amount specified in the Invoice.

(j) Any dispute between the Parties in relation to a disputed Invoice will be settled in accordance with Article 21.

(k) A certificate issued by ***[Executing Agency]*** in accordance with Clause 9.4(i) shall be referred to as a Payment Certificate.

(l) If, within 10 (ten) days from the date of receipt of an Invoice, ***[Executing Agency]*** does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by ***[Executing Agency]***, and the Concessionaire may issue instructions to the Escrow Bank {(with a copy to ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]***)}[45] to release the amounts specified in the Invoice, upon the expiry of the 10 (ten) day period.

(m) Immediately upon receipt of a Payment Certificate in accordance with Clause 9.4(i)(A) [or upon receipt of instructions from the Concessionaire in accordance with Clause 9.4(l)], the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice, in accordance with the Escrow Agreement.

(n) Notwithstanding anything to the contrary in this Agreement, ***[Executing Agency]*** shall have no obligation to issue a Payment Certificate unless:

[43]To be deleted if not applicable.
[44] To be deleted if not applicable.
[45]To be deleted if not applicable.

(i) the O&M Securities remain valid and in effect;

(ii) the insurances to be obtained by the Concessionaire in accordance with Clause 11.2 are valid and in effect;

(iii) the Concessionaire Applicable Permits for O&M of the Facilities are in full force and effect, unless the withdrawal or cancellation of any Applicable Permit is not attributable to the Concessionaire's failure to comply with Applicable Laws;

(iv) the Concessionaire has complied with the ESHS Documents in undertaking the O&M of the Facilities; and

(v) there is no subsisting Concessionaire Event of Default.

9.5 Escrow Account

(a) Prior to the Effective Date, the Concessionaire, ***[Name of the State / National Level Agency, if any]***,[46]***[Executing Agency]*** and the Escrow Bank shall enter into the Escrow Agreement and ***[Name of the State / National Level Agency, if any]*** shall open the Escrow Account with the Escrow Bank in accordance with the Escrow Agreement, which shall be operational until the expiry of the Term. The Escrow Agreement shall set out the terms of appointment of the Escrow Bank, ***[Name of the State / National Level Agency, if any]***'s obligation to deposit the Construction Payments and the O&M Payments in accordance with this agreement with the Escrow Bank and terms of withdrawal of amounts from the Escrow Account.

(b) Minimum Escrow Balance

At all times, to maintain the minimum balance in the Escrow Account (the **"Minimum Escrow Balance"**):

(i) ***[Name of the State / National Level Agency, if any]*** shall deposit an amount equivalent to the first 2 ***[Location]*** Facilities Payment Milestones prior to the Effective Date. From the Effective Date and during the Construction Period, ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[47] shall ensure that the Escrow Account is funded with an amount equivalent to the next 2 ***[Location]*** Facilities Payment Milestones for the ***[Location]*** Facilities; and

(ii) on and from the COD until Expiry Date, ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[48] shall deposit the O&M Payments in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuity (along with interest), the O&M Charges and the estimated Power Charges for the next 2 years for both the ***[Location]*** Facilities,

[46]To be deleted if not applicable.
[47]Delete whichever not applicable.
[48]Delete whciever not applicable.

If at any time during the Construction Period or the O&M Period, the balance in the Escrow Account falls below the Minimum Escrow Balance, ***[Name of the State / National Level Agency, if any]/[Executing Agency]***[49] shall promptly, and in any event, no later than 90 (ninety) days, fund the Escrow Account such that the Minimum Escrow Balance is maintained. A failure to maintain the Minimum Escrow Balance for 90 (ninety) days would be treated as a ***[Name of the State / National Level Agency, if any]/[Executing Agency]***[50] Event of Default and the consequences set out in Article 16 would follow.

It is clarified that any interest earned on the amounts deposited by ***[Name of the State / National Level Agency, if any]/ [Executing Agency]***[51] in the Escrow Account will be counted towards the Minimum Escrow Balance.

(c) The Concessionaire may withdraw amounts from the Escrow Account in accordance with the provisions of this Agreement and the Escrow Agreement.

9.6 Taxes and Royalties

(a) The Construction Payments and the O&M Payments are inclusive of all Taxes.

(b) ***[Executing Agency]*** may deduct from the Construction Payments, the O&M Payments and any other amounts due to the Concessionaire, any income tax or withholding tax that is required to be deducted at source.

(c) The Concessionaire shall be responsible for payment of all applicable Taxes, including all procedural compliances related to the payment of Taxes pursuant to this Agreement, and shall be solely responsible for any proceedings initiated by any Government Authority, in respect of any non-payment or short-payment of Taxes.

(d) The Concessionaire shall be responsible for payment of all applicable royalties on any fine and coarse aggregate, core sand, fine sand, grit and any other minerals extracted and/or used by the Concessionaire or any Subcontractor during the Construction Period and furnish proof of payment of such royalties to ***[Executing Agency]*** along with the Invoices for the Construction Payments.

(e) Upon a request from the Concessionaire, ***[Name of the State / National Level Agency, if any]/[Executing Agency]*** will provide all relevant certificates and information to enable the Concessionaire to obtain any Tax exemptions available in relation to the Project. It **is** clarified that ***[Executing Agency]*** shall not be responsible in any manner for ensuring that any applicable Tax exemptions are available to the Concessionaire.

(f) The Concessionaire shall indemnify ***[Name of the State / National Level Agency, if any]***[52] and ***[Executing Agency]*** from and against any cost or liability that may arise due to the Concessionaire's failure to pay all applicable Taxes, in connection with the

[49]Delete whichever not applicable
[50]Delete whichever not applicable.
[51]Delete whichever not applicable.
[52]To be deleted if not applicable.

Project.

(g) Any Taxes payable in relation to the ***[Location]***Facilities Sites shall be borne by ***[Executing Agency]***.

9.7 Default Interest

Upon any Party's failure to make a payment due and payable by it on the due date for such payment, the defaulting Party shall be liable to pay default interest on all such outstanding amounts at the prevailing SBI MCLR + 3% per annum or part thereof. This is without prejudice to any Party's right to terminate this Agreement in accordance with Article 16 or any other right or remedy available to it under this Agreement or Applicable Laws.

9.8 Right of Set-Off

The Concessionaire shall not be entitled to retain or set off any amount due to {***[Name of the State / National Level Agency, if any]*** or}[53]***[Executing Agency]*** by it, but {***[Name of the State / National Level Agency, if any]*** or}[54]***[Executing Agency]*** may retain or set off any amount owed to it by the Concessionaire under this Agreement, which has fallen due and payable against any amount due to the Concessionaire under this Agreement. ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[55] shall notify the Concessionaire at the time it exercises its right to set-off and shall provide the Concessionaire its reasons for exercising such right to set-off.

9.9 Revenue Share

The Concessionaire agrees to pay to the Authority, for every [year] of the Concession Period, based on the audited financial report issued by an independent Auditor commencing from the [second quarter Post-COD], [10% (ten per cent)] of the Revenue from Disposal and sale of STP By-Products, FSTP By-Products, Treated Effluent, Digested Sludge, Residual Grit and Screenings, etc., as its share in the revenues earned from the Project (the "**Revenue Share**"), as escalated in accordance with this Article 9.

9.10 Payment of Revenue Share

(a) The Revenue Share payable under this Agreement shall be due and payable as follows:

(i) Revenue Share to be paid by the Concessionaire shall be due and payable within [15 (fifteen)] days of the commencement of the Financial Year. Provided that the Revenue Share for the first Financial Year shall be paid within [15 (fifteen)] days of the occurrence of the COD; and

(ii) The Revenue Share shall be payable in [monthly] installments. Within [7 (seven)] days of the end of each month, the Concessionaire shall pay to the Authority against the Revenue Share, a provisional amount calculated on the basis of

[53]Delete if not applicable.
[54]Delete if not applicable.
[55]Delete whichever not applicable.

Revenue from Disposal of STP By-Products, FSTP By-Products, Treated Effluent, Digested Sludge, Residual Grit and Screenings, etc., of the immediately preceding month and final settlement thereof, based on audited accounts of the Concessionaire, shall be made within [120 (one hundred and twenty)] days of completion of the respective Financial Year.

The Concessionaire shall, with each payment of the Revenue Share submit: (a) a certificate that the amounts paid are correct and in accordance with the provisions of the Agreements; [(b) detailed calculations of the Revenue Share based on the Revenue from Disposal of STP By-Products, FSTP By-Products, Treated Effluent, Digested Sludge, Residual Grit and Screenings, etc.] ; (c) details in respect of Taxes/duties payable/reimbursable in accordance with the provisions of this Agreement; (d) details in respect of other Damages payable in accordance with the provisions of this Agreement; and (e) net amount payable under the provisions of this Agreement.

ARTICLE 10
FINANCING ARRANGEMENTS AND SECURITY

10.1 Financing and Bankability Support

(a) The Parties acknowledge that for the purposes of implementing the Project, the Concessionaire may require Financial Assistance from the Lenders. To this end, ***[Executing Agency]*** shall co-operate with the Concessionaire to achieve Financial Close, including providing such consents and waivers as may be reasonably required by the Lenders.

(b) In case of a Concessionaire Event of Default, ***[Executing Agency]*** and ***[Name of the State / National Level Agency, if any]*** acknowledge that the Lenders will have a right to substitute the Concessionaire in accordance with Clause 16.2 and the Substitution Agreement. ***[Executing Agency]*** will suspend its right to step-in or terminate this Agreement until the expiry of the period available to the Lenders to exercise their substitution rights under Clause 16.2.

(c) The Concessionaire shall maintain books of accounts recording all its receipts (including fees and other revenues derived/collected by it from or on account of any of the Facilities and/or its use), income, expenditure, payments (including payments from the Escrow Account), assets and liabilities, in accordance with this Agreement, Good Industry Practice, Applicable Laws and Applicable Permits.

(d) The Concessionaire shall not make any addition, replacement or amendments to any of the Financing Documents without the prior written consent of the ***[Executing Agency]*** if such addition, replacement or amendment has, or may have, the effect of imposing or increasing any financial liability or obligation on the ***[Executing Agency]***, and in the event that any replacement or amendment is made without such consent, the Concessionaire shall not enforce such replacement or amendment nor permit enforcement thereof against the ***[Executing Agency]***. For avoidance of doubt, the ***[Executing Agency]*** acknowledges and agrees that it shall not unreasonably withhold its consent for restructuring or rescheduling of the debt of the Concessionaire.

10.2 Security Creation

(a) The Concessionaire shall be entitled to create assignment by way of Security over all of its rights, title and interests in and to the Concession Agreement and the Escrow Agreement in favour of the Lenders for the purpose of obtaining Financial Assistance for the Project, provided that the creation of such Security will not result in any financial liability to ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***}[56].

(b) The Concessionaire shall be entitled to include the Lenders as co-insured and/or additional loss payees in any of the insurances taken by the Concessionaire in accordance with Clause 11.2 and/or grant Security over the proceeds of such insurance.

[56]Delete if not applicable.

(c) Except for any Security created by operation of law and any Security created pursuant to this Clause 10.2, the Concessionaire shall not be entitled to create any other Security over the Concession Agreement, the Escrow Agreement or insurance policies taken by it in favour of any third Persons, without the prior written consent of ***[Executing Agency]***, which consent ***[Executing Agency]*** may deny in its sole discretion.

(d) The Concessionaire shall not be entitled to create any Security over the Site or any part thereof, or any of the Facilities or the Power Plant, if any, whether in favour of the Lenders or any third Persons.

ARTICLE 11
INSURANCE AND INDEMNITIES

11.1 Indemnity and Limitation of Liability

(a) Subject to Clause 11.1(b) below, the Concessionaire shall be responsible for release, hold harmless and indemnify ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]***, and ***[Executing Agency]*** Related Parties {and the ***[Name of the State / National Level Agency, if any]***}[57] Related Parties on demand from and against, all suits, actions, claims, demands, losses, damages, fines, penalties, costs or expenses (including costs of legal fees) or liability for:

(i) death or personal injury of any person;

(ii) loss of or damage to property;

(iii) non-compliance with Applicable Laws or Applicable Permits (including specifically, environmental laws and environmental consents);

(iv) any damage caused to the environment by the Concessionaire (including specifically, due to the Concessionaire's failure to meet the Discharge Standards); and

(v) any third-party losses or claims;

which may arise out of, or in consequence of the performance or non-performance of the Concessionaire's obligations under this Agreement.

(b) The Concessionaire shall not be responsible or be obliged to indemnify ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} for any injury, loss, damage, cost and expense caused by the negligence or Wilful Misconduct of ***[Executing Agency],*** {***[Name of the State / National Level Agency, if any]***}[58], ***[Executing Agency]*** Related Parties {or the ***[Name of the State / National Level Agency, if any]*** Related Parties or} by a breach by ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} of their respective obligations under this Agreement, provided the Concessionaire was/is not partly/ wholly or directly/ indirectly responsible for such injury, loss, damage, cost and expense.

(c) ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***} shall have the right, but not the obligation, to contest, defend, and litigate any claim, action, suit or proceeding by any third party alleged or asserted against them in respect of, resulting from, related to or arising out of any matter for which they are entitled to be indemnified under this Agreement, and the reasonable costs and expenses (including legal fees) thereof, shall be subject to the indemnification obligations of the Concessionaire.

[57]Delete if not applicable.
[58]Contents in the curly parenthesis may be deleted if not applicable.

If, however, the Concessionaire acknowledges in writing its obligations to indemnify ***[Executing Agency]*** {and/or ***[Name of the State / National Level Agency, if any]***} in respect of loss to the full extent provided by this Agreement, the Concessionaire shall be entitled, at its option, to assume and control the defense of such claim, action, suit or proceeding at its expense and through a counsel of its choice if it gives prompt notice of its intention to do so to ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***}[59] and reimburses ***[Executing Agency]*** {and/or ***[Name of the State / National Level Agency, if any]***} for the costs and expenses incurred by ***[Executing Agency]*** {and/or ***[Name of the State / National Level Agency, if any]***} prior to the assumption by the Concessionaire of such defense. A Party shall not settle or compromise any such claim, action, suit or proceeding without the prior written consent of the other Parties, which consent shall not be unreasonably withheld or delayed. Notwithstanding the foregoing, ***[Executing Agency]*** {and/or ***[Name of the State / National Level Agency, if any]***} shall have the right to employ its own counsel and such counsel may participate in such action, but the fees and expenses of such counsel, as and when incurred, shall be at the expense of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***}, as the case may be.

(d) ***[Executing Agency]*** shall be responsible for, release, hold harmless and indemnify the Concessionaire and the Concessionaire Related Parties on demand from and against, all suits, actions, claims, demands, losses, damages, fines, penalties, costs or any other liability incurred or suffered by the Concessionaire under Applicable Laws, or pursuant to the law of torts, principles of absolute liability or strict liability or polluter pays principle, as a result of any environmental pollution or health hazard caused by the quality of raw Sewage/Faecal Sludge/Septage which is delivered at the Facilities not pertaining to the Influent Standards, for which the Concessionaire was/is not partly/ wholly or directly/ indirectly responsible.

(e) Limitation of liability

(i) Notwithstanding anything to the contrary contained in this Contract, the maximum overall liability of any Party under this Agreement shall not exceed ***[Amount of Liability]***[60]

(ii) Provided that the limitation of liability set out in Clause 11.1(e) above shall not apply to the following:

(A) breach of Applicable Law and Applicable Permits;

(B) breach of any third-party Intellectual Property Rights;

(C) fraud and Wilful Misconduct;

[59]Contents in the curly parenthesis may be deleted if not applicable.
[60]Total agreed capital cost.

(D) gross negligence;
(E) damages to or loss of third-party property;

(F) damage caused to the environment;

(G) misrepresentation by the Concessionaire; and

(H) health hazard, bodily injury or loss of life.

(iii) The Parties agree and acknowledge that the provisions of this Clause 11.1(e) in respect of limitation and exclusion of liabilities is an agreed allocation of risk between the Parties, the sufficiency of which the Parties hereby agree and acknowledge.

(f) The provisions of this Clause 11.1 shall survive the termination of this Agreement.

11.2 Insurance

(a) The Concessionaire shall, obtain and maintain the policies of insurance set out below in the minimum coverage amounts and during the specified periods. In addition, the Concessionaire shall obtain any additional coverage required by Applicable Laws and/or deemed necessary by the Concessionaire, the Lenders or ***[Executing Agency]*** in accordance with this Clause 11.2.

Insurances during the Construction Period

During the Construction Period, the Concessionaire shall obtain and maintain such insurances for such maximum sums as may be required under the Financing Documents and Applicable Laws, and such insurances as may be necessary or prudent in accordance with Good Industry Practices.

Insurances during the O&M Period

During the O&M Period, the Concessionaire shall obtain and maintain insurance policies including but not limited to the following:

(i) loss, damage or destruction of the Facilities, at replacement value;

(ii) comprehensive third-party liability insurance including injury to or death of personnel of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***}[61] or others caused by the Project;

(iii) the Concessionaire's general liability arising out of the Project;

(iv) liability to third parties for goods or property damage;

[61]Delete if not applicable.

(v) workmen's compensation insurance; and

(vi) any other insurance that may be necessary to protect the Facilities, the Concessionaire and its employees, including for all Force Majeure Events that are insurable at commercially reasonable premiums and not otherwise covered in items (i) to (v) above.

(b) The level of insurance to be maintained by the Concessionaire after repayment of the Lenders' dues in full shall be determined on the same principles as applicable for determining the level of insurance prior to such repayment of the Lenders' dues, in accordance with the Financing Documents.

(c) The Concessionaire shall, within 30 (thirty) days of the Effective Date, provide a notice to ***[Executing Agency]***, setting out information in respect of the insurances that it proposes to effect and maintain. Within 15 (fifteen) days of receipt of such notice, ***[Executing Agency]*** may require the Concessionaire to effect and maintain such other insurances as it may deem necessary, and in the event of any difference or disagreement relating to any such insurance, the provisions of Article 21 (*Dispute Resolution*) shall apply.

(d) The Concessionaire shall purchase insurance from reputable Indian and/or international companies licensed to operate in India, at competitive terms, and shall maintain the insurances on terms consistent with Good Industry Practices. Within 15 (fifteen) days of obtaining any insurance cover, the Concessionaire shall furnish to ***[Executing Agency]***, notarised true copies of the certificate(s) of insurance, copies of insurance policies and premium payment receipts in respect of such insurance.

(e) Each insurance policy shall contain the following endorsements:

(i) ***[Executing Agency]*** shall be additional insured under all policies maintained by the Concessionaire in relation to the Site and the Project, against loss or damage;

(ii) the insurers shall waive all rights of subrogation against ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***}[62];

(iii) the insurance policy may not be cancelled or materially changed by the insurer without giving 45 (forty five) days' prior written notice, except in the case of non-payment, in which case it will be 10 (ten) days' prior written notice, to ***[Executing Agency]***; and

(iv) ***[Executing Agency]*** shall not be responsible for payment of any insurance premium.

(f) Any changes in the insurances which impact the Site, or the Project will need the prior written consent of ***[Executing Agency]***, which consent shall not be unreasonably withheld.

[62]Delete if not applicable.

(g) The Concessionaire shall apply proceeds from all insurance claims, except life and injury, for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the Facilities, and the balance remaining, if any, shall be applied in accordance with the provisions contained in this behalf in the Financing Documents.

(h) If the Concessionaire fails to procure or maintain any insurance required pursuant to this Clause 11.2 which is required to be obtained for the Site or the Project, ***[Executing Agency]*** shall have the right to procure and maintain such insurance in accordance with the requirements of this Clause 11.2 and charge the full cost thereof to the Concessionaire.

ARTICLE 12
CHANGE IN OWNERSHIP

12.1 Ownership Information

The Selected Bidder shall inform ***[Executing Agency]*** that it has caused the Concessionaire to be incorporated as a special purpose company to implement the Project and undertake other obligations of the Concessionaire under and in accordance with this Agreement. The shareholding pattern of the ***[Selected Bidder/Members]***[63] in the Concessionaire is as follows:

S. No.	Name of the shareholder	No. of shares held	Nature of the shares [Equity/ Preference]	Value of the shares held [INR]	Shareholding [in %]

The Concessionaire represents and warrants to ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***}[64] that no arrangements are in place that have resulted or may result in a breach of the change in ownership restrictions set out in Clause 12.2 below.

12.2 Change in Ownership Restrictions

(a) The Concessionaire shall ensure that the Selected Bidder holds at least 51% (fifty one per cent) of the total Capital and voting rights of the Concessionaire until the COD, and at least [26% (twenty six per cent)] of the total Capital and voting rights of the Concessionaire until [1 (one)] year after the COD.

After the expiry of [1 (one)] year from the COD, with the prior consent of the ***[Executing Agency]***, the Selected Bidder can exit the Concessionaire, subject to: (i) the entity acquiring the shareholding of the Selected Bidder in the Concessionaire meeting the O&M qualification criteria set out in the RFP; or (ii) the Concessionaire appointing an O&M contractor who complies with the technical qualification criteria set out in the RFP.][65]

(b) The Concessionaire shall ensure that the change in ownership restrictions set out in Clause 12.2(a) are incorporated in the articles of association of the Concessionaire.

(c) If, any Associate, whose credentials were taken into consideration for determining Technical Capacity, ceases or will cease to be an Associate of the ***[Selected Bidder/Member]***[66]***,*** then, the Concessionaire shall seek the approval of ***[Executing Agency]*** for such occurrence along with all relevant details. While ***[Executing Agency]*** shall not unreasonably withhold or delay such approval, the decision of ***[Executing***

[63] Delete Member if the Selected Bidder is a single entity.
[64] Delete if not applicable.
[65] This paragraph may be deleted if the Selected Bidder is a Consortium.
[66] Delete Member if the Selected Bidder is a single entity.

Agency] will be final in this regard. If ***[Executing Agency]*** is of the view that such occurrence is likely to affect the Technical Capacity of the Concessionaire to undertake the Project, then ***[Executing Agency]*** may treat such occurrence as a Concessionaire Event of Default, in which case the consequences set out in Article 16 shall follow.

(d) If, at any time after the expiry of [1 (one)] year from the COD, the ***[Selected Bidder/any Member]***[67]is proposed to be replaced by an entity that meets the O&M qualification criteria set out in the RFP or the Concessionaire proposes to appoint an O&M contractor to meet the change in ownership condition set out in Clause 12.2(a), then the Concessionaire shall submit a proposal to ***[Executing Agency]*** with details of the proposed shareholder/O&M contractor, for its approval. The proposal should demonstrate to the satisfaction of ***[Executing Agency]*** that the Concessionaire or the proposed O&M contractor meets the O&M qualification criteria specified in the RFP.

Within 15 (fifteen) days of receipt of a proposal from the Concessionaire, ***[Executing Agency]*** shall notify the Concessionaire of its approval or rejection (along with reasons) of the proposed shareholder/O&M contractor.

The approval of the proposed shareholder/O&M contractor by ***[Executing Agency]*** shall be at ***[Executing Agency]***'s sole discretion.

If ***[Executing Agency]*** does not notify its approval or rejection of the proposed shareholder/O&M contractor within 60 (sixty) days of the receipt of the proposal from the Concessionaire, then such proposed shareholder/O&M contractor will be deemed to be approved by ***[Executing Agency].***

[67] Delete Member if the Selected Bidder is a single entity.

ARTICLE 13
CHANGE IN LAW

13.1 Change in Law

The Concessionaire may claim the benefit of and/or relief for a Change in Law event subject to and in accordance with this Article 13.

13.2 Consequences of Change in Law

(a) The Concessionaire shall not be allowed any relief and/or compensation for any Change in Law which is not a: (i) Qualifying Change in Law; or (ii) Fundamental Change in Law.

(b) If a Qualifying Change in Law occurs, then the Concessionaire shall notify ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***}[68] of such Qualifying Change in Law along with details of:

(i) any necessary change in the Construction Plan, the O&M Manual or the Technical Specifications on the basis of which construction works and O&M services are required to be undertaken for the Facilities;

(ii) any changes that are required to the terms of this Agreement to deal with such Qualifying Change in Law;

(iii) any extension of the Scheduled Payment Milestone Completion Date or the Scheduled Construction Completion Date, to account for the delay, if any, resulting from the Qualifying Change in Law; and/or

(iv) any increase in Costs that will result from the Qualifying Change in Law.

(c) As soon as practicable and in any event, within 30 days from the receipt of any notice from the Concessionaire under Clause 13.2(b) above, the Parties shall agree on the consequences of the Qualifying Change in Law, as specified in the notice, and any way in which the Concessionaire can mitigate the effect of the Qualifying Change in Law, including:

(i) providing evidence that the Concessionaire has used reasonable endeavors (including, where practicable, the use of competitive quotes) to minimise any increase in Costs or oblige the Subcontractors to minimise any increase in Costs;

(ii) providing evidence as to how the Qualifying Change in Law has affected prices of materials used for construction or O&M of STP which are similar to the Facilities; and

(iii) demonstrating to ***[Executing Agency]*** {and ***[Name of the State / National Level***

[68]Contenets in curly parenthesis may be deleted if not applicable..

Agency, if any]} that the Qualifying Change in Law is the direct cause of the increase in Costs or delay and the estimated increase in Costs, or extension of time could not reasonably be expected to be mitigated or recovered by the Concessionaire.

(d) If the Parties fail to agree on the consequences of the Qualifying Change in Law within 30 days from the receipt of any notice from the Concessionaire under Clause 13.2(b) above, the dispute will be finally settled in accordance with the dispute resolution procedure set out in Article 21 (Dispute Resolution).

(e) If the Concessionaire has complied with Clause 13.2 (c) above and the Parties mutually agree or it is determined in accordance with Clause 13.2 (d) above, that the Concessionaire is required to incur additional Costs due to a Qualifying Change in Law, then:

(i) the Concessionaire shall be required to bear all Costs resulting from any one or more Qualifying Change in Law events, up to an aggregate amount equivalent to 0.5% of the total Bid Project Cost (Threshold Limit); and

(ii) for any additional Costs resulting from the Qualifying Change in Law, which is in excess of the Threshold Limit, the Concessionaire shall be entitled to be compensated for such additional Costs, in excess of the Threshold Limit, by way of,

(A) a lump-sum payment of an amount equivalent to the additional Costs incurred by the Concessionaire, over and above the Threshold Limit; or

(B) an appropriate adjustment in the O&M Charges.

(f) If the Concessionaire has complied with Clause 13.2(c) above and the Parties mutually agree or it is determined in accordance with Article 21 that the Concessionaire will suffer any delay as a result of the occurrence of a Qualifying Change in Law, then the Concessionaire shall be entitled to an extension of time in accordance with Clause 7.11(b).

(g) In case of a dispute with respect to the quantum of relief (whether extension of time or compensation) that the Concessionaire shall be entitled to under this Clause 13.2 shall be as agreed by the Parties or as determined in accordance with Article 21, provided always that:

(i) the Concessionaire shall bear any increased Cost to the extent of the Threshold Limit; and

(ii) the Concessionaire shall only be entitled to relief that is reasonable for such Qualifying Change in Law.

(h) Notwithstanding anything to the contrary in this Agreement, the Concessionaire shall not be entitled to any schedule relief and/or compensation or adjustment in the Bid

Project Cost or the O&M Charges due to a Qualifying Change in Law, if such Qualifying Change in Law becomes applicable as a result of a delay in the execution of the Project, which is not attributable to a Delay Event.

(i) If a Fundamental Change in Law occurs, then,

(i) the affected Party may notify the other Parties of the effects of such Fundamental Change in Law on the validity and enforceability of this Concession Agreement or on the rights of the Concessionaire under this Agreement; and

(ii) any Party may propose amendments to the Concession Agreement, which would make the Concession Agreement compliant with Applicable Laws, while enabling the Parties to achieve their commercial objectives.

If the Parties are unable to agree on necessary amendments to the terms of this Agreement within 30 days of receipt of a notice from the affected Party or the Fundamental Change in Law event is such that it cannot be mitigated with amendments to the terms of this Agreement, the Fundamental Change in Law event shall be treated as a Direct Political Force Majeure Event in accordance with Article 14.

ARTICLE 14
FORCE MAJEURE

14.1 Force Majeure Events

(a) A **Force Majeure Event** means any act, event or circumstance or a combination of acts, events or circumstances or the consequence(s) thereof occurring after the date of this Agreement, which is/are:

(i) beyond the reasonable control of the Affected Party;
(ii) such that the Affected Party is unable to overcome or prevent despite exercise of due care and diligence;
(iii) which does/do not result from the negligence of such Affected Party or the failure of such Affected Party to perform its obligations hereunder; and
(iv) such that it/they has/have a Material Adverse Effect.

(b) A Force Majeure Event means the following events and circumstances to the extent that they satisfy the conditions set out in Clause 14.1(a):

(i) Non-Political Force Majeure Events

(A) acts of God including storm, tempest, cyclone, hurricane, tsunami, flood, whirlwind, lightning, earthquake, washout, landslide, soil erosion, volcanic eruption, or extreme adverse weather or environmental conditions or actions of the elements;

(B) fire or explosion caused by reasons not attributable to the Concessionaire or any Concessionaire Related Parties;

(C) chemical or radioactive contamination or ionising radiation;

(D) epidemic, plague or quarantine;

(E) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; and

(F) accidents of navigation, air crash, shipwreck, train wreck or other similar failures of transportation of equipment and/or material necessary for construction or O&M of the Facilities.

Non-Political Force Majeure Event shall not include the following conditions, except to the extent resulting from a Non-Political Force Majeure Event:

(A) heavy rainfall;

(B) quantum of the Sewage/Faecal Sludge/Septage being more than the Design Capacity;

(C) characteristics of the Sewage/Faecal Sludge/Septage being beyond the Influent Standards;

(D) unavailability, late delivery or changes in cost of plant, machinery, equipment, materials or spare parts required for undertaking the Project;

(E) a delay in the performance of any Subcontractor;

(F) non-performance resulting from normal wear and tear; or

(G) non-performance caused by the non-performing Party's (I) negligent or intentional acts, errors or omissions, (II) failure to comply with the Applicable Laws or Applicable Permits, or (III) breach of, or default under, this Agreement, as the case may be.

(ii) Indirect Political Force Majeure Events

(A) hostilities (whether declared as war or not), riot, civil disturbance, revolution, rebellion, insurrection, act of terrorism, in each case involving the GoI or the Go***[XX]***[69] or occurring in ***[State of Location]***;

(B) invasion, armed conflict, coup d'état, act of foreign enemy, blockade, embargo, revolution, insurgency, nuclear blast/explosion, politically motivated sabotage, religious strife or civil commotion, in each case involving the GoI or the Go***[XX]*** or occurring in ***[State of Location]***;

(C) strikes or boycotts (including non-political strikes other than those involving the Concessionaire, Sub-Contractors or their respective employees/representatives, or attributable to any act or omission of any of them and the indirectpolitical strikes such as industry-wide or state-wide strikes), lockout, or other industrial disputes which are not directly attributable to the actions of the Affected Party;

(D) any orders issued by the relevant Government Authority, which require the Concessionaire to suspend the construction or O&M of the Facilities provided that, such orders are not attributable to the Concessionaire's breach or violation of any Applicable Laws or Applicable Permits; and

(E) delay or failure by relevant Government Authorities in renewing or granting any Applicable Permit, despite the Concessionaire having applied for such Applicable Permit expeditiously and complied with the requirements of Applicable Laws in making such application or the unlawful revocation of any Applicable Permit.

(iii) Direct Political Force Majeure Events

[69]Name of the State Government.

(A) occurrence of a Fundamental Change in Law in accordance with Clause 13.2(i);

(B) compulsory acquisition in national interest or expropriation of the Site; and

(C) any order, notification or judgement issued or passed by any Government Authority/ Court of Law/ Tribunal which restricts the Concessionaire from constructing or operating the Facilities as contemplated in this Agreement on the Site, unless such restriction is, in any manner, attributable to the Concessionaire.

(c) Without prejudice to the provisions of Clauses 14.1(a) or 14.1(b) above,

(i) any act, event or circumstance which primarily affects any of the Concessionaire Related Parties associated with the Project shall constitute a Force Majeure Event if and to the extent that it is of a kind or character that, if it had directly affected the Concessionaire, it would have come within the definition of Force Majeure Event under this Clause 14.1; and

(ii) any act, event or circumstance which primarily affects any of ***[Executing Agency]*** Related Parties {or the ***[Name of the State / National Level Agency, if any]*** Related Parties}[70] shall constitute a Force Majeure Event if and to the extent that it is of a kind or character that, if it had directly affected ***[Executing Agency]*** or {***[Name of the State / National Level Agency, if any]***}, it would have come within the definition of Force Majeure Event under this Clause 14.1.

(d) If the Parties are unable to agree in good faith on the occurrence or existence of a Force Majeure Event, such dispute shall be finally settled in accordance with the dispute resolution procedure set out in Article 21, provided however that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Affected Party.

14.2 Notice of Force Majeure Events

(a) The Affected Party shall give notice to the other Party in writing of the occurrence of any Force Majeure Event (the **FM Notice**), as soon as the same arises or as soon as reasonably practicable and in any event within 3 days after the Affected Party knew of its occurrence, the adverse effect it has or is likely to have on the performance of its obligations under this Agreement, the actions being taken and an estimate of the time period required to overcome the Force Majeure Event and/or its nature and effects (if it is possible to estimate the same).

(b) If, following the issue of the FM Notice, the Affected Party receives or becomes aware of any further information relating to the Force Majeure Event, it shall submit such further information to the other Party as soon as reasonably practicable.

(c) Any party claiming to have been affected by a Force Majeure Event shall not be entitled

[70]Contents in curly parenthesis may be deleted if found not applicable.

to any relief unless it has complied with all the provisions of this Clause 14.2.

14.3 Excuse of Performance

If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations to the extent it is unable to perform on account of such Force Majeure Event; provided that:

(a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;

(b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and

(c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

If a Force Majeure Event affects only one Facilities, and not the other Facilities, then the Affected Party shall only be excused from the performance of its obligations in relation to the affected Facilities.

14.4 No Liability for Other Losses

Save and except as expressly provided in this Agreement, no Party shall be liable in any manner whatsoever to the other Parties in respect of any loss relating to or arising out of the occurrence or existence of any Force Majeure Event or the exercise by it of any right pursuant to this Article 14.

14.5 Resumption of Performance

The Affected Party shall in consultation with the other Parties, make all reasonable efforts to limit or mitigate the effects of a Force Majeure Event on the performance of its obligations under this Agreement. The Affected Party shall also make efforts to resume performance of its obligations under this Agreement as soon as possible and upon resumption, shall notify the other Parties of the same in writing. The other Parties shall afford all reasonable assistance to the Affected Party in this regard.

14.6 Allocation of costs during a Force Majeure Event

(a) Upon occurrence of a Force Majeure Event prior to the COD, the Parties shall bear their respective Costs and no Party shall be required to pay any Costs to the other Parties.

(b) Upon occurrence of a Force Majeure Event after the COD, the costs incurred and

attributable to such event and directly relating to the Facilities (the "**Force Majeure Costs**") shall be allocated and paid as follows:

(i) upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure Costs and neither Party shall be required to pay to the other Party any costs thereof;

(ii) upon occurrence of an Indirect Political Event, all Force Majeure Costs attributable to such Indirect Political Event, and not exceeding the Insurance Cover for such Indirect Political Event, shall be borne by the Concessionaire, and to the extent Force Majeure Costs exceed such Insurance Cover, one half of such excess amount shall be reimbursed by the Authority to the Concessionaire; and

(iii) upon occurrence of a Political Event, all Force Majeure Costs attributable to such Political Event shall be reimbursed by the Authority to the Concessionaire.

Provided that upon occurrence of a Force Majeure Event post the COD, the Concessionaire shall be entitled to continue receiving the Capex Annuity (along with interest) and the O&M Charges during the subsistence of the Force Majeure Event.

(c) For avoidance of doubt, Force Majeure Costs may include interest payments on debt, O&M Charges, any increase in the cost of development, construction and operation and maintenance of the Facilities on account of inflation and all other costs directly attributable to the Force Majeure Event, but shall not include loss of Revenue, or debt repayment obligations, and for determining such costs, information contained in the Financial Package may be relied upon to the extent that such information is relevant.

(d) Save and except as expressly provided in this Article, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

14.7 Termination due to Force Majeure Event

(a) **Termination due to a Non-Political Force Majeure Event**

If within a continuous period of [365 (three hundred and sixty five)] days, a Non-Political Force Majeure Event continues for a period of [180 (one hundred and eighty)] days or more, after the notification of a Non-Political Force Majeure Event or any extended period agreed in pursuance of Clause 14.3, any Party shall, after the expiry of the period of [180 (one hundred and eighty)] days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

Notwithstanding anything contained in this Clause 14.7:

(i) if the ***[Location]*** Facilities are affected by a Total Casualty, then the Concessionaire may terminate this Agreement without having to wait for the expiry of the period of [180 (one hundred and eighty)] days stipulated for a Non-Political Force Majeure Event;

(ii) if the ***[Location]*** Facilities are affected by a Minor Casualty, then the Concessionaire shall be required to repair and restore the ***[Location]*** Facilities to the same condition as previously existed and the Concessionaire shall not be entitled to terminate this Agreement on the grounds of a continuing Non-Political Force Majeure Event.

(b) **Termination due to an Indirect Political Force Majeure Event**

If within a continuous period of [365 (three hundred and sixty five)] days, an Indirect Political Force Majeure Event continues for a period of [180 (one hundred and eighty)] days or more, after the notification of an Indirect Political Force Majeure Event or any extended period agreed in pursuance of Clause 14.3, any Party shall, after the expiry of the period of [180 (one hundred and eighty)] days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

(c) **Termination due to a Direct Political Force Majeure Event**

If within a continuous period of [365 (three hundred and sixty five)] days, an Direct Political Force Majeure Event continues for a period of [180 (one hundred and eighty)] days or more, after the notification of a Direct Political Force Majeure Event or any extended period agreed in pursuance of Clause 14.3, any Party shall, after the expiry of the period of [180 (one hundred and eighty)] days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

All the other consequences of termination that are set out at Article 17 shall apply in case of termination of this Agreement due to a Force Majeure Event.

ARTICLE 15
SUSPENSION

15.1 [Suspension by the Concessionaire

(a) Suspension of construction or O&M of the Facilities

(i) At any time during the Term, the Concessionaire may suspend, whether partially or wholly, the construction or O&M of any Facilities, in case of an Emergency.

(ii) The Concessionaire acknowledges that suspension of the construction of any Facilities during the Construction Period pursuant to Clause 15.1(a)(i) shall not entitle the Concessionaire to an extension of time, if such event is attributable to the Concessionaire.

(iii) In case of suspension of the performance of the O&M services of any Facilities pursuant to Clause 15.1(a)(i) for reasons attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, but not the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause 15.1(a)(i).

(iv) In case of suspension of the performance of the O&M services pursuant to Clause 15.1(a)(i) for reasons not attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, and the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause 15.1(a)(i).

(v) Upon the occurrence of an Emergency, the Concessionaire shall as soon as reasonably possible, and in no event later than 3 (three) days after such occurrence, notify ***[Executing Agency]*** of such occurrence.

(vi) If, upon notification, ***[Executing Agency]*** does not concur with the Concessionaire on the nature of such occurrence, then the Concessionaire shall be required to immediately re-commence the construction or O&M of the Facilities, as the case may be. Upon re-commencement of the construction or O&M services, the Concessionaire may initiate a Dispute regarding its claim for the occurrence of such an event or circumstance, and such Dispute shall be finally settled in accordance with the dispute resolution procedure set out in Article 21, provided however that the burden of proof as to the occurrence or existence of such an event shall be upon the Concessionaire.]

(b) Mitigation, Resumption and Termination

(i) The Concessionaire shall make best endeavors to:

(A) mitigate the effects (including incremental costs and delays) of the events or circumstances resulting in suspension pursuant to Clause 15.1(a)(i) above. Notwithstanding anything to the contrary contained in this

Agreement, if ***[Executing Agency],*** in its sole assessment, is not satisfied with the steps being taken by the Concessionaire to mitigate the effects of the Emergency, ***[Executing Agency]*** shall have the right to step-in to this Agreement and undertake necessary measures to mitigate the effect of the Emergency at the cost and risk of the Concessionaire; and

(B) resume the construction or O&M services of the Facilities within 24 hours of the ceasing of any of the events or circumstances resulting in suspension pursuant to Clause 15.1(a)(i) or such longer period as may be approved by ***[Executing Agency]*** and notify ***[Executing Agency]*** of the resumption of the works or services.

(ii) Without prejudice to Clause 15.1(b)(i):

(A) if suspension of the construction or O&M of a Facilities pursuant to Clause 15.1(a)(i) continues for a period of 60 days, and such event is attributable to the Concessionaire, then such suspension shall amount to a Concessionaire Event of Default in accordance with Clause 16.1; and

(B) if suspension of the construction or O&M of a Facilities pursuant to Clause 15.1(a)(i) continues for a period of 60 days, and such event is not attributable to the Concessionaire, then such event will be treated as a Force Majeure Event and the consequences set out in Article 14 shall apply.

15.2 Suspension by *[Executing Agency]*

(a) Suspension of construction and/or O&M of the Facilities

(i) At any time during the Term, ***[Executing Agency]*** may suspend, whether partially or wholly, the construction or O&M of a Facilities, in any of the following events or circumstances:

(A) upon the occurrence of an Emergency; or

(B) if the Concessionaire fails to comply with Applicable Laws, Applicable Permits, the ESHS Documents, the O&M Manual or otherwise fails to perform its obligations in accordance with this Agreement (including the Technical Specifications).

(ii) The Concessionaire acknowledges that suspension of the construction of the Facilities during the Construction Period pursuant to Clause 15.2(a)(i) shall not entitle the Concessionaire to an extension of time if such event is attributable to the Concessionaire.

(iii) In case of suspension of the performance of the O&M services pursuant to Clause 15.2(a)(i) for reasons attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, less the

Liquidated Damages payable by the Concessionaire for failure to operate the Facilities pursuant to Clause 15.2(a)(i). The Concessionaire shall not be entitled to the O&M Charges for the period during which it suspends the performance of the O&M services pursuant to Clause 15.2(a)(i).

(iv) In case of suspension of the performance of the O&M services pursuant to Clause 15.2(a)(i) for reasons not attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, and the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause 15.2(a)(i).

(b) Mitigation, Resumption and Termination

(i) The Concessionaire shall make best endeavors to:

(A) mitigate the effects (including incremental costs and delays) of the events or circumstances resulting in suspension pursuant to Clause 15.2(a) above. Notwithstanding anything to the contrary contained in this Agreement, if ***[Executing Agency]***, in its sole assessment, is not satisfied with the steps being taken by the Concessionaire to mitigate the effects of the Emergency, ***[Executing Agency]*** shall have the right to step-in to this Agreement and undertake necessary measures to mitigate the effect of the Emergency at the cost (as determined by the Project Engineer) and risk of the Concessionaire; and

(B) resume the construction or O&M services of the relevant Facilities within 24 hours of the ceasing of any of the events or circumstances resulting in suspension pursuant to Clause 15.2(a) or such longer period as may be agreed between the Parties, and notify ***[Executing Agency]*** of the resumption of the works or services.

(ii) Without prejudice to Clause 15.2(b)(i):

(A) if suspension of the construction or O&M of the relevant Facilities pursuant to Clause 15.2(a)(i)(A) and the Emergency is attributable to the Concessionaire, or a suspension pursuant to Clause 15.2(a)(i)(B), continues for a period of 60 days, and such suspension is attributable to the Concessionaire then such suspension shall amount to a Concessionaire Event of Default in accordance with Clause 16.1; and

(B) if suspension of the construction or O&M of the relevant Facilities pursuant to Clause 15.2(a)(i)(A) continues for a period of 60 days, and such suspension is not attributable to the Concessionaire, then such suspension will be treated as a Force Majeure Event and the consequences set out in Article 14 shall apply.

ARTICLE 16
EVENTS OF DEFAULT

16.1 Concessionaire Events of Default

A **Concessionaire Event of Default** means any of the following events arising out of any acts or omissions of the Concessionaire and which have not occurred solely as a consequence of a ***[Executing Agency]*** Event of Default,{an ***[Name of the State / National Level Agency, if any]*** Event of Default}, a Qualifying Change in Law, a Fundamental Change in Law or any other Force Majeure Event, and where the Concessionaire has failed to remedy the defects within any specified time period (to the extent any time period is provided):

(a) failure of the Concessionaire to complete the construction of a Facilities by the expiry of the Grace Period;

(b) failure of the Concessionaire to pay the Delay Liquidated Damages within the timelines specified in this Agreement;

(c) failure of the Concessionaire to achieve successful completion of Trial Operations of a Facilities in accordance with Clause 7.14;

(d) failure of the Concessionaire to remedy any reduction in Availability within 3 days of receipt of a notice from ***[Executing Agency]*** in accordance with Clause 8.12(a)(v);

(e) for any Facilities, failure of the Concessionaire to cure a Third Breach within 20 days from the Third Breach Notice or a failure to comply with the Discharge Standards results in occurrence of a Third Breach more than 3 times in a continuous 12 (twelve) month period, in accordance with Clause 8.12(b)(iii)(D);

(f) for any Facilities, failure of the Concessionaire to achieve the KPIs for 2 (two) consecutive days, 32 (thirty two) times in a continuous 12 (twelve) month period;

(g) for any Facilities, failure of the Concessionaire to achieve the KPIs for one day, 64 (sixty four) times in a continuous 12 (twelve) month period;

(h) suspension of the construction or O&M of a Facilities pursuant to Clause 15.1(a)(i) (to the extent such Emergency is attributable to the Concessionaire) for a continuous period of 60 (sixty) days;

(i) suspension of construction or O&M of a Facilities pursuant to Clause 15.2(a)(i)(A) (to the extent the Emergency is attributable to the Concessionaire) or a suspension pursuant to Clause 15.2(a)(i)(B), for a continuous period of 60 (sixty) days;

(j) a breach by the Concessionaire of its obligations under this Agreement which has a Material Adverse Effect on the ability of the Concessionaire to construct and/or operate and maintain the Facilities and such breach, if capable of being remedied, is not remedied within 30 (thirty) days of issuance of written notice from ***[Executing Agency]*** specifying such breach and requiring the Concessionaire to remedy the same;

(k) any representation made or warranties given by the Concessionaire under this Agreement being found to be false or misleading in any material respect;

(l) failure of the Concessionaire to submit and maintain a valid Performance Security in accordance with Clause 5.1 or a valid O&M Security in accordance with Clause 5.4;

(m) failure of the Concessionaire to maintain a valid Mobilization Advance Guarantee in accordance with Clause 5.21;

(n) breach by the Concessionaire of its obligations under Article 4, 10.2 or 23.12;

(o) breach of the Concessionaire's obligations under Article 12;

(p) failure of the Concessionaire to obtain, renew and maintain any Concessionaire Applicable Permit;

(q) failure of the Concessionaire to comply with any Applicable Law (including specifically the EPA);

(r) failure of the Concessionaire to obtain and maintain insurance cover in accordance with Clause 11.2;

(s) failure of the Concessionaire or the Subcontractors to comply with the ESHS Documents in accordance with Clause 7.4;

(t) (i) a resolution for insolvency of the Concessionaire is passed, or any petition for insolvency of the Concessionaire is initiated before a court (including tribunal) of competent jurisdiction in accordance with the provisions of Insolvency and Bankruptcy Code, 2016 and such application has not been withdrawn within 14 (fourteen) days of the date thereof;

(ii) if a trustee or receiver is appointed for the Concessionaire or for the whole or material part of its assets that has a material bearing on the Project;

(iii) a resolution for winding up of the Concessionaire is passed, or any petition for winding up of the Concessionaire is admitted by a court(including tribunal) of competent jurisdiction in accordance with the provisions of Insolvency and Bankruptcy Code, 2016 or Companies Act, 1956/Companies Act, 2013 and a liquidator or receiver is appointed and such order has not been set aside within 90(ninety) days of the date thereof or the Concessionaire is ordered to be wound up by Court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Concessionaire are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Concessionaire under this Agreement and the agreements in relation thereto; and provided that:

(A) the amalgamated or reconstructed entity has the capability and operating experience necessary for the performance of its obligations under this Agreement and the agreements in relation thereto; and

(B) the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and the agreements in relation thereto and has a credit worthiness at least as good as that of the Concessionaire as at the Effective Date; or

(u) the breach of the Concessionaire's obligations under or the occurrence of an 'event of default' or analogous event under the Financing Documents or the Escrow Agreement, or termination of the Financing Documents, or the Escrow Agreement (for reasons attributable to the Concessionaire).

(v) [failure of the Concessionaire to meet the obligations in Clause 3.2(d) and 3.2(e) of the RFP document.][71]

(w) [failure of the Concessionaire to meet the obligations in Clause 2.4(c) of this Concession Agreement.][72]

16.2 Notice of Intent to Terminate upon occurrence of a Concessionaire Event of Default

(a) Without prejudice to the other provisions of this Agreement, upon the occurrence of a Concessionaire Event of Default, ***[Executing Agency]*** may initiate termination by delivering a Notice of Intent to Terminate to the Concessionaire,{ with a copy to ***[Name of the State / National Level Agency, if any]***}[73]. The Notice of Intent to Terminate shall specify with reasonable detail the grounds on which termination is sought.

(b) If, within 60 days from the date of the Notice of Intent to Terminate, the Concessionaire rectifies or remedies the Event of Default to the satisfaction of ***[Executing Agency]*** or ***[Executing Agency]*** is satisfied with the steps taken or proposed to be taken by the Concessionaire or the Event of Default has ceased to exist, ***[Executing Agency]*** shall withdraw the Notice of Intent to Terminate, in writing.

(c) If, within 60 days from the date of the Notice of Intent to Terminate, the Concessionaire does not rectify or remedy the Event of Default to the satisfaction of ***[Executing Agency]*** or ***[Executing Agency]*** is not satisfied with the steps taken or proposed to be taken by the Concessionaire to remedy the Event of Default, ***[Executing Agency]*** shall issue a notice to the Lenders to exercise their substitution rights.

(d) If, within 60 days from the date of receipt of the Notice of Intent to Terminate pursuant to Clause 16.2(c) or such longer period as may be mutually agreed between ***[Executing Agency]*** and the Lenders, the Lenders have notified their intent to substitute the defaulting Concessionaire, then:

[71]To be deleted if not applicable
[72]To be deleted if not applicable
[73]To be deleted if not applicable.

(i) ***[Executing Agency]*** shall withdraw the Notice of Intent to Terminate, in writing, with a copy to the Lenders; and

(ii) the process set out in the Substitution Agreement for nomination and approval of a substitute concessionaire will apply.

(e) If, within 60 days from the date of receipt of the Notice of Intent to Terminate pursuant to Clause 16.2(c) or such longer period as may be mutually agreed between ***[Executing Agency]*** and the Lenders, the Lenders have not notified their intent to substitute the defaulting Concessionaire, then, ***[Executing Agency]*** shall terminate the Agreement and the consequences set out in Article 17 shall apply.

(f) Notwithstanding anything contained in this Clause 16.2, during the subsistence of a Concessionaire Event of Default, the Parties shall continue to perform such of their respective obligations under this Agreement, which are capable of being performed in accordance with this Agreement.

16.3 *[Executing Agency]*'s Events of Default

[Executing Agency]* Event of Default** means any of the following events, unless such an event has occurred as a consequence of a Concessionaire Event of Default, or a Force Majeure Event and where ***[Executing Agency] has failed to remedy the defects within any specified time period (to the extent any time period is provided):

(a) a breach by ***[Executing Agency]*** of Clause 23.12 (b);

(b) a breach by ***[Executing Agency]*** of its obligations under this Agreement which has a Material Adverse Effect on the ability of the Concessionaire to construct or operate and maintain a Facilities and such breach, if capable of being remedied, is not remedied within 30 (thirty) days of a notice being given by the Concessionaire;

(c) failure to achieve successful completion of Trial Operations due to the inadequate quantity or inferior quality of the Sewage/Faecal Sludge/Septage delivered to the relevant Facilities;

(d) a breach by ***[Executing Agency]*** of its obligations under Clause 7.8(g) or Clause 8.5(d), in relation to its rights, title and interest in the Site; or

(e) any representation made or warranties given by ***[Executing Agency]*** under this Agreement being found to be false or misleading in any material respect.

16.4 *[Name of the State / National Level Agency, if any]*'s[74] Events of Default

An ***[Name of the State / National Level Agency, if any]* Event of Default** means any of the following events, unless such an event has occurred as a consequence of a Concessionaire

[74]If not applicable the provisions under this Clause shall be added to the Executing Agency event default in Clause 16.3.

Event of Default, or a Force Majeure Event and where ***[Name of the State / National Level Agency, if any]*** has failed to remedy the defects within any specified time period (to the extent any time period is provided):

(a) a failure by ***[Name of the State / National Level Agency, if any]*** to pay any undisputed amounts due and payable for 90 consecutive days, notwithstanding service of a formal written demand by the Concessionaire;

(b) a failure by ***[Executing Agency]***/***[Name of the State / National Level Agency, if any]*** to maintain the Minimum Escrow Balance for a period of 90 (ninety) days;

(c) a breach by ***[Name of the State / National Level Agency, if any]*** of Clause 23.12 (b); or

(d) any representation made or warranties given by ***[Name of the State / National Level Agency, if any]*** under this Agreement being found to be false or misleading in any material respect.

16.5 Notice of Intent to Terminate upon occurrence of a *[Executing Agency]* Event of Default {or an *[Name of the State / National Level Agency, if any]* Event of Default}

(a) Without prejudice to the other provisions of this Agreement, upon the occurrence of a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default}[75], the Concessionaire may initiate termination of this Agreement by delivering a Notice of Intent to Terminate, which shall specify with reasonable detail the grounds on which termination is sought.

(b) If, within 60 days from the date of the Notice of Intent to Terminate, ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***, }as the case may be, rectifies or remedies ***[Executing Agency]*** Event of Default {or the ***[Name of the State / National Level Agency, if any]*** Event of Default,}[76] to the satisfaction of the Concessionaire or the Concessionaire is satisfied with steps taken or proposed to be taken by***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} or ***[Executing Agency]*** Event of Default {or the ***[Name of the State / National Level Agency, if any]*** Event of Default}, as the case may be, has ceased to exist, the Concessionaire shall withdraw the Notice of Intent to Terminate.

(c) If, within 60 days from the date of the Notice of Intent to Terminate, ***[Executing Agency]*** Event of Default {or the ***[Name of the State / National Level Agency, if any]*** Event of Default} has not been remedied or ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***, as the case may be}, has not taken steps or proposed to take steps to remedy ***[Executing Agency]*** Event of Default {or the ***[Name of the State / National Level Agency, if any]*** Event of Default} to the satisfaction of the Concessionaire, then the Concessionaire shall terminate the Agreement and the consequences set out in Article 17 shall follow.

[75]Contents in curly parenthesis may be deleted if not applicable.
[76]Contents in curly parenthesis may be deleted if not applicable.

(d) During the subsistence of a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default}, the Parties shall continue to perform such of their respective obligations under this Agreement, which are capable of being performed in accordance with this Agreement.

ARTICLE 17
CONSEQUENCES OF TERMINATION

17.1 Upon termination of this Agreement

(a) the Concessionaire shall cease all work in relation to construction of the Facilities and the Power Plant (if any);

(b) the Concessionaire shall cease all work in relation to O&M of the Facilities and the Power Plant (if any);

(c) the Concessionaire shall take all necessary steps to safeguard and protect the Facilities and the Power Plant (if any) (at whatever stage of completion or operation) and all other equipment, materials and goods on the Site;

(d) the Concessionaire shall hand over the Site, the Facilities and the Power Plant, if any, to ***[Executing Agency]*** or its nominee in accordance with the Hand-back Requirements set out in Clause 19.3, to the extent applicable; and

(e) in case of termination of this Agreement due to a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default,} ***[Executing Agency]*** shall return the Performance Security(ies), the O&M Security(ies) and the Mobilization Advance Guarantee(s), if not already returned to the Concessionaire, after adjusting any outstanding amounts owed by the Concessionaire, within 30 (thirty) days from the date of the Transfer Date.

17.2 Consequences of termination due to a Force Majeure Event

In case of termination of the Agreement due to a Force Majeure Event, the following consequences shall apply:

(a) the Concessionaire shall hand over the Site, the Facilities and the Power Plant, if any, to ***[Executing Agency]*** on an "as is where is" basis and to the extent relevant, in accordance with the Hand-back Requirements set out in Clause 19.3;

(b) ***[Executing Agency]*** shall be required to return the Mobilization Advance Guarantees, Performance Securities or the O&M Securities, as the case may be, after adjusting any outstanding amounts owed by the Concessionaire, within 30 (thirty) days from the date of the Transfer Date; and

(c) in case of termination due to an Indirect Political Force Majeure Event or a Direct Political Force Majeure Event, ***[Executing Agency]*** shall (or shall require the Project Engineer) to assess the Cost of the construction work undertaken by the Concessionaire in relation to the Facilities as on the date of the notice of termination under Clause 14.7 and based on such assessment, pay the Termination Compensation in accordance with Clause 18.4.

17.3 Accrued Rights and Liabilities

(a) Notwithstanding anything to the contrary contained in this Agreement, any termination of this Agreement shall be without prejudice to the accrued rights of a Party, including its right to claim and recover damages and other rights and remedies which it may have in law or contract. All accrued rights and obligations of a Party under this Agreement, including without limitation, all rights and obligations with respect to Termination Compensation, shall survive the termination of this Agreement, to the extent such survival is necessary for giving effect to such rights and obligations.

(b) Nothing in Article 16 or this Article 17 shall prevent or restrict a Party to seek injunctive relief or a decree of specific performance or other discretionary remedies of the court.

ARTICLE 18
TERMINATION COMPENSATION

18.1 Termination Compensation for Termination post the Effective Date but prior to the Construction Completion Date

(a) For a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default}

If the Agreement is terminated prior to the Construction Completion Date for a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default,}[77]***[Name of the State / National Level Agency, if any]***/***[Executing Agency]***[78] shall be liable to pay to the Concessionaire the aggregate of:

(i) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by ***[Executing Agency]*** as on the date of the Notice of Intent to Terminate;

(ii) Debt Due;

(iii) Equity infused in the Concessionaire as on the date of Notice of Intent to Terminate along with interest on the Equity at the rate of the prevailing SBI MCLR + 3%;

LESS

(iv) any unadjusted Mobilization Advance (and interest if any);

(v) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

(b) For a Concessionaire Event of Default

If the Agreement is terminated prior to the Construction Completion Date for a Concessionaire Event of Default, ***[Name of the State / National Level Agency, if any]*** / ***[Executing Agency]***[79] shall pay to the Concessionaire, the aggregate of:

(i) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by ***[Executing Agency]*** as on the date of the Notice of Intent to Terminate;

(ii) 85% of Debt Due;

LESS

[77]Contents in curly parenthesis may be deleted if not applicable.
[78]Delete whichever not applicable
[79]Delete whichever not applicable.

(iii) any unadjusted Mobilization Advance (and interest if any);

(iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

18.2 Termination Compensation for Termination post the Construction Completion Date but prior to the COD

(a) For a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default}[80]

If the Agreement is terminated post the Construction Completion Date but prior to the COD for a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default,} ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[81] shall be liable to pay to the Concessionaire the aggregate of:

(i) Construction Payments, if not already paid as on the date of the Notice of Intent to Terminate;

(ii) Debt Due or the percentage of the Bid Project Cost linked with each of the payment milestones, whichever is lower;[82]

(iii) Equity infused in the Concessionaire as on the date of Notice of Intent to Terminate along with interest on the Equity at the rate of the prevailing SBI MCLR + 3% (three percent);

LESS

(iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

(b) For a Concessionaire Event of Default

If the Agreement is terminated post the Construction Completion Date but prior to the COD for a Concessionaire Event of Default, ***[Name of the State / National Level Agency, if any]***/***[Executing Agency]***[83] shall pay to the Concessionaire, the aggregate of:

(i) Construction Payments, if not already paid as on the date of the Notice of Intent to Terminate;

(ii) 85% of Debt Due;

[80]Contents in curly parenthesis may be deleted if not applicable.
[81]Delete whichever is not applicable.
[82]For clarity – Among the aggregate, Debt Due or [x]% of the Bid Project Cost, whichever is lower" for each of the payment milestones shall be added; with [x]% being different for each payment milestone.
[83]Delete whichever is not applicable.

LESS

(iii) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

18.3 Termination Compensation for Termination post the COD

(a) For a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default}[84]

If the Agreement is terminated post the COD for a ***[Executing Agency]*** Event of Default {or an ***[Name of the State / National Level Agency, if any]*** Event of Default,} ***[Name of the State / National Level Agency, if any]***/***[Executing Agency]***[85] shall be liable to pay to the Concessionaire the aggregate of:

(i) Construction Payments that remain outstanding on the date of the Notice of Intent to Terminate;

(ii) O&M Payments due to the Concessionaire as on the date of the Notice of Intent to Terminate;

(iii) Capex Annuity for the unexpired portion of the O&M Period;

LESS

(iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages).

(b) For a Concessionaire Event of Default

If the Agreement is terminated post the COD for a Concessionaire Event of Default, ***[Name of the State / National Level Agency, if any]*** shall pay to the Concessionaire, the aggregate of:

(i) Construction Payments that remain outstanding on the date of the Notice of Intent to Terminate;

(ii) O&M Payments due to the Concessionaire as on the date of the Notice of Intent to Terminate;

(iii) Such percentage of Capex Annuity payments for post COD facilities for the unexpired portion of the O&M period as specified in Schedule 13;

LESS

[84]Contents in curly parenthesis may be deleted if not applicable.
[85]Delete whichever not applicable.

(iv) any amounts due and payable by the Concessionaire under this Agreement (including Availability Liquidated Damages).

18.4 Termination Compensation for Termination due to a Force Majeure Event

(a) Non-Political Force Majeure Event and Indirect Political Force Majeure

(i) If the Agreement is terminated due to an Indirect Political Force Majeure Event or Non-Political Force Majeure Event, prior to the COD:

(A) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by ***[Executing Agency]*** as on the date of the notice of termination under Article 14.7;

(B) Debt Due;

LESS

(C) any insurance proceeds received and retained by the Concessionaire

(ii) If the Agreement is terminated due to an Indirect Political Force Majeure Event or Non-Political Force Majeure Event, post the COD, ***[Name of the State / National Level Agency, if any]***/ ***[Executing Agency]***[86] shall be liable to pay to the Concessionaire:

(A) Construction Payments that remain outstanding on the date of the notice of termination in case of facilities under Article 14.7;

(B) O&M Payments due to the Concessionaire as on the date of the notice of termination under Article 14.7;

(C) Debt Due;

LESS

(D) any insurance proceeds received and retained by the Concessionaire.

(b) Direct Political Force Majeure

(i) If the Agreement is terminated due to a Direct Political Force Majeure Event, prior to the COD, ***[Name of the State / National Level Agency, if any]***/***[Executing Agency]***[87] shall be liable to pay to the Concessionaire:

(A) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by ***[Executing Agency]*** as on the date of the notice

[86]Delete whichever not applicable
[87]Delete whichever not applicable.

of termination under Clause 14.7;

(B) Debt Due;

(C) Equity infused in the Concessionaire as on the date of the notice of termination under Clause 14.7 along with interest on the Equity at the rate of the prevailing SBI MCLR + 3%;

LESS

(D) any unadjusted Mobilization Advance (and interest if any);

(E) any insurance proceeds received and retained by the Concessionaire; and

(F) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

(ii) If the Agreement is terminated due to a Direct Political Force Majeure Event post the COD, ***[Name of the State / National Level Agency, if any]***/***[Executing Agency]***[88] shall be liable to pay to the Concessionaire:

(A) Construction Payments that remain outstanding on the date of the notice of termination under Clause 14.7;
(B) O&M Payments due to the Concessionaire as on the date of the notice of termination under Clause 14.7;
(C) Capex Annuity for the unexpired portion of the O&M Period;

LESS

(D) any insurance proceeds received and retained by the Concessionaire; and

(E) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

18.5 All Termination Compensation required to be paid by ***[Name of the State / National Level Agency, if any]*** to the Concessionaire shall be paid within 60 (sixty) days of handover of the Site, the Facilities and the Power Plant, if any, to ***[Executing Agency]*** in accordance with Article 19.

18.6 Limitations on Termination Compensation

(a) Termination Compensation, due and payable under this Agreement shall be limited to the Debt Due and Adjusted Equity, as the case may be, which form part of the Bid Project Cost, in accordance with the provisions of this Agreement. For avoidance of

[88]Delete whichever not applicable.

doubt, it is agreed that within a period of [60 (sixty)] days from COD, the Concessionaire shall notify to the ***[Executing Agency]***, the Bid Project Cost and its disaggregation between Debt Due and Equity, and only the amounts so conveyed shall form the basis of computing Termination Compensation, and it is further agreed that in the event such disaggregation is not notified to the Authority, the Equity and Debt Due shall be arrived at by adopting the proportion between debt and equity as specified in the Financing Documents. The Parties also agree that, notwithstanding anything contained in this Agreement, for the purposes of computing Termination Compensation, the Debt Due shall at no time exceed [50% (fifty percent)] of the Bid Project Cost.

(b) The amount payable in respect of any Debt Due expressed in foreign currency shall be computed at the Reference Exchange Rate for conversion into the relevant foreign currency as on the date of Termination Compensation. Provided, however, that the provisions of this Article 18.6 (b) shall not apply if the Concessionaire does not notify the particulars of any foreign currency loans within [60 (sixty)] days of the date of conversion of such foreign currency loans into Indian currency. Provided further that all borrowings in foreign currency shall be restricted to the financing of the Bid Project Cost ad any borrowings in excess thereof shall not qualify for computation of Termination Compensation.

18.7 Full and Final Settlement

Notwithstanding anything to the contrary elsewhere in this Agreement, any Termination Compensation determined pursuant to this Article 18 shall, once paid, be in full and final settlement of any claim, demand and/or proceedings of the Concessionaire against{ ***[Name of the State / National Level Agency, if any]*** and}[89]***[Executing Agency]***, in relation to termination of this Agreement and the Concessionaire shall be excluded from all other rights and remedies in respect of such termination.

18.8 The provisions of this Article 18 shall survive the termination of this Agreement.

[89]Delete if not applicable.

ARTICLE 19
TRANSFER UPON THE EXPIRY OR ON TERMINATION

19.1 Transfer of the Site and the Facilities

Upon the expiry or early termination of this Agreement, the Concessionaire shall hand over the Site, the Facilities, and the Power Plant, if any, to ***[Executing Agency]*** or any other entity nominated by ***[Executing Agency]*** in accordance with this Article 19 on a date mutually decided by the ***[Executing Agency]***and the Concessionaire (the "**Transfer Date"**).

19.2 Inspection of the Site and the Facilities

(a) No later than 30 days from the end of the 14th(fourteenth) year of the O&M Period or 30 (thirty) days from the date of termination of the Agreement, as the case may be, ***[Executing Agency]*** shall or shall cause the Project Engineer to carry out a survey of the Site, the Facilities and the Power Plant, if any, to assess whether they have been maintained by the Concessionaire in accordance with its obligations under this Agreement, and are in working condition in line with the design life stipulated in the Technical Specifications.

(b) ***[Executing Agency]*** shall notify the Concessionaire at least 7 (seven) days prior to the date on which it wishes to carry out the survey of the Site, the Facilities and the Power Plant, if any.

(c) If the survey carried out by ***[Executing Agency]*** or the Project Engineer shows that the Concessionaire has not or is not complying with its obligations under this Agreement, then ***[Executing Agency]*** shall notify the Concessionaire of the rectification and/or maintenance work which is required to ensure that the condition of the Site, the Facilities and the Power Plant, if any, is restored to the Hand-back Conditions.

(d) The Concessionaire shall carry out such rectification and/or maintenance work to achieve the Hand-back Conditions within 30 (thirty) days from the receipt of a notice from ***[Executing Agency]*** in accordance with Clause 19.2(c) above, at its own cost and risk. Upon completion of the rectification and/or maintenance work, the Concessionaire shall request ***[Executing Agency]*** to carry out a final survey and inspection of the Site, the Facilities, and the Power Plant, if any. ***[Executing Agency]*** shall carry out the final survey within 7 (seven) days of receipt of a notice from the Concessionaire pursuant to this Clause 19.2(d).

If ***[Executing Agency]*** is satisfied with the results of the final survey, then ***[Executing Agency]*** shall notify the Concessionaire within 7 days of carrying out the final survey that the Site, the Facilities and the Power Plant, if any, comply with the Hand-back Conditions. If ***[Executing Agency]*** is not satisfied with the results of the final survey, then ***[Executing Agency]*** shall or shall cause the Project Engineer to estimate the cost of restoring the Site, the Facilities and/or the Power Plant, if any, to the Hand-back Conditions and recover such cost from the Concessionaire.

19.3 Hand-back Requirements

On the expiry or early termination of this Agreement, the Concessionaire shall, at its own cost:

(a) hand over to ***[Executing Agency]*** or any entity nominated by ***[Executing Agency]***, the Site, the Facilities and the Power Plant, if any;

(b) to the extent that such rights and interests are not already vested in ***[Executing Agency]***, transfer all its rights and interest in the assets comprising in the Facilities and the Power Plant, if any and execute such deeds and documents as may be necessary for this purpose and complete all related legal or other formalities;

(c) hand over all records and documents relating to the Site, the Facilities and the Power Plant, if any, including as-built records, Designs and Drawings, online monitoring and metering data, operating logs, manuals, reports, plans and records;

(d) transfer to ***[Executing Agency]*** or its nominee (free of cost) the license to use the Proposed Technology and other know-how relating to the Facilities and the Power Plant, if any;

(e) transfer or cause to be transferred to ***[Executing Agency]*** or its nominee any Subcontract that ***[Executing Agency]*** or its nominee has chosen to take over and terminate all other Subcontracts;

(f) transfer to ***[Executing Agency]*** or its nominee all Concessionaire Applicable Permits which ***[Executing Agency]*** or its nominee may require, and which can be legally transferred;

(g) remove from the Site all employees and workmen, and assets, equipment and materials that are not required to be taken over by ***[Executing Agency]*** or its nominee; and

(h) cooperate with and assist the ***[Executing Agency]***with theProject post the handing over.

19.4 The provisions of this Article 19 shall survive the termination of this Agreement.

ARTICLE 20
VARIATION

20.1 Both ***[Executing Agency]*** and the Concessionaire may, at any time during the Term, propose a Variation to the Scope of Work, Technical Specifications, and/or the Designs and Drawings.

20.2 ***[Executing Agency]*** **Proposed Variation**

(a) ***[Executing Agency]*** may propose a Variation in the Scope of Work, Technical Specifications or the approved Designs and Drawings. Provided that, ***[Executing Agency]*** shall not propose a Variation, which: (i) is not technically feasible; or (ii) is not in compliance with any Applicable Law or Applicable Permit.

(b) Within 15 (fifteen) days of receipt of a request for Variation from ***[Executing Agency],*** the Concessionaire shall submit a proposal to ***[Executing Agency]***(with a copy to the Project Engineer) setting out in sufficient detail the implications of the proposed Variation, including any implications on the Construction Plan, the Scheduled Milestone Completion Date, the Scheduled Construction Completion Date and Scope of Work and additional Costs incurred in undertaking the Variation or any reduction in Costs resulting from the Variation. It is clarified that the additional Costs incurred in undertaking the Variation or any reduction in Costs resulting from the Variation will be determined on the basis of ***[Executing Agency]***'s schedule of rates for similar worksapplicable at the time of undertaking such works.

(c) Notwithstanding anything to the contrary in this Clause 20.2, the Concessionaire shall have the right to reject a Variation proposed by ***[Executing Agency]*** if, in the Concessionaire's view, the proposed variation will result in: (i) the Concessionaire incurring additional Costs, of more than 25% of the Bid Project Cost of the Facilities; (ii) reduction in the Bid Project Cost of the Facilities by more than 25%; or (iii) a delay of more than 120 days in a Scheduled Milestone Completion Date or the Scheduled Construction Completion Date.

(d) Based on its review of the proposal submitted by the Concessionaire, ***[Executing Agency]*** may, at its sole discretion: (i) accept the proposal and the corresponding adjustment to the Construction Plan and/or the additional Costs or reduction in the Bid Project Cost for undertaking the Variation; (ii) provide its comments on the proposal seeking amendments and/or justification for the implications put forth by the Concessionaire; or (iii) reject the proposal submitted by the Concessionaire and withdraw the proposed Variation, within 15 (fifteen) days from the date of receipt of the Concessionaire's proposal under Clause 20.2(b) above.[90]

(e) To the extent ***[Executing Agency]*** seeks amendments and/or justification in the proposal submitted by the Concessionaire, the Concessionaire shall incorporate or address, in writing, ***[Executing Agency]***'s comments and submit a revised proposal.

[90]The Executing Agency may include athreshold amount for undertakingvariations upto which the costswould be borne by theConcessionaire, beyond which thecosts would be reimbursed by theExecuting Agency.

(f) On approval of the proposal or the revised proposal, as the case may be, ***[Executing Agency]*** shall issue a Variation Order and Concessionaire shall proceed with the Variation in accordance with the Variation Order.

(g) If the Parties are unable to agree on the implications of a Variation proposed by ***[Executing Agency]***, which in ***[Executing Agency]***'s view is necessary or desirable for the Project, ***[Executing Agency]*** shall have the right to require the Concessionaire to carry out the proposed variation at the cost determined in accordance with ***[Executing Agency]***'s schedule of rates for similar works. Where ***[Executing Agency]***'s schedule of rates do not provide schedule of rates for similar works, then the cost of the works covered by the proposed Variation will be determined by ***[Executing Agency]***, in consultation with the Project Engineer. Any dispute on the terms of the Variation will be resolved in accordance with Article 21.

(h) On implementation of a Variation Order, the Concessionaire shall be entitled to the agreed adjustment to the Construction Plan, Scheduled Milestone Completion Date, Scheduled Construction Completion Date and/or payment of additional amounts, if any, set out in the Variation Order.

20.3 Concessionaire Proposed Variation

(a) The Concessionaire may propose a Variation if it considers such Variation necessary or desirable to improve the efficiency, quality, reliability, durability, maintainability or safety of the Facilities.

(b) To propose a Variation, the Concessionaire shall submit a proposal to ***[Executing Agency]*** (with a copy to the Project Engineer), with a statement setting out:

(i) the need for a Variation;

(ii) the additional work required; and

(iii) adjustment to the Effective Date, Construction Plan, Scheduled Milestone Completion Date and Scheduled Construction Completion Date;

(c) Based on its review of the proposal submitted by the Concessionaire, if ***[Executing Agency]*** is of the view that the proposed Variation is justified, then it will determine the cost of the proposed Variation using ***[Executing Agency]***'s schedule of rates for similar works and where ***[Executing Agency]***'s schedule of rates do not provide schedule of rates for similar works, then the cost of the works covered by the proposed Variation will be determined by ***[Executing Agency]***, in consultation with the Project Engineer. Thereafter, ***[Executing Agency]*** shall notify the Concessionaire of the additional cost determined by ***[Executing Agency]*** for the proposed Variation and any other comments that ***[Executing Agency]*** may have on the implications of the proposed Variation. To the extent ***[Executing Agency]*** seeks amendments and/or justification in the proposal submitted by the Concessionaire, the Concessionaire shall incorporate or address, in writing, ***[Executing Agency]***'s comments.

(d) On the Concessionaire's acceptance of the costs determined by ***[Executing Agency]*** for the proposed Variation and any other amendments sought by ***[Executing Agency]*** to the Concessionaire's proposal, ***[Executing Agency]*** shall issue a Variation Order and Concessionaire shall proceed with the Variation in accordance with the Variation Order.

(e) On implementation of a Variation Order, the Concessionaire shall be entitled to the agreed adjustment in the Construction Plan and/or additional costs, as set out in the Variation Order.

20.4 To the extent of Variation in Scope of Work and Technical Specifications and Standards, the Concessionaire shall be obliged to implement the Project in accordance with the provisions set forth, *inter-alia*, in Articles 7 and 8 shall be applicable.

20.5 Pursuant to a Variation Order, if the Concessionairedoes not undertake additional works, the ***[Executing Agency]*** shall hold theright to undertake such additional works (by itself or through a contractor), at the cost of the Concessionaire.

20.6 Notwithstanding anything to the contrary in this Article 20, the Concessionaire shall be bound to implement any Variation that is necessitated by a Change in Law and any consequent adjustment in the Construction Plan and additional Costs shall be determined in accordance with Article 13.

20.7 Notwithstanding the above, a Variation made necessary due to any act, omission or default of the Concessionaire or any Subcontractor in the performance of the Concessionaire's obligations under this Agreement shall not entitle the Concessionaire to any adjustment in the Construction Plan or any other compensation or relief.

20.8 No Variation shall invalidate this Agreement.

ARTICLE 21
DISPUTE RESOLUTION

21.1. Amicable Resolution

(a) Save where expressly stated to the contrary in this Agreement, any dispute, difference or controversy of whatever nature between the Parties, howsoever arising under, out of or in relation to this Agreement, including those arising with regard to acts, decision or opinion of the ***[Executing Agency]*** (the "**Dispute**") and so notified in writing by either Party, shall in the first instance be attempted to be resolved amicably by the representatives of the Parties in accordance with the procedure set forth in Article 21.1(b) below.

(b) In the event of a Dispute, either Party may require such Dispute to be referred to the Competent ***[Executing Agency]***, the ***[Executing Agency]*** (or the Person holding charge) and the Chief Executive Officer of the Concessionaire for the time being, for amicable settlement. Upon such reference, the representatives of the Parties shall within 15 (fifteen) days of service of a written notice from one Party to the other Party(ies) (the **"Dispute Notice")** hold a meeting (the **"Dispute Meeting"**) in an effort to resolve the Dispute in good faith. In the absence of any agreement to the contrary, the Dispute Meeting shall be held at the office of the ***[Executing Agency]*** in [Location] and the Dispute may be mutually settled between the parties.

(c) The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

(d) If the Dispute is not amicably settled within 15 (fifteen) days of the Dispute Meeting, either Party may refer the Dispute to conciliation or arbitration in accordance with the provisions of Articles 21.2 and 21.3below.

21.2. Conciliation

In the event of any Dispute between the Parties, either Party may call upon the Project Engineer, as the case may be, to mediate and assist the Parties in arriving at an amicable settlement thereof. Failing mediation by the Project Engineer or without the intervention of the Project Engineer, as the case may be, either Party may require such Dispute to be referred to Principal Secretary to the ***[Executing Agency]*** and the Chairman of the Board of Directors of the Concessionaire for amicable settlement, and upon such reference, the said persons shall meet no later than [7 (seven)] days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the [7 (seven)] day period or the Dispute is not amicably settled within [15 (fifteen)] days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within [30 (thirty)] days of the notice in writing referred to in Article 21.1(a) or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the provisions of Article 21.3.

21.3. Arbitration

(a) Procedure

Subject to the provisions of Articles 21.1 and 21.2, any Dispute which is not resolved amicably shall be finally settled by reference to arbitration. Such arbitration shall be held in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi, or such other rules as may be mutually agreed by the parties, and shall be subject to the provisions of the Arbitration and Conciliation Act, 1996. The expenses of arbitration shall be borne equally by both the Parties.

(b) Arbitration Panel

There shall be a panel of three arbitrators, of whom each Party shall appoint one, and the third arbitrator shall be appointed by the two arbitrators so selected, and in the event of disagreement between the two arbitrators, the appointment shall be made in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi.

(c) Place of Arbitration

The place of arbitration shall ordinarily be [Location] but by agreement of the Parties, the arbitration hearings, if required, may be held elsewhere.

(d) Language

The request for arbitration, the answer to the request, the terms of reference, any written submissions, any orders and awards shall be in English and, if oral hearings take place, English shall be the language to be used in the hearings. Any party using other than English as language shall supply the other party an authorized transcript of true translation of its submissions into English at its costs and expenses.

(e) Enforcement of Award

(i) The arbitrators shall make a reasoned award (the "**Award**"). Any Award made in any arbitration held pursuant to this Article 39 shall be final and binding on the Parties as from the date it is made, and the Concessionaire and the ***[Executing Agency]*** agree and undertake to carry out such Award without delay subject to the rights of the aggrieved parties to secure relief from any higher forum.

(ii) The Concessionaire and the ***[Executing Agency]*** agree that an Award may be enforced against the Concessionaire and/or the ***[Executing Agency]***, as the case may be, and their respective assets wherever situated.

(iii) This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

21.4. Performance during Dispute

Pending the submission of and/or decision on a Dispute and until the arbitral Award is published, the Parties shall continue to perform their respective obligations under this

Agreement without prejudice to a final adjustment in accordance with such Award.

21.5. Adjudication by Regulatory *[Executing Agency]* or Commission

In the event of constitution of a statutory regulatory authority or commission with powers to adjudicate upon Disputes between the Concessionaire and the ***[Executing Agency]***, all Disputes arising after such constitution shall, instead of reference to arbitration under Article 21.3, be adjudicated upon by such regulatory authority or commission in accordance with the Applicable Law and all references to Dispute Resolution Procedure shall be construed accordingly. For the avoidance of doubt, the Parties hereto agree that the adjudication hereunder shall not be final and binding until an appeal against such adjudication has been decided by an appellate tribunal or High Court, as the case may be, or no such appeal has been preferred within the time specified in the Applicable Law.

ARTICLE 22
REPRESENTATIONS AND WARRANTIES

22.1 Mutual Representations and Warranties

Each Party represents and warrants to the other Parties that:

(a) it has full power and authority to execute, deliver and perform its obligations under this Agreement, the Substitution Agreement, the Escrow Agreement and any other agreements required in relation to the Project;

(b) it has taken all necessary action to authorise the execution, delivery and performance of this Agreement, the Substitution Agreement and the Escrow Agreement; and

(c) there are no actions, suits or proceedings pending or to its best knowledge, threatened against or affecting it before any court, administrative body or arbitral tribunal which might materially and adversely affect its ability to meet or perform any of its obligations under this Agreement, the Substitution Agreement or the Escrow Agreement.

22.2 Concessionaire's Representations and Warranties

The Concessionaire represents and warrants to ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***}[91] that:

(a) it is duly organized, validly existing and of good standing under the laws of India;

(b) it has the financial standing and capacity to design, finance, construct, complete, operate and maintain the Facilities in accordance with this Agreement;

(c) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with its terms, and its obligations under this Agreement will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;

(d) it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;

(e) the information furnished in the Bid of the Selected Bidder, and as updated on or before the date of this Agreement is true and accurate in all respects as on the Appointed Date as applicable;

(f) all undertakings and obligations of the Concessionaire arising from the {RFP/RFQ} or otherwise shall be binding on the Concessionaire as if they form part of this Agreement;

[91]Delete if not applicable.

(g) the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under any of the terms of its memorandum and articles of association/charter documents or any Applicable Laws or Applicable Permits or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;

(h) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of the GoI or the Go***[XX][92] [State of Location]*** which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;

(i) it has complied with all Applicable Laws and Applicable Permits in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities, which in the aggregate have or may have a Material Adverse Effect on its ability to perform its obligations under this Agreement;

(j) none of its employees, consultants, service providers, suppliers, or Subcontractors, including any O&M contractor, as of this day, have been engaged in any corrupt, fraudulent, collusive, coercive or obstructive practice, as defined in Clause 23.18; and

(k) no representation or warranty by it contained in this Agreement or in any other document furnished by it to ***[Executing Agency]***, ***[Name of the State / National Level Agency, if any]***, the GoI or the Go***[XX][93] [State of Location]*** in relation to Applicable Permits contains any untrue or misleading statement of material fact or omits to state a material fact necessary to make such representation or warranty.

22.3 *[Executing Agency]*'s Representations and Warranties

[Executing Agency] represents and warrants to the Concessionaire and ***[Name of the State / National Level Agency, if any]*** that:

(a) it is duly organized, validly existing and in good standing under the laws of India;

(b) it has the financial standing and legal capacity to execute this Agreement and perform its obligations under this Agreement;

(c) it has taken all necessary approvals to execute this Agreement (including any approval required under the ***[ACT APPLICABLE IN THE State of Location]*** Act) and perform its obligations under this Agreement;

(d) this Agreement constitutes legal, valid and binding obligations enforceable against it in accordance with the terms hereof;

[92]Name of the State Government.
[93]Name of the State Government.

(e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of the GoI or the Go***[XX[94]] [State of Location]***, which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement; and

(f) it has complied with all Applicable Laws and Applicable Permits in all material respects.

22.4 *[Name of the State / National Level Agency, if any]*'s[95] Representations and Warranties

[Name of the State / National Level Agency, if any] represents and warrants to the Concessionaire and ***[Executing Agency]*** that:

(a) it is duly organized, validly existing and in good standing under the laws of India;

(b) it has the financial standing and legal capacity to execute this Agreement and perform its obligations under this Agreement;

(c) it has taken all necessary approvals to execute this Agreement and perform its obligations under this Agreement;

(d) this Agreement constitutes legal, valid and binding obligations enforceable against it in accordance with the terms hereof;

(e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of the GoI or the Go***[XX] [State of Location]***, which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement; and

(f) it has complied with all Applicable Laws and Applicable Permits in all material respects.

[94]Name of the State Government.

[9595]If not applicable the representations and warranties shall be merged with that of the Executing Agency in Clause 22.3 and the Clause 22.4 may be deleted.

ARTICLE 23
MISCELLANEOUS

23.1 Survival

(a) Any cause or action which may have occurred in favour of any Party or any right which is vested in any Party under this Agreement as a result of any act, omission, deed, matter or thing done or omitted to be done by any Party before the expiry of the Term by efflux of time or otherwise in accordance with this Agreement, shall survive the expiry of the Agreement.

(b) The provisions of this Agreement, to the fullest extent necessary to give effect thereto, survive the Term or the termination of this Agreement and the obligations of Parties to be performed or discharged following the termination of this Agreement, shall accordingly be performed or discharged by the Parties.

23.2 Entire Agreement

The Parties hereto acknowledge, confirm and undertake that this Agreement and the RFP constitutes the entire understanding between the Parties regarding the development of the Project and supersedes all previous written or oral representations and/or arrangements regarding the Project.

23.3 Non-exhaustive Remedies

(a) Save and except as provided in this Agreement, the remedies available to the Concessionaire under this Agreement are not exhaustive and the Concessionaire and third parties shall be entitled to all other rights and remedies and to take all actions in law and in equity in addition to the remedies provided for herein.

(b) Save and except as provided in this Agreement, the exercise of any rights by any Party under this Agreement shall not preclude such Party from availing of any other rights or remedies that may be available to it under this Agreement or any other agreement in relation to the Project. All remedies available to the Parties shall be cumulative and the exercise or failure thereof of one or more remedies by any Party shall not limit or preclude the exercise of or constitute a waiver of any other remedies by such Party.

23.4 Notices

(a) Any notice or request in reference to this Agreement shall be written in English language and shall be sent by email, registered post, courier or facsimile and shall be directed to the other Parties at the address mentioned below:

***[Executing Agency]*:**
Attention:
Address:
Tel: [_____]
Fax: [_____]

Email: [_____]

[Name of the State / National Level Agency, if any][96]**:**
Attention: ----------
Address: ----------
Tel:
Fax:
Email:

Concessionaire:
Attention:[_____]
Address: [_____]
Tel: [_____]
Fax: [_____]
Email: [_____]

(b) Any notice or demand served by registered post or courier shall be deemed to be duly served 48 hours after posting and a notice or demand sent by facsimile shall be deemed to have been served at the time of its transmission and in proving service of the same it will be sufficient to prove, in the case of a letter, that such letter was sent by registered post or courier, addressed and placed in the post and in the case of a facsimile transmission, that such facsimile was duly transmitted to a current facsimile number of the addressee at the address referred above.

(c) Each Party may change the above address by prior written notice to the other Parties.

23.5 Governing Law and Jurisdiction

This Agreement shall be governed by the laws of India and shall be subject to the jurisdiction of the courts at ***[COURTS AS DECIDED BY THE EXECUTING AGENCY]***.

23.6 Counterparts

This Agreement may be executed in three counterparts, each of which, when executed and delivered, will be an original, and all three counterparts together shall constitute one and the same instrument.

23.7 Language

(a) The formal text of this Agreement and other agreements in relation to the Project shall be in the English language.

(b) All notices and communications between the Parties under this Agreement shall be in English and all arbitration proceedings undertaken pursuant to this Agreement shall be conducted in English.

[96]To be deleted if not applicable.

23.8 Confidentiality

(a) No recipient Party shall, without the prior written consent of the disclosing Party, at any time divulge or disclose or suffer or permit its representatives to divulge or disclose to any person or use for any purpose unconnected with the Project any Confidential Information during the Term and for a period of 5 years after the expiry or termination of this Agreement, except to its representatives officers, directors, advisors, employers, agents and Associates (including ***[Executing Agency]*** Related Parties, {the ***[Name of the State / National Level Agency, if any]*** Related Parties}[97] and the Concessionaire Related Parties) who have a legitimate need to know the Confidential Information in order to perform their duties relating to the Agreement.

(b) This Clause 23.8 shall not apply to Confidential Information, which:

(i) at the time of disclosure or thereafter has become part of public knowledge or literature without a breach of this Agreement;

(ii) is already in the possession of the Party receiving such Confidential Information before it was received from any other Party and which was not obtained under any obligation of confidentiality from the Party which disclosed such information;

(iii) was obtained from a third party (other than one disclosing it on behalf of a Party) who was free to divulge the same and who was not under any obligation of confidentiality in relation to such Confidential Information to the Party, which disclosed the information;

(iv) is disclosed by the Concessionaire to the Lenders, any actual or *bona fide* potential shareholders, investors or bankers (and their professional advisers) of the Concessionaire;

(v) is required to be disclosed pursuant to any legal and mandatory requirement of any court, legislative or administrative body or any Government Authority, or the rules of any applicable stock exchange;

(vi) is disclosed by the Concessionaire to its Associates or the permitted assignees and transferees;

(vii) is disclosed by the Concessionaire to any Subcontractor of the Concessionaire;

(viii) is disclosed to actual or prospective insurers, re-insurers and insurance brokers;

(ix) is disclosed to any professional advisors or consultants of any persons to whom a Party is entitled to disclose Confidential Information under this Clause 23.8(b);

(x) is disclosed to any Person in connection with the dispute resolution provisions

[97]To be deleted if not applicable.

under this Agreement;

(xi) is independently developed by the receiving Party without reliance on the Confidential Information disclosed by the disclosing Party; or

(xii) is disclosed to any Government Authority or any other body in any relevant jurisdiction in connection with the obtaining or renewal of any Applicable Permit required for the Project.

Provided that the Party making a disclosure of Confidential Information pursuant to (iv) and (vi) to (ix) (inclusive) above shall ensure that any Person to whom it makes such disclosure undertakes to hold such Confidential Information subject to the same confidentiality obligations as those set out in Clause 23.8(a) above.

(c) A Party making a disclosure of Confidential Information pursuant to Clause 23.8(a) shall,

(i) at the time of making such disclosure, inform its representatives and Associates of their obligation of confidentiality pursuant to this Agreement and ensure their compliance; and

(ii) be liable for any breach of such obligations by such representatives and Associates.

(d) In the event that a Party is required or requested to make a disclosure of Confidential Information referred to in Clause 23.8(b)(v) above, such Party shall prior to such disclosure (to the extent permissible by Applicable Law) use its best efforts to promptly notify the disclosing Party or its Associate so that appropriate protection order and/or other action can be taken if possible. In the absence of such a protection order restricting disclosure, the Party required to make such disclosure may disclose only that portion of the Confidential Information which it is legally required to disclose and shall use reasonable efforts to obtain assurances that confidential treatment will be accorded to the Confidential Information.

(e) The recipient party agrees that it, its Associates and representatives shall, upon request by the disclosing Party promptly:

(i) return, and use all reasonable endeavors to procure that any third party to whom the recipient party has disclosed the Confidential Information pursuant to this Agreement shall return, all the Confidential Information that is in tangible form (including, without limitation, Confidential Information contained on compact discs or other electronic storage media or devices) furnished, together with any copies or extracts; and

(ii) destroy, and use all reasonable endeavors to procure that any third party to whom the recipient party has disclosed the Confidential Information pursuant to this Agreement shall destroy, all analysis, compilations, studies or other documents which have been prepared and which reflect or refer to any Confidential

Information,

provided that the recipient party shall be entitled to retain such Confidential Information which forms part of the permanent records of the recipient party or its Associates and which was prepared for the purposes of the review or decision-making process of the recipient party or such Affiliate and/or which the recipient party or its Associates is required to retain by Applicable Law if it continues to keep such Confidential Information confidential in accordance with this Agreement.

23.9 Amendments

(a) Any provision of this Agreement may be amended, supplemented or modified only by an agreement in writing signed by all the Parties.

(b) A Party may at any time request the other to enter into discussions to review the operation of any part of this Agreement and, but without commitment by the other Parties, to determine whether it should be amended by mutual agreement provided that, unless there is such mutual agreement, the provisions of this Agreement (as then most recently, if at all, amended) shall continue to apply whatever the outcome of any such discussions or review and whether or not any such discussions or review take place.

23.10 Waivers and Consents

(a) Unless otherwise specified, any provision or breach of any provision of this Agreement may be waived before or after it occurs only if evidenced by an agreement in writing signed by the Parties.

(b) Any consent under or pursuant to any provision of this Agreement must also be in writing and given prior to the event, action or omission for which it is sought.

(c) Any such waiver or consent may be given subject to any conditions thought fit by the Party giving it and shall be effective only in the instance and for the purpose for which it is given.

23.11 Severability

(a) If any provision of this Agreement is or becomes illegal, invalid or unenforceable in any respect under any Applicable Law, the legality, validity or enforceability of the remaining provisions will not, in any way, be affected or impaired.

(b) The Parties shall negotiate in good faith with a view to agreeing one or more provisions which may be substituted for any such invalid, illegal or unenforceable provision and which produce as nearly as is practicable in all the circumstances the appropriate balance of the commercial interests of the Parties.

23.12 Assignment

(a) Except as expressly permitted in this Agreement, the Concessionaire shall not be

entitled to divest, transfer, assign or novate all or substantially all of its rights, interests, benefits and obligations under this Agreement, without the prior written consent of ***[Executing Agency]*** {and ***[Name of the State / National Level Agency, if any]***}[98].

(b) The rights and obligations of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} under this Agreement shall not be assigned, novated or otherwise transferred (whether by virtue of any Applicable Law or otherwise) to any Person other than a public body or a government company or a statutory corporation that:

(i) is a single entity;

(ii) acquires the whole of the Agreement;

(iii) has the legal capacity, power and authority to become a party to and to perform the obligations of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} under this Agreement, as the case may be; and

(iv) has sufficient financial standing or financial resources to perform the obligations of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} under this Agreement, as the case may be.

23.13 No Agency or Partnership

Nothing contained or implied in this Agreement shall constitute or be deemed to constitute a partnership or agency between the Parties and none of the Parties shall have any authority to bind, commit or make any representations on behalf of the other Parties.

23.14 Costs and Expenses

(a) Each Party shall be responsible for paying its own costs and expenses incurred in connection with the negotiation, preparation and execution of this Agreement, the Substitution Agreement and the Escrow Agreement.

(b) The Concessionaire shall bear the applicable stamp duty and registration fee (if applicable) in respect of this Agreement, the Substitution Agreement and the Escrow Agreement.

23.15 Reservation of Rights

No forbearance, indulgence, relaxation or inaction by the Concessionaire at any time to require performance of any of the provisions of this Agreement shall in any way affect, diminish or prejudice the right of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***}[99] to require performance of that provision, and no delay in exercising or omitting to exercise any right, power or remedy accruing to ***[Executing Agency]*** {or

[98]Contents in curly parenthesis may be deleted if not applicable.
[99]Contents in the curly parenthesis may be deleted if not applicable.

[Name of the State / National Level Agency, if any]} upon any default or otherwise under this Agreement shall impair any such right, power or remedy or shall be construed to be a waiver thereof or any acquiescence in such default, nor shall the action or inaction of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} in respect of any default or any acquiescence by it in any default, affect or impair any right, power or remedy of ***[Executing Agency]*** {or ***[Name of the State / National Level Agency, if any]***} in respect of any other default.

23.16 Third Parties

This Agreement and all rights hereunder are intended for the sole benefit of the Parties and, to the extent expressly provided, for the benefit of ***[Executing Agency]*** Related Parties, {***[Name of the State / National Level Agency, if any]*** Related Parties}, the Concessionaire Related Parties and the Lenders, and shall not imply or create any rights on the part of, or obligations to, any other Person.

23.17 Inspection and Audit

The Concessionaire shall permit and shall cause its Subcontractors and sub consultants to permit, {the ***[Name of the State / National Level Agency, if any]***}[100] / ***[Executing Agency]*** to inspect the Site and/or the accounts and records relating to the performance of the Contract and the submission of the Bid, and to have such accounts and records audited by auditors appointed by {***[Name of the State / National Level Agency, if any]***} / ***[Executing Agency]*** if requested by {***[Name of the State / National Level Agency, if any]*** /} ***[Executing Agency]***. The Concessionaire's and its Subcontractors' and sub consultants' attention is drawn to Clause 23.18 which provides, inter alia, that acts intended to materially impede the exercise of the ***[Name of the State / National Level Agency, if any]***[101] / ***[Executing Agency]***'s inspection and audit rights provided for under Sub-Clause 23.18.1 constitute a prohibited practice subject to contract termination.

[100]Contents in curly parenthesis may be deleted if not applicable.
[101]Delete if not applicable.

In witness whereof the Parties[102] hereto have signed this Agreement on this _____day of _____2020.

The Executing Agency – ***[Name of the EXECUTING AGENCY]***

By:

Name:

Title:

(***[Name of the State / National Level Agency, if any]***)[103]

By:

Name:

Title:

[***Insert name of the Concessionaire***] (CONCESSIONAIRE)

By:

Name:

Title:

[102] For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution.
[103] Delete if not applicable.

Schedule 1: Scope of Work

1. Scope of work of activities to be undertaken at every site

In general, the scope includes as a minimum but not limited to design, supply, construction, installation, testing & commissioning and operation,& maintenance of project infrastructure, as necessary.

Designing, part-financing, supplying, constructing, erecting, installing, testing, commissioning and completing the following project infrastructure works and facilities by the scheduled construction completion date and operating and maintaining the facilities and the associated infrastructure for [15 (fifteen)] years from the date of COD, in compliance to Applicable Laws, Applicable Permits, Technical Specifications, Designs and Drawings, the Construction Plan, the ESHS plan, the resource plan, mobilization plan of manpower, material & machinery, QA/QC plan and good industry practices to ensure compliance with the KPIs.

The works should be completed ina manner as desired by ExecutingAgency and their authorizedrepresentatives, as per standardengineering practices, ApplicableLaws, Applicable Permits andgoverning BIS codes or otherrelevant codes.The Concessionaire shall verify and satisfy themselves with their own reassessment of the engineering requirements as per actual site requirements to ensure smooth operation and maintenance of the entire infrastructure during the Concession Period and handing over all the assets in good operating condition at the end of Concession Period. The details provided below are only for guidance purpose.

Necessary permits, approvals required during construction and operation stage need to be obtained by the Concessionaire. Necessary field investigations such as topography survey, soil investigation and any other testing required to be carried out by the Concessionaire to validate the design basis and assumptions.

The sewage and treated sewage testing need to be carried out by the Concessionaire on a monthly basis at NABL accredited laboratory to validate the testing to be carried out on daily basis at the site level and the online parameters.

All the designs, drawings, specification need to be submitted to ***[Executing Agency]***for approval. All the works shall be carried out only with the approval of the ***[Executing Agency]***.

List of suggested vendors for equipments, materials,and machineries should be submitted by the Concessionaire to ***[Executing Agency]*** for approval and the procurement/placement of order should be carried out after approval of the ***[Executing Agency]***.

Appointment of subcontractors, agents, advisors and consultants and entering sub-contracts to undertake the project with the prior approval of the ***[Executing Agency]***. The Concessionaire shall operate and maintain the facilities and the associated infrastructure and treat the sewage in a manner such that the KPIs are achieved, and the treated effluent and digested sludge comply with the discharge standards.
The STP by-products and FSTP by-products will be trifurcated into screenings, digested

sludge,and residual grit. The Concessionaire will be required to dispose the STP by-products FSTP by-products as follows:

- The residual grit and the screenings will be disposed at the waste disposal site to be identified by the ***[Executing Agency]***within a radius of 10 (ten)kms from the Project site, in accordance with technical specifications.
- The Concessionaire shall dry the digested sludge at a sludge handling facility to be provided by the Concessionaire at the site and have the option to sell the digested sludge to farmers/other third-party buyers or dispose the digested sludge at the waste disposal site.
- The Concessionaire shall transfer the treated sewage/faecal sludge/septage through the treated effluent disposal pipeline/channel to the discharge point for discharge into the ----------(Name of the water body, if applicable), sell to third parties or utilize for irrigation purposes free of cost.

Indicative engineering assessment of work –*[Location]*

S. No.	Description	Quantity
1.	Design, supply, installation, testing, and commissioning of [Capacityin MLD]capacity **Sewage Treatment Plant(s)**at ***[Location(s)]***,and [Capacity in MLD] capacity **Faecal Sludge Treatment Plant(s)**at ***[Location(s)]***, complete including all civil works & electro-mechanical works by making necessary preparatory works to treat the sewage as per applicable disposal norms. The power generation using the by-product/biogas is mandatory. Civil works shall include site grading, dressing, excavation, filling, RCC foundations, plastering, painting, grill and gates, masonry compound wall, internal water supply, drainage, internal road of minimum ***[xx]*** m width and approach road of minimum ***[xx]***m width, street light, security guard room, footpath, landscaping and gardening, peripheral drainetc., Electro-mechanical works shall include design, supply, installation, testing, and commissioning of all electro-mechanical components of STP(s)/FSTP(s)including pumps, drive and drive controls- MCCs with local push button stations, tanks, pipelines, pipe fittings, valves and supports, all measuring instruments along with their power supply and instrument / signal cabling, power cabling, cable containments, earthing, firefighting system etc., and carry out the operation and maintenance of STP(s)/FSTP(s) for the Concession Period. Provision of Diesel Generator set and electric substation, internal and external electrification as per CPWD/applicable guidelines/codes. Design, supply and laying of RCC NP-3 treated effluent conduit from STP(s)/FSTP(s) to ***[Outlet Name]*** and discharge point must be designed considering the HFL. The HFL of ***[Outlet]*** is ***[xx]***m.	***[As decided by the Executing Agency]***

<table>
<tr><th>S. No.</th><th>Description</th><th>Quantity</th></tr>
<tr><td></td><td>Co-treatment of [xx]cum /day sewage/faecal sludge/septageat [Capacityof STP/FSTP plant in MLD] MLD STP/FSTP. And carry out operation and maintenance for theConcession Period.

Design and construct all necessary buildings for administrative, laboratory (supply of all necessary testing apparatus/equipments), PLC room, buildings for E&M equipment, security guard room, staff quarters with size and FSI as per the CPWD norms provided in “Revised Plinth Area Norms for General Pool Residential Accommodation (GPRA) to be constructed for Central Govt. Employees and its applicability to all Govt. Departments, MoUD”/[Executing Agency]standards and as necessary in the proposed STP/FSTP complex and carry out the operation and maintenance throughout the Concession Period.

<table>
<tr><th>S.no</th><th>Type of Quarter</th><th>No. of Quarters</th></tr>
<tr><td>1</td><td>A</td><td rowspan="4">[As per standards set by Executing Agency/MoHUA]</td></tr>
<tr><td>2</td><td>B</td></tr>
<tr><td>3</td><td>C</td></tr>
<tr><td>4</td><td>D</td></tr>
</table>
</td><td></td></tr>
<tr><td>2.</td><td>Design, supply, installation, testing and commissioning of Main Sewage pumping station of [Capacity OF STP/FSTP Plantin MLD]MLD capacity with necessary civil works, electro-mechanical items, including rising main and all standard accessories / fittings complete with fully automatic Y/D starters / VFD starters/ ATS starter panels (for both working and standby pumps), power backup, CI pipes & specials, level switches, earthing, cabling, structural supports / duck foot bends etc., as required as per site requirements, sanitary and plumbing works, cleaning of site and approach road, gate, peripheral drain, internal drainage, internal road, streetlight, plastering, painting, flooring, lights and fans, wiring, rubber mats in front of electrical switch boards/panel boards, first air boxes, firefighting system, voltage stabilizer etc. And carry out operation and maintenance for the Concession Period.

Provision of Diesel Generator set and electric substation, internal and external electrification as per CPWD/Applicable guidelines/codes.</td><td>[As decided by the Executing Agency]</td></tr>
<tr><td>3.</td><td>Design, supply, construction, testing & commissioning of civil, mechanical and electrical & instrumentation works for I&D worksat [name of the Drain(s)],as necessary and carry out the operation and maintenance for the Concession Period. The Concessionaire needs to install flow measurement instrument and actuator gates at I&D structure. Provision of manual and mechanical screen at each I&Ds.</td><td>[As decided by the Executing Agency]</td></tr>
</table>

<table>
<tr><th>S. No.</th><th>Description</th><th>Quantity</th></tr>
<tr><td>4.</td><td>Design, supply, construction of trapezoidal type RCC drain at upstream of each I&Ds and carry out operation and maintenance for the Concession Period.

<table><tr><th></th><th>I&D</th><th>Top width(m)</th><th>Bottom width (m)</th><th>Depth (m)</th><th>Length (m)</th></tr><tr><td>1.</td><td>[Name of the drain]</td><td>[xx]</td><td>[xx]</td><td>[xx]</td><td>[xx]</td></tr><tr><td>2.</td><td>[Name of the drain]</td><td>[xx]</td><td>[xx]</td><td>[xx]</td><td>[xx]</td></tr></table></td><td>[As decided by the Executing Agency]</td></tr>
<tr><td>5.</td><td>Design, supply, Laying of intercept sewer line from I&D to connecting manhole, intercept sewer shall be RCC NP-3 class complying to IS 458-2003 (up to date amendment) with rubber ring and complete including cutting of existing roads and restoration/ use of trenchless technology, excavation of earth to required depth(s), painting of the inside of pipes with 30/40 grade bitumen, providing new sewer pipes, reconnecting the removed connections, jointing of pipes, leak testing, backfilling the excavated trench, ramming, consolidating and bringing back the surface to original condition including black topping, shoring, shuttering etc. and testing, commissioning and carry out operation and maintenance. The pipe shall be ISI marked.

Providing and constructing brick masonry / RCC manhole for various depths and bringing back the surface to original condition including blacktopping, providing Gully chambers in appropriate places etc., and carry out the operation and maintenance for the Concession Period.

<table><tr><th></th><th>Location</th><th>No. of Manholes</th><th>NP3 Class Pipe (mm)</th><th>Length (m)</th></tr><tr><td>1</td><td>[Name of the drain]</td><td>[xx]</td><td>[xx]</td><td>[xx]</td></tr><tr><td>2</td><td>[Name of the drain]</td><td>[xx]</td><td>[xx]</td><td>[xx]</td></tr></table>
The intercept sewer shall be connected to the manholes of trunk sewer which is being laid by [Executing Agency]under [Name of Central Govt. Scheme/Other Convergance Project] project.</td><td>[As decided by the Executing Agency]</td></tr>
<tr><td>6.</td><td>Design and Construction of inlet works of [xx] MLD with distribution chamber designed to feed proposed [Capacityof the STP/FSTP Plant in MLD] MLD STP/FSTP. The Concessionaire needs to install flow measurement instrument and actuator gates at distribution structure. The process control of distribution</td><td>[As decided by the Executing</td></tr>
</table>

S. No.	Description	Quantity
	chamber shall be completely automated.	***Agency]***
7.	Design, supply, installation, testing and commissioning of all hardware and software items related to provision of Online Monitoring System at MPS, STP, FSTP and I&D for online real-time data transmission of various operating parameters from these proposed MPS/STP/FSTP/I&Ds to cloud-based web server over GSM / land telephony for monitoring from central office / sub-offices and by various authorized government agencies from fixed / portable devices / locations. The frequency of data storage for sewage / effluent quality shall be for every 2 hours and shall be to the nearest millisecond of each event. The Sequence-of -event (SOE) data shall be collected by the RTOLMS system from PLCs. The description of each event shall include the database description name, device state, the date, and the time (to the nearest millisecond) of each event. Information Storage and Retrieval (ISR) system shall collect and store analog data (telemetered and calculated) periodically at every 5 minute (configurable) and status data by exception.	***[As decided by the Executing Agency]***
8.	Any other works as necessary for smooth operation of the sewerage system	

2. Overview of procedural activities to be undertaken (Submissions by Concessionaire with timelines)

a) Submit Basic Engineering Drawings as defined in the Agreement;
b) Submit the Construction Plan for the for the Facilities and the Associated Infrastructure;
c) Carry out all preparatory work like survey & investigations, clearing out debris and proper disposal of the extra surplus excavated earth to a suitable location as per Applicable Laws;
d) Develop the site, landscaping, arboriculture, and horticulture at the STP/FSTP Site and by providing earth filling, greenery, plantation, and diversion & extension of stormwater drainage network, etc. and maintain condition of landscape establishment;
e) Design and construct all necessary buildings for administrative, laboratory, PLC room buildings for E&M equipment as per Technical Specifications;
f) Undertake electrical and instrumentation works as per provisions detailed in key single line diagrams and plant control configuration diagrams.
g) Provide electrical substation, as required, in accordance with the requirements of State power corporation limited;
h) Keep the Facilities in clean, hygienic, tidy and safe conditions;
i) Illuminate the STP/FSTP with suitable arrangement, as per the Technical Specifications;
j) Undertake trial runs, testing, commissioning of Facilities as per the requirements of Concession Agreement;
k) Based on its assessment of the power supply, make necessary arrangements, as required, to ensure continuous uninterrupted operations of the Facilities during any power supply failure from the grid;
l) Undertake Operations and Maintenance of Facilities as per Technical Specifications and safe disposal of Treated Effluent, STP By-Products and FSTP By-Products;
m) Develop and implement the environment, social, health and safety plans as per the requirements of the Concession Agreement;

n) Implement quality system and environmental management system in accordance with ISO 9001 and ISO 14001;
o) Prepare appropriate records and reports as outlined in the Concession Agreement;
p) Undertake security control of the Facilities
q) Carry out the required tests and laboratory analysis;
r) Obtain and renew licenses, permits,and certificates necessary to operate the Facilities;
s) Hand-back the Facilities and the Associated Infrastructure to the***[Executing Agency]*** at the end of the O&M Period;
t) Develop the necessary Design and Drawings and other submissions, as per the requirements of the Concession Agreement. These submissions, inter-alia are outlined in the table below:

Submissions required from the Concessionaire

Submission &timeline	**Descriptionofsubmission**
ConstructionPlanbefore effectiveness	DetailedconstructionplanfortheFacilitiesandtheAssociatedInfrastructuresettingoutheworkplantoachieveeachofthePaymentMilestones,suchthattheFacilitiesandtheAssociatedInfrastructurearecompletedonorpriortotheScheduledConstructionCompletionDate.Theshouldincludethefollowingsectionsattheminimum: • Sitemanpowerandlabormobilizationdetails.Detailsofprojectmanagementandhealth&safetypersonneltobedeployed at the site to be provided separately. • Detailed implementation schedule (including details of construction milestones) • Construction method statements • Details of civil works and equipment control • Quality assurance plans • Subcontractingdetails
Designs and Drawings before Effectiveness	Processdesignandcalculations: • Description of Proposed Technology including proposed treatment process, process design calculations,and mass balance diagrams • Hydraulic calculations and Hydraulic Flow Diagram • Details of the aeration device stating the turndown ratio • Details of the sludge digestion system stating maintenance mechanism from outside the digester (without draining its contents) • I&D design document Sitelayout • Facilities layout: general arrangement drawings for the buildings, tanks, foundations, process units, approach road, Inlet Point, Outlet Point • Alignment drawings for Effluent Disposal Pipeline • Location of site office, staff quarters, • Location of batching - plant, go-down / yard, store/workshop, etc. • Details of the stormwater drainage inside the STP/FSTP • Layout of the earthen embankment • I&D Layout drawing

Submission &timeline	Descriptionofsubmission
	ArchitecturalDesignsandConcepts • Architectural design proposals for interior and exterior architecture along with an appropriate landscaping scheme • Architectural statement explaining the factors considered in the design • Architectural work shall include walls, roof, flooring and floor finish, roof waterproofing, down water pipes, windows, ventilators, doors, glazing, equipment access doors, painting and other ornamentalworks Structuraldesignsandcalculations • Basic design calculations of foundations • General arrangement drawings and explanatory sketches • Methods statement describing work procedure before commencing concretework Power • Powersinglelinediagrams • Process data sheets to define design criteria, installed capacities and loading rates of principal items of plant and equipment • Control philosophy report • Electrical load list
	InstrumentationandControl • Process and Instrumentation Diagrams • Instrument schedule & I/O schedule for each Motor Control Centre • Functional Design Specification - Comprising an overall description of the plant, its functioning and control, and description of each section of the control system covering modes of operation, manual overrides, set-point and parameter selection and adjustment. It shall describe the 'fail-safe' features incorporated into the design for the event of failure of a plant item or system or loss of an input signal affecting a control loop or process sequence. It shall also describe control actions taken and monitoring functions which remain available during a power failure, and any automatic controls or sequencing which take place during system start-up and shut-down. It shall include figures or drawings where appropriate. • Drawings and schedules–Includingthefollowing- o Process and instrumentation diagram which shall comply with BS 1646 (all parts) and BS 1553-1:1977. o General arrangement drawings of field-mounted instruments showing installation details. o General arrangement drawings of instrument and control panels, fully-dimensioned in plan and elevation views, showing foundation and fixing details, access doors, clearances, cable-entry positions, weight and lifting arrangement. o Layout drawings of panel showing instruments, controls, and details of

Submission &timeline	Descriptionofsubmission
	all labels. o Layout drawings of panel interior showing equipment, terminal blocks & cableways. o Annunciator arrangement and engraving details. o Internal circuit and wiring diagrams for instrument and control panels. o Schematic control diagrams. o Instrument loop diagrams. o Instrument wiring and piping diagrams. o Interconnection wiring diagrams. o Cable block diagrams, drawings, and schedules. o Instrument system and panel power distribution diagrams. o Programmable-device functional design specifications which shall include hardware details, logic flow charts, ladder diagrams and program listings. o Schedules of inputs to and outputs from programmable controllers and telemetry outstations. o Labeling schedules. o Comprehensive testing schedules for all off-site, on-site, pre-commissioning and commissioning tests and take-over tests. o Drawings necessary for the provision of ducts, openings, trenches, fixing holes for panels etc. • Data and calculations o Manufacturer's catalogues and data sheets o Calculations to support control system design o Specificationforprotectivecoatingsandpainting • Certificates o Manufacturer's works tests o Pre-installation checks o Pressure-testing schedules o Instrument loop test check sheets o Installed instrument performance tests o System tests o Statutory certificates of compliance (such as hazardous area equipment) Pipework layout diagrams including all valves and penstocks Online Monitoring • SCADA/instrumentation/process control system architecture • Geotechnical analysis and topography survey report Topographical survey reports • Site details & topography of STP/FSTP Site, L-sections of channels & other works • Survey records, borehole records, and soil test reports

Submission &timeline	Descriptionofsubmission
	EHS Plan for Construction Period • Health and Safety Standards • Environmental and Social Management Plan Threshold Influent Standards proposed – which are the minimum standards, beyond the Influent Standards, that the Sewage must meet for it to be treated at the Facilities, in line with clause 7.2 (a) of the Concession Agreement.
DuringConstruction Period	Detailed construction design and drawings: Information on equipment during installation • Performance curves and drawings of equipment • Schedules of equipment • Quality plans for electrical, mechanical, instrumentation and SCADA works • Test and inspection certificates
Upon Construction Completion	As-Built Drawings • Final version of the design calculations • Key construction records and tests • Asset sheets
At least 30 (thirty) days prior to the Scheduled Construction Completion Date	O&M Manual including the following: • O&M Procedures o Overall description of permits and standards, operation,and control of Facilities and Associated Infrastructure, operation and control of sludge handling facilities, sampling and laboratory analysis, records and reporting, maintenance, emergency O&M procedures o Overall plan for O&M of the Facilities and Associated Infrastructure with due consideration to the reliability of performance, flexibility to cope with variability, diligence to maintain tidiness and cleanliness, capability to respond to emergency situations and effectiveness to handle complaints and to meet the KPIs; o Provision of spare parts and special tools with quantity and particulars throughout the O&M Period for effective and uninterrupted operation of the Facilities and Associated Infrastructure; o Sampling and testing methodologies to determine physical, chemical and biological characteristics of raw Sewage and Effluent Water as per CPHEEO manual; o Methodology for sampling and testing of heavy metals in line with the CPHEEO manual o Inventory control of consumables such as fuel, sand and various types of chemicals, dangerous goods and hazardous materials; o Safe and proper storage and transfer of various types of materials and chemicals, dangerous goods, and hazardous materials to assure the continuous operation of the Facilities and Associated Infrastructure, the

Submission &timeline	Descriptionofsubmission
	compliance with statutory requirements and avoidance of environmental nuisance; o Upkeep of the central control and monitoring system to ensure availability of reliable online and archived data o Arrangements for ensuring data security and integrity, and prevention of unauthorized alteration o Arrangements for data recovery in case of accidental loss of essential operational data o Arrangements for allowing flexibility of the computer database to store and process data upon introduction of new technologies and data management system o Preventative maintenance and corrective maintenance requirements o Precautionary measures and arrangements for inclement weathers o Procedures to record and handle complaints o Operational arrangements related to tests for KPIs o Procedures to prepare and submit routine records and reports to the ***[Executing Agency]*** • Operational Contingency Plan o Identification of potential problems that may cause disruptions to operation and assessment of potential impacts o Measures to handle potential problems and prevent disruptions to operation o Measures to handle emergency situations that may cause disruptions to operation and shutdown of the Facilities o Precautions and procedures to resume operation after addressing of the emergency situations; and o Fire and emergency drill plans • Human Resources Plan o Mobilization of labor for O&M o Means and flow of communication among field staff, staff at control rooms and truck drivers for disposal of the Digested Sludge; • Scheduled Maintenance Program for the first year post-COD • EmergencyProcedures for: o Fire o Vehicle breakdown and accidents o Facilities closure o Procedure to handle excessive incoming Sewage due to rain, storm or infiltration o Floods o Inclement weather conditions o Unscheduled and Forced Outage

Submission &timeline	Descriptionofsubmission
	○ Spillage of chemicals ○ Labor disputes • Asset Management Plan: ○ Composite manual describing the functions and operations of each equipment ○ Composite manual for testing and servicing every system and individual item ○ Assets overview ▪ description of various components of the Facilities and Associated Infrastructure ▪ dependencies between the components ▪ asset management strategy ○ Systemperformance ▪ design lives of plant, buildings, and structures; ▪ benchmarks, standards and guidelines adopted for performance tests, ▪ condition surveys and residual life assessments; ○ Asset remediation plans ▪ schedules for overhaul and replacement of plant ▪ schedules for refurbishment and renewal planned actions to bring or keep the assets above their minimum ▪ conditions required under the Concession Agreement ○ Operational arrangements related to the survey of the Hand-back Conditions EHS Plan: • Waste (Screenings & Grit and other waste) management plan • Sludge management plan, including a strategy and improvement measures and actions to treat and dispose of sludge, including sludge valorization opportunities in compliance with applicable standards • Health and safety standards ○ Hazardous material management plan ○ Health and safety requirements to be followed by staff & sub-contractors ○ Traffic management plan during construction ○ Identification, elimination, and mitigation of safety and health risks ○ associated with the O&M of the Facilities and Associated Infrastructure; • Environmental and social management system ○ Pollution prevention plan (water, air, noise) ○ Procedures, plans, and actions to achieve compliance with the requirements of the Concession Agreement; ○ Measures to enhance and sustain the good image of the Facilities and the Associated Infrastructure ○ Plan for maintaining good communication and relationship with all stakeholders

Submission &timeline	Descriptionofsubmission
	Guaranteed Energy Consumption in the format provided in the table below (refer to clause 9.4 (e) (ii) (C)). The figures presented in the last column (which corresponds to peak flow) should be equal to those quoted in the Financial Proposal.
O&M Period	Annual scheduled maintenance program every year

Part C - Overview of SCADA system to be employed

The schematic representation of the required RTOLMS architecture to be provided by the bidder as part of Basic engineering package to meet the KPI requirements as per schedule 1 and 10.

Typical parameter and relayed to control monitoring station

Parameters	Description of soft signal	Main pumping station		STP			I&D & distribution	Bio gas generation	Septage handling system	Bio gas DG set
		Sump / collection well	Pumps	Sump / collection well	Pumps	Other equipment's				
Date & Time	Real time	□	□	□	□	□	□	□	□	□
Liquid Level	High	□		□			□			
	Low	□		□			□			
Liquid flow	Inlet flow measurement			□			□		□	
Sewage quality	pH, TOC bases BOD and COD, TSS, TP, TN and residual chloride			□						
Pump status for individual pumps	On, OFF, Trip		□		□	□				
Flow rate in common	Flow rate, head		□		□					

Parameters	Description of soft signal	Main pumping station		STP			I&D & distribution	Bio gas generation	Septage handling system	Bio gas DG set
		Sump / collection well	Pumps	Sump / collection well	Pumps	Other equipment's				
header										
Electrical parameter for individual pumps & main switch board	Voltage, Current, KWH, PF, KVA		□		□	□				
No of operating personnel			□		□	□		□		
Temperature - Ambient, liquid		□	□							
Bio gas monitoring	Online status for various activity							□		
Gas generation	Cum / day, cumulative gas generation, gas quality							□		
Septage handling monitoring	Online status for various activity								□	
Septage treatment	Cum / day,								□	

Parameters	Description of soft signal	Main pumping station		STP			I&D & distribution	Bio gas generation	Septage handling system	Bio gas DG set
		Sump / collection well	Pumps	Sump / collection well	Pumps	Other equipment's				
	cumulative septage received, quality									
DG set running hours										
Electrical parameter for individual Bio gas-based engine generator, DG set pumps & main switch board	Voltage, Current, KWH, PF, KVA									

Note:

- *For flow measurement at I&D, the Concessionaire is free adopt any available flow measuring instruments with compatibility for online monitoring*

SCHEDULE 2: SUBSTITUTION AGREEMENT

[on appropriate stamp paper]

This Substitution Agreement (**Substitution Agreement**) is executed on this [●] day of [●] 2019 at [***Location]***:

AMONGST

(1) ***[Executing Agency],*** a statutory body constituted under the ***[Act under which the Executing Agency is established]*** with its registered office at ***[Address of Executing Agency]***. (hereinafter referred to as ***[Executing Agency]***, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(2) [Name of the State / National Level Agency, if any][1], a statutory body constituted ----------, with its registered office at ---------- (hereinafter referred to as ---------, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(3) [_____[***insert name of the Concessionaire***], a company organized, incorporated, registered and existing under the Companies Act, with its registered office at _____ [***insert address***] acting through _____, _____ [***insert name of the authorised signatory and his/her designation***] duly authorized by resolution dated _____ ***[insert date of the Board Resolution***] (hereinafter referred to as the **Concessionaire**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(4) [***Insert name of the Lenders' Representative***] a company organized, incorporated, registeredand existing under the Companies Act, with its registered office at**[*insert address*]**(hereinafter referred to as the Lenders' Representative, which expression shall, unless it be repugnant to the context having its registered office at **[*insert address*]**, [acting for itself and for and on behalf of the Lenders listed in Annexure 1].

The ***[Executing Agency]***, (Name of the National/State Level Agency, if any), the Concessionaire and the Lenders' Representative are hereinafter collectivelyreferred to as **Parties** and individually as **Party**.

WHEREAS:

A. With a view to implement ---------(Name of the Projects/scheme), the ***[Executing Agency]*** in association with (Name of the National/State Level Agency, if any), has decided to undertake

[1] If there is a State Level/National Level intermediate agency funding the project and such an entity is part of the contract/procurement process the name of that agency can be inserted here. Otherwise all references to the National/State Level agency in the document are to be deleted.

integrated development, operation and maintenance of Sewage Treatment Plant(s) (the **"STP"**) and Faecal Sludge Management System, with a proposed Design Capacity of ***[Capacity of STP in MLD]*** MLD of STP and [***Capacity of FSTP in MLD***] MLD of Faecal Sludge Treatment Plant(s) (the **"FSTP"**), along with other Facilities and its Associated Infrastructure at ***[Location]***, on a PPP basis, through a hybrid annuity model.

B. For this purpose, the ***[Executing Agency]*** selected the Concessionaire post a bid process to: (i) design, develop,part-finance, construct, operate and maintain the Facilities on the Site and the Associated Infrastructure, and after the expiry of the Term, transfer the Facilities and the Associated Infrastructure to the ***[Executing Agency]*** (collectively the **"Project"**).

C. The ***[Executing Agency]***, (Name of the National/State Level Agency, if any) and the Concessionaire executed a Concession Agreement dated [Insert date] to implement the Project (the **"Concession Agreement"**).

D. The Lenders have agreed to finance the Project in accordance with the terms and conditions of the Financing Documents and have requested the ***[Executing Agency]*** and (Name of the National/State Level Agency, if any) to enter into this Substitution Agreement for securing their interests through substitution of the Concessionaire to a nominated Company, in accordance with this Substitution Agreement.

E. The Parties have agreed to execute this Substitution Agreement on the terms and conditions mentioned herein below.

IT IS AGREED as follows:

1. DEFINITIONS AND INTERPRETATION

1.1. Definitions

The capitalised terms used but not defined in this Agreement shall have the meaning ascribed to them in the Concession Agreement:

Annexure	means an annexure to this Substitution Agreement.
Arbitration	has the meaning ascribed to it in Clause 8.2
Article	means an article of this Substitution Agreement.
Clause	means a clause of this Substitution Agreement.
Companies Act	means the (Indian) Companies Act, 1956 or the (Indian) Companies Act, 2013, as amended from time to time, as the context may require.
Company	means a company incorporated under the Companies Act or a foreign company incorporated under the relevant statute of its jurisdiction.
Concession Agreement	has the meaning ascribed to it in Recital C.
Concession Event of Default	means a Concessionaire Event of Default as defined under the Concession Agreement
Dispute	means any difference or dispute of whatsoever nature relating to this Substitution Agreement between the Parties arising under, out of or in connection with this Substitution Agreement.
Financial Assistance	means all funded and non-funded financial assistance, including

	loans, advances and guarantees or any re-financing that the Concessionaire has availed of for the Project from the Lenders, as set out in the Financing Documents.
Financial Default	means a Concessionaire event of default as set out under the financing Documents.
Financing Documents	means, collectively, the documents entered into or to be entered into by the Concessionaire with the Lenders, in respect of all funded and non-funded financial assistance, including loans, advances and or any re-financing that the Concessionaire may avail of for the Project from the Lenders and includes any document providing Security to the Lenders.
Indemnified Party	has the meaning ascribed to it in Clause 7.2.
Indemnifying Party	has the meaning ascribed to it in Clause 7.2.
Lenders	means the financial institutions set out in Annexure 1.
Lenders' Dues	means the aggregate of all monies owed by the Concessionaire to the Lenders under the Financing Documents on account of principal thereunder for funding the whole or any part of the cost to be incurred for implementing the Project and all accrued interest, additional interest, liquidated damages, commitment fees, commission, prepayment premium, costs, charges and other monies including financing charges and fees owed by the Concessionaire to the Lenders under the Financing Documents for the Project that are payable under the Financing Documents, up to the date of the Notice of Intent to Terminate or notice of termination issued under the Concession Agreement, or up to the date of issuance of the Notice of Financial Default under the Financial Documents, as the case may be.
Notice of Dispute	has the meaning ascribed to it in Clause 8.1.
Notice of Financial Default	has the meaning ascribed to it in Clause 3.2(a).
Notice of Intent to Terminate	means a notice issued by the ***[Executing Agency]***upon occurrence of a Concessionaire Event of Default in accordance with the Concession Agreement, conveying its intention to terminate the Concession Agreement.
Person	means any individual, company, corporation, partnership, joint venture, trust, society, sole proprietor, limited liability partnership, co-operative society, government company, unincorporated organization or any other legal entity.
Project	has the meaning ascribed to it in Recital B.
Proposal	shall have the meaning ascribed to it in Clause 4.1(c).
RFP	means the request for proposal dated [insert date] issued by the ***[Executing Agency]***, for conducting a bid process to implement the Project.
Selectee	means a new Company proposed by the Lenders pursuant to this Substitution Agreement for performing the rights and obligations of the Concessionaire for the remaining Term of

	the Concession Agreement.
Substitution notice under Concession Agreement	has meaning ascribed to it in Clause 3.3(c).
Substitution	has meaning ascribed to it in Clause 3.3 (b)

1.2. Interpretation

In this Substitution Agreement, unless the context otherwise requires:

(a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.

(b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.

(c) Headings in this Substitution Agreement are for convenience of reference only.

(d) The references to the word 'include' or 'including' or to the phrase 'in particular', shallbe construed without limitation.

(e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.

(f) The references to any agreement or deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.

(g) A requirement that a payment be made on a day which is not a Business Day shall be construed as a requirement that the payment be made on the next Business Day.

(h) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing and the words 'notify', 'endorse', 'approve', 'permit', 'certify' or 'determine' shall be construed accordingly. Where any notice, consent or approval is to be givenby either of the Parties, the notice, consent or approval shall be given on their behalf only by any authorized persons.

(i) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.

(j) The provisions of the Articles, Clauses and Annexures of this Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the Articles, Clauses or Annexures.

(k) In the event of any ambiguities or discrepancies between two Clauses of this

Agreement, the provisions of the specific Clause relevant to the issue under consideration shall prevail over those in other Clauses.

(l) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Agreement.

2. ASSIGNMENT

The Concessionaire hereby agrees to assign its rights, title and interest under the Concession Agreement to and in favour of the Lenders pursuant to and in accordance with this Substitution Agreement and the Concession Agreement by way of Security in respect of the Financial Assistance provided by the Lenders.

The***[Executing Agency]{***and (Name of the National/State Level Agency, if any)}[2] hereby consent to assignment by the Concessionaire of its rights, title and interest under the Concession Agreement by way of Security to and in favour of the Lenders in connection with the Financial Assistance provided by the Lenders.

3. SUBSTITUTION OF THE CONCESSIONAIRE

3.1. Right of Substitution

(a) The ***[Executing Agency]*** and {(Name of the National/State Level Agency, if any)} hereby irrevocably agree to substitute the Concessionaire with a Selectee, selected by the Lenders in accordance with the provisions of this Substitution Agreement and approved by the ***[Executing Agency]***,

(b) The Lenders shall, at their sole discretion, exercise one of the 2 (two) modes below for substituting the Concessionaire in accordance with the provisions set out in this Agreement and Applicable Laws:

(i) Novation: In this case, the Concession Agreement will be novated in favour of the Selectee. , and the Selectee will be a party to the Concession Agreement;

or

(ii) Share sale: In this case, the Selectee will acquire the entire Capital of the Concessionaire, and upon such transfer, the 'Concessionaire' will be deemed to be the Selectee under and in accordance with this Agreement.

(c) The ***[Executing Agency]***{and (Name of the National/State Level Agency, if any)} agree that they shall provide all necessary consents and assistance to effect such substitution of the Concessionaire with a Selectee.

(d) It is clarified that nothing contained herein shall entitle the Lenders to design, develop, construct, rehabilitate, complete, operate or maintain the Facilities or the Associated Infrastructure themselves under and in accordance with the Concession Agreement either individually or collectively

[2] Contents in curly parenthesis may be deleted if not applicable.

3.2. Procedure in case of a Financial Default

(a) Upon occurrence of a Financial Default, the Lenders' Representative shall notify theConcessionaire by a notice, with a copy simultaneously sent to the ***[Executing Agency]***{and (Name of the National/State Level Agency, if any)}, about the occurrence of a Financial Default and the amount of the Lenders' Dues (**Notice of Financial Default**).

The Notice of Financial Default shall be conclusive evidence of occurrence of the Financial Default and the Lenders' Dues, and shall be final, conclusive and binding upon the Concessionaire for the purpose of this Substitution Agreement and the Financing Documents.

The Parties agree that the ***[Executing Agency]***shall have the right to trigger a Concessionaire Event of Default and issue a Notice of Intent to Terminate under the Concession Agreement upon receipt of a Notice of Financial Default.

(b) The Lenders' Representative (on behalf of the Lenders) may, within 60 days after the issuance of the Notice of Intent to Terminate under Clause 3.2(a) above or such longer period as may be mutually agreed between the ***[Executing Agency]***and the Lenders, make a representation to the ***[Executing Agency]***, stating the intention to substitute the Concessionaire by a Selectee (**Substitution Notice under Financing Documents**).

In the event that the Lenders' Representative issues the Substitution Notice under Financing Documents, then, within 90 days of issue of such notice, the Lenders shall be entitled to undertake and complete the substitution of the Concessionaire by a Selectee, in accordance with the provisions of this Substitution Agreement. The Lenders' right to substitute the Concessionaire shall be without prejudice to any other right or remedy available to the Lenders under the Financing Documents and/or this Substitution Agreement.

(c) If the Lenders' Representative does not convey the intention to substitute the Concessionaire with a Selectee within 60 days of the Notice of Intent to Terminate under Clause 3.2(a) above or such longer period as may be mutually agreed between the ***[Executing Agency]*** and the Lenders, or the Lenders fail to substitute the Concessionaire within the time period set out in (b) above, the ***[Executing Agency]***shall be entitled to terminate the Concession Agreement in accordance with its provisions.

3.3. Procedure in case of a Concessionaire Event of Default

(a) Upon occurrence of a Concessionaire Event of Default, the ***[Executing Agency]***shall issue a Notice of Intent to Terminate issued to the Concessionaire.

(b) If, within 60 days from the date of the Notice of Intent to Terminate, the Concessionaire does not rectify or remedy the Event of Default to the satisfaction of the ***[Executing Agency]***or the ***[Executing Agency]*** is not satisfied with the steps taken or proposed to be taken by the Concessionaire to remedy the Event of Default, the ***[Executing Agency]***shall issue a Notice of Intent to Terminate to the Lenders to exercise their substitution rights. The Notice of Intent to Terminate issued by the ***[Executing Agency]***to the Lenders under this Clause 3.3(b) shall be conclusive evidence of occurrence of the FinancialConcessionaire Event of Default, and shall be final, conclusive and binding upon

the Concessionaire for the purpose of this Substitution Agreement and the Financing Documents.

(c) The Lenders' Representative (on behalf of the Lenders) may, within 60 days after the issuance of the Notice of Intent to Terminate under Clause 3.3(b) above or such longer period as may be mutually agreed between the ***[Executing Agency]*** and the Lenders make a representation to the ***[Executing Agency]***, stating the intention to substitute the Concessionaire by a Selectee (**Substitution Notice under Concession Agreement**). In the event that the Lenders' Representative issues the Substitution Notice under Concession Agreement, then, within 90 days of issue of such notice, the Lenders shall be entitled to undertake and complete the substitution of the Concessionaire by a Selectee, in accordance with the provisions of this Substitution Agreement. The Lenders' right to substitute the Concessionaire shall be without prejudice to any other right or remedy available to the Lenders under the Financing Documents and/or this Substitution Agreement.

(d) If the Lenders' Representative does not convey the intention to substitute the Concessionaire with a Selectee within 60 days of issuance of the Notice of Intent to Terminate under Clause 3.3(b) above or such longer period as may be mutually agreed between the ***[Executing Agency]*** and the Lenders, or the Lenders fail to substitute the Concessionaire within the time period set out in (c) above, the ***[Executing Agency]*** shall be entitled to terminate the Concession Agreement in accordance with its provisions.

3.4. Criteria for Selection of Selectee

(a) The Lenders' Representative shall apply the following criteria while selecting a Company as the Selectee:

(i) the Company shall meet the financial, eligibility and qualification criteria set out in the RFP, demonstrating that it has the necessary experience and technical qualification to construct and operate and maintain the Facilities and the Associated Infrastructure for the remaining Term. Provided that if the Financial Default or the Concessionaire Event of Default has occurred during the O&M Period, the Selectee shall be required to meet only the O&M qualification criteria set out in the RFP, in addition to the financial and eligibility criteria;

(ii) the Company shall be capable of properly discharging the duties, obligations and liabilities of the Concessionaire under the Concession Agreement;

(iii) the Company shall provide Security to the satisfaction of the Lenders for the repayment of Lenders' Dues;

(iv) the Company shall have the capability and shall unconditionally consent to assume the liability for the payment and discharge of dues of the Concessionaire to the ***[Executing Agency]*** under and in accordance with the Concession Agreement and of Lenders' Dues upon terms and conditions as agreed to with the Lenders;

(v) the Company shall have not been in breach of any agreement between itself {and (Name of the National/State Level Agency, if any)}[3], the ***[Executing Agency]***, the

[3] Contents in the curly parenthesis may be deleted if not applicable.

GoI or the Go***[XX] [STATE OF Location]***; and

(vi) any other appropriate condition or criterion determined by the Lenders [or the ***[Executing Agency]***], whereby continuity in the performance of the Concessionaire's obligations under the Concession Agreement is maintained and the Security in favour of the Lenders under the Financing Documents is preserved.

(b) At any time prior to the approval of a Company as the Selectee by the ***[Executing Agency]***pursuant to this Substitution Agreement, the ***[Executing Agency]***may require the Lenders' Representative to satisfy the ***[Executing Agency]*** as to the eligibility of such Selectee and the decision of the ***[Executing Agency]*** in this behalf shall be reasonable, final, conclusive and binding on the Lenders and such Selectee.

4. MODALITIES OF SUBSTITUTION

4.1. Modalities

The following modalities shall be applicable to any substitution of the Concessionaire by the Selectee:

(a) the Lenders' Representative may invite, negotiate, procure offers either through privatenegotiations or public auction or process of tender or otherwise for the substitution of the Concessionaire by another Company;the Lenders' Representative shall on behalf of the Lenders propose to the ***[Executing Agency]***.

(b) with a copy to {(Name of the National/State Level Agency, if any)}, pursuant to Clause 4.1(c), the name of such Company proposed to be the Selectee for acceptance and shall apply to the ***[Executing Agency]*** for:

(i) grant to such Company, as substitute to the Concessionaire, the right to design, construct, rehabilitate, finance, operate, maintain and transfer the Facilities and the Associated Infrastructure under and in accordance with and subject to and on the terms and conditions set out in the Concession Agreement;

(ii) In case the Lenders intend to exercise their substitution rights through share transfer, the Lenders' Representative shall also apply to the ***[Executing Agency]*** for permitting such share transfer to the Selectee upon approval in accordance with this Concession Agreement.

In case the Lenders intend to exercise their substitution rights through novation, the Lenders' Representative shall also apply to the ***[Executing Agency]*** for:(i) novation of the Concession Agreement to such Company, upon being approved as the Selectee, on the same terms and conditions for the remaining Term under the Concession Agreement; and

(iii) the execution of a new substitution agreement with such Company, upon being approved as the Selectee, for the remaining Term, on the same terms and conditions as set out in this Substitution Agreement.

(c) the Lenders' Representative shall be entitled, within the time period set out in Clause3.2(b) or Clause 3.3(c) above as the case may be, to select and propose a Company as the Selectee to the ***[Executing Agency]***{(with a copy to (Name of the National/State Level Agency, if any))}[4] for its approval (**Proposal**). The Proposal of the Lenders' Representative pursuant to this Clause 4.1(c) shall contain the details of such Company (including information in relation to the Company's ability to meet the technical and financial criteria set out in the RFP), the Lenders' Dues and any other data and information as may be relevant for the ***[Executing Agency]***to consider and take a decision on the Proposal.

(d) Without prejudice to the foregoing, the Lenders' Representative agrees and undertakes to provide to the ***[Executing Agency]*** (and (Name of the National/State Level Agency, if any)), such further and other information and clarifications in respect of any data, details or information, furnished by the Lenders' Representative as the ***[Executing Agency]*** and/or (Name of the National/State Level Agency, if any) may reasonably require. The ***[Executing Agency]*** shall convey its approval or otherwise of such Proposal, including such Company proposed as the Selectee, in its sole discretion within [15] days of (i) the date of receipt of the Proposal by the ***[Executing Agency]***; or (ii) the date when the last of any further information and clarifications in respect of any data, details or information comprised in the Proposal, have been provided by the Lenders' Representative to the ***[Executing Agency]***, whichever is later. It is expressly agreed between the Parties that the Proposal shall be accompanied by an unconditional undertaking of the Company proposed as the Selectee that it shall, upon approval by the ***[Executing Agency]*** of the Proposal, perform and fulfill the terms and conditions of the Concession Agreement as if such Company was the original signatory to the Concession Agreement and shall be liable for and shall assume, discharge and pay the Lenders' Dues under and in accordance with the terms and conditions of the Financing Documents. Upon approval of the Proposal by the ***[Executing Agency]***, the Company shall become the Selectee hereunder;

(e) the ***[Executing Agency]*** shall, upon its satisfaction of the eligibility of the Selectee and in accordance with the provisions of this Substitution Agreement and subject to the provisions of Clause 4.1(e), proceed to substitute the Concessionaire with the Selectee by novation of the Concession Agreement or such other form of document as the ***[Executing Agency]***{and (Name of the National/State Level Agency, if any)} may reasonably require, on the same terms and conditions as set out under the Concession Agreement for the remaining Term; or (ii) by requiring selectee tothe substitution as aforesaid shall be subject to the Selectee completing corporate compliances for executing the documents and obtaining Applicable Permits necessary for implementing and/or operating and maintaining the Facilities and the Associated Infrastructure under and in accordance with the Concession Agreement;

(f) the ***[Executing Agency]*** shall have the right to object to the choice of the proposed Selectee after hearing the Lenders' Representative, provided however, that in the event of a refusal as stated above, the Lenders' Representative may propose another Company as the Selectee, within 90 days of the issuance of the Substitution Notice under Financing Documents or Substitution Notice under Concession Agreement, as the case may be. In the event that no objection is raised with respect to the Company proposed to be the Selectee

[4] Contents in the curly parenthesis may be deleted if not applicable.

by the ***[Executing Agency]*** within the period set forth in Clause 4.1(c), the Company proposed as the Selectee shall be deemed to have been accepted by the ***[Executing Agency]***;

(g) the substitution as aforesaid, shall be deemed to be complete only upon the Selectee accepting and complying with the terms and conditions stipulated in the Concession Agreement; and

(h) all actions of the Lenders' Representative hereunder shall be deemed to be on behalf of the Lenders and be binding upon them. The Lenders' Representative is authorised to receive payment of compensation, payment to cure default and any other payments, consideration for transfer in accordance with the Substitution Notice under Financing Documents or Substitution Notice under the Concession Agreement, as the case may be, the Concession Agreement and the Financing Documents and give valid discharge on behalf of all the Lenders.

4.2. Waiver of Concessionaire's Right to Remedy

The Concessionaire hereby irrevocably agrees and waives any right to challenge the Lenders' decision to apply to the ***[Executing Agency]*** for substitution as aforesaid and neither the Concessionaire nor the ***[Executing Agency]*** shall be entitled to prevent the Lenders' Representative from proceeding to seek such a substitution of the Concessionaire by the Selectee as provided in this Article 4. The Concessionaire agrees and confirms that the Concessionaire shall not have any right to seek re-evaluation of the Concessionaire's assets and the Concession Agreement, otherwise than as contracted in the Financing Documents while the ***[Executing Agency]*** permits substitution as hereinbefore provided, pursuant to the Lenders' Representative's request. The Parties acknowledge that the rights of the Lenders under this Article 4 are irrevocable and shall not be contested in any proceedings before any court of law and the Concessionaire shall not have any right or remedy to prevent, obstruct, injunct or restrain the ***[Executing Agency]*** and/or the Lenders from effecting or causing the substitution as aforesaid. No third party shall have the right to question the decision of the Lenders/Lenders' Representative, the ***[Executing Agency]***{or (Name of the National/State Level Agency, if any)}[5] in relation to substitution of the Concessionaire.

4.3. No Guarantee

Nothing contained in this Article 4 shall mean or be interpreted as provision of any guarantee or surety by the ***[Executing Agency]***{or (Name of the National/State Level Agency, if any)} and it is expressly agreed that the ***[Executing Agency]***{and (Name of the National/State Level Agency, if any)}have not provided any surety, guarantee or counter guarantee whether directly or indirectly for the recovery of amount of Financial Assistance advanced by the Lenders to the Concessionaire.

5. INTERIM PROTECTION

If the Lenders notify the ***[Executing Agency]*** of a Financial Default and until such time that a Selectee is approved in accordance with this Substitution Agreement, the Lenders agree that the

[5] Contents in the curly parenthesis may be deleted if not applicable

[Executing Agency]shall (either itself or through an entity nominated by it) be entitled to maintain, preserve and protect the Facilities and the Associated Infrastructure if, in the ***[Executing Agency]***'s opinion, it is necessary and required for the construction or operation and maintenance of the Facilities and the Associated Infrastructure. In case of such interim protection during the O&M Period, the ***[Executing Agency]*** or an entity nominated by the ***[Executing Agency]*** shall operate and maintain the Facilities and the Associated Infrastructure pending the substitution of the Concessionaire by the Selectee.

6. STAND-STILL

The ***[Executing Agency]*** agrees that on the occurrence of any Concessionaire Event of Default or a Financial Default, it shall not exercise: (a) its ***[Executing Agency]*** right to step-in in place of the Concessionaire; (b) suspend or terminate the Concession Agreement; or (c) take any action for the winding-up of the Concessionaire or the appointment of a receiver or administrator in respect of the Concessionaire's business and assets, until expiry of the time period available to the Lenders to exercise the substitution rights, as set out in Article 3.

7. INDEMNITY

7.1. Indemnity

(a) The Concessionaire shall indemnify, defend and hold harmless the ***[Executing Agency]***, {(Name of the National/State Level Agency, if any)}, the Lenders and the Lenders' Representative against any and all proceedings, actions and third party claims for any loss, damage, cost and expenses of whatever kind and nature arising out of any breach by the Concessionaire of any of its obligations under this Substitution Agreement or on account of failure of the Concessionaire to comply with Applicable Laws and Applicable Permits.

(b) The Lender shall indemnify, defend and hold harmless the ***[Executing Agency]*** and {(Name of the National/State Level Agency, if any)}[6] against any and all proceedings, actions and third party claims for any loss, damage, cost and expenses arising out of the Lenders' or the Lenders' Representative's failure to fulfill their obligations under this Substitution Agreement, materially or adversely affecting the performance of the Concessionaire's, the ***[Executing Agency]***'s {or (Name of the National/State Level Agency, if any)}'s obligations under the Concession Agreement, other than any loss, damage, cost and expenses arising out of acts done in discharge of their lawful functions by the Lenders/Lenders' Representative.

7.2. Notices and Contest of Claims

In the event that any Party receives a claim from a third party in respect of which it is entitled to the benefit of an indemnity under Clause 7.1 or in respect of which it is entitled to reimbursement (**Indemnified Party**), it shall notify the other Party responsible for indemnifying such claim hereunder (**Indemnifying Party**) within 30 days of receipt of claim and shall not settle or pay the claim without prior approval of the Indemnifying Party, such approval not being unreasonably withheld or delayed. In the event that the Indemnifying Party

[6] Contents in the curly parenthesis may be deleted if not applicable

wishes to contest or dispute the claim, it may conduct the proceedings in the name of the Indemnified Party and shall bear all costs involved in contesting it. The Indemnified Party shall provide all cooperation and assistance in contesting any claim and shall sign all such writings and documents as the Indemnified Party may reasonably require.

8. DISPUTE RESOLUTION

8.1. Amicable Settlement

In the event of a Dispute, either Party may give the other written notice at any time of a Dispute having arisen (**Notice of Dispute**). The Notice of Dispute shall set out brief details of the nature of the Dispute.

The Parties agree that they shall endeavor to resolve any Dispute amicably and in good faith within 30 days of a Notice of Dispute being served by one Party on the other Party in respect of that Dispute. In the event that resolution of the Dispute is reached pursuant to this Clause 8.1, the resolution and its terms shall be recorded in writing and signed by one representative from each of the Parties.

8.2. Dispute Resolution by Arbitration

Failing amicable settlement and/or settlement of a Dispute pursuant to the provisions of Clause 8.1, each of the Parties unconditionally and irrevocably agrees to the submission of such Dispute to binding arbitration governed by the Arbitration and Conciliation Act, 1996.

Any arbitration proceedings commenced pursuant to this Clause 8.2 shall be referred to as the **Arbitration**.

If a Dispute is referred to Arbitration by any Party, such Dispute shall be resolved by a sole arbitrator to be appointed by mutual agreement of the Parties. If Parties fail to appoint an arbitrator within 30 days after service of the notice of Arbitration, such arbitrator shall be appointed in accordance with the provisions of the Arbitration Act.

8.3. Place of Arbitration

The place of the Arbitration shall be ***[Location OF CHOICE OF Executing Agency]***

8.4. English Language

The request for the Arbitration, the answer to the request, the terms of reference, any written submissions, any orders and rulings pursuant to the Arbitration shall be in English and, if oral hearings take place, English shall be the language to be used in the hearings.

8.5. Fees and Expenses

The fees and expenses of the arbitrator and all other expenses of the Arbitration shall be initially borne and paid by respective Parties, subject to determination by the arbitrator. The arbitrator may provide in the award for the reimbursement to the prevailing Party of its costs and expenses in bringing or defending the Arbitration claim, including legal fees and expenses incurred by

such Party.

8.6. Performance of Obligations during the Pendency of the Arbitration Proceedings

The Substitution Agreement and rights and obligations of the Parties shall remain in full force and effect pending the award under any Arbitration proceedings pursuant to this Article 8.

8.7. Survival

The provisions of this Article 8 shall survive the termination of the Substitution Agreement.

9. GOVERNING LAW AND JURISDICTION

The Substitution Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the courts in Allahabad shall have exclusive jurisdiction over matters arising out of or relating to this Substitution Agreement.

10. MISCELLANEOUS

10.1. Duration of this Agreement

This Agreement shall come into force from the date hereof and shall expire at the earliest to occur of the following events:

(a) termination of the Concession Agreement; or

(b) no sum remains to be advanced and no sum are outstanding to the Lenders, under the Financing Documents.

10.2. Survival

(a) Any cause or action which may have occurred in favour of any Party or any right which is vested in any Party under this Agreement as a result of any act, omission, deed, matter or thing done or omitted to be done by any Party before the expiry of the Term by efflux of time or otherwise in accordance with this Agreement, shall survive the expiry of the Agreement.

(b) The provisions of this Agreement, to the fullest extent necessary to give effect thereto, survive the Term or the termination of this Agreement and the obligations of Parties to be performed or discharged following the termination of this Agreement, shall accordingly be performed or discharged by the Parties.

10.3. Counterparts

This Agreement may be executed in four counterparts, each of which, when executed and delivered, will be an original, and all four counterparts together shall constitute one and the same instrument.

10.4. Waivers and Consents

(a) Unless otherwise specified, any provision or breach of any provision of this Agreement may be waived before or after it occurs only if evidenced by an agreement in writing signed by the Parties.

(b) Any consent under or pursuant to any provision of this Agreement must also be in writing and given prior to the event, action or omission for which it is sought.

(c) Any such waiver or consent may be given subject to any conditions thought fit by the Party giving it and shall be effective only in the instance and for the purpose for which it is given.

10.5. Severability

(a) If any provision of this Agreement is or becomes illegal, invalid or unenforceable in any respect under any Applicable Law, the legality, validity or enforceability of the remaining provisions will not, in any way, be affected or impaired.

(b) The Parties shall negotiate in good faith with a view to agreeing one or more provisions which may be substituted for any such invalid, illegal or unenforceable provision and which produce as nearly as is practicable in all the circumstances the appropriate balance of the commercial interests of the Parties.

10.6. Waiver of sovereign immunity

The ***[Executing Agency]*** {and (Name of the National/State Level Agency, if any)}[7] unconditionally and irrevocably:

(a) agree that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;

(b) agree that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the ***[Executing Agency]*** {and (Name of the National/State Level Agency, if any)} with respect to its assets; and

(c) consent to the enforcement of any judgment or award against them in any such proceedings.

10.7. Language

(a) The formal text of this Agreement and other agreements in relation to the Project shall be in the English language.

[7] Contents in the curly parenthesis may be deleted if not applicable

(b) All notices and communications between the Parties under this Agreement shall be in English.

10.8. Third Parties

This Agreement and all rights hereunder are intended for the sole benefit of the Parties and shall not imply or create any rights on the part of, or obligations to, any other Person.

10.9. Representations and Warranties

The Parties hereto expressly represent and warrant that they are duly empowered to sign and execute this Substitution Agreement.

10.10. Notices

Notices under this Substitution Agreement shall be sent to the addresses first hereinabove mentioned and Annexure 1 (in case of Lenders). Any change in the address of any Party shall be duly notified by registered post acknowledgement due and delivered to other Parties.

10.11. Amendments to Substitution Agreement

(a) This Substitution Agreement shall not be affected by re-organisation of any Lender, Lenders' Representative, the ***[Executing Agency]***, {or (Name of the National/State Level Agency, if any)}[8] and the successor-in-interest of such Lender, Lenders' Representative, the ***[Executing Agency]***{or (Name of the National/State Level Agency, if any)} shall have the benefit of this Substitution Agreement.

(b) No amendment, variation or modification to this Substitution Agreement shall be valid and effectual unless made in writing and executed by the duly authorised representatives of all the Parties.

(c) All stamp duties or other imposts and charges as are applicable on this Substitution Agreement or on novation of the Concession Agreement for the purpose of substitution as specified in this Substitution Agreement shall be borne by the Concessionaire. In the event of Lenders making such payment in the interim, such amount shall be deemed to be a part of the Lenders' Dues.

10.12. Harmonious Construction

(a) For the purpose of giving full and proper effect to this Substitution Agreement, the Concession Agreement and this Substitution Agreement shall be read together and construed harmoniously. The terms of the Concession Agreement shall prevail in the event of any inconsistencies with this Substitution Agreement.

(b) The consultation, recommendation or approval of the Lenders' Representative under this Substitution Agreement shall always be taken as consultation, recommendation

[8] Contents in the curly parenthesis may be deleted if not applicable

or approval of every concerned Lender and each such Lender shall be bound by the same and hereby waives its right to question or dispute it.

(c) This Substitution Agreement shall be in addition to and shall not be in derogation of the terms of the Financing Documents.

(d) It shall not be necessary for the Lenders or the Lenders' Representative to enforce or exhaust any other remedy available to them before invoking the provisions of this Substitution Agreement.

In witness whereof the Parties hereto have signed this Agreement on this _____ day of 20**.

[Executing Agency]

By:
Name:
Title:

(**Name of the National/State Level Agency, if any**)[9]
By:
Name:
Title:

[**CONCESSIONAIRE**]
By:
Name:
Title:

[**LENDERS'REPRESENTATIVE**]
By:
Name:
Title:

[9] Delete if not applicable.

ANNEXURE 1

S.No.	Details of Lenders
1.	**[[*insert name of the Lender*]],** a company organized,
	incorporated, registered and existing under the Companies Act, with its registered office [***insert address]***andbranch office [***insert address]***
	Company Identification Number [***insert company identification number]***
2.	**[[*insert name of the Lender*]],** a company organized,
	incorporated, registered and existing under the Companies Act, with its registered office [[***insert address]***and branch office [***insert address]***
	Company Identification Number [***insert company identification number]***

SCHEDULE 3: FORMAT OF THE ESCROW AGREEMENT
(on appropriate stamp paper)

THIS ESCROW AGREEMENT (this **Escrow Agreement**) is entered into at [ ] on [] by and among:

(1) ***[Executing Agency],*** a statutory body constituted under the ***[Act under which the Executing Agency is established]*** with its registered office at ***[Address of Executing Agency]***. (hereinafter referred to as ***[Executing Agency]***, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(2) [Name of the State / National Level Agency, if any]1, a statutory body constituted --------, with its registered office at ---------- (hereinafter referred to as --------, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

(3) [_____[***insert name of the Concessionaire***], a company organized, incorporated, registered and existing under the Companies Act, with its registered office at _____ [***insert address***] acting through _____, _____ [***insert name of the authorised signatory and his/her designation***] duly authorized by resolution dated _____ ***[insert date of the Board Resolution***] (hereinafter referred to as the **Concessionaire**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns)

AND

(4) [***Insert name of Escrow Bank***], a bank duly constituted in accordance with Applicable Laws and carrying on the business of banking in India as a Scheduled Commercial Bank, with its registered office at [*insert address*] and acting for the purposes of this Escrow Agreement through its branch office at [*insert address*] (hereinafter referred to as **Escrow Bank**, which expression shall unless repugnant to the context or meaning thereof includes its successors and permitted assigns).

The ***[Executing Agency]***, {(Name of the National/State Level Agency, if any)}[2], the Concessionaire and the Escrow Bank are collectively referred to as **Parties** and individually as **Party**.

WHEREAS:

A. ***[Executing Agency]***, {in association with (Name of the National/State Level Agency, if any)}, has decided to undertake the development of STPalong with other Facilities and Associated Infrastructure at ***[Location]*** on a PPP basis, through a hybrid annuity model.

[1] If there is a State Level/National Level intermediate agency funding the project and such an entity is part of the contract/procurement process the name of that agency can be inserted here. Otherwise all references to the National/State Level agency in the document are to be deleted.

[2] Contents in the curly parenthesis may be deleted if not applicable.

B. For this purpose, the ***[Executing Agency]*** selected the Concessionaire post a bid process to undertakeintegrated development, operation and maintenance of Sewage Treatment Plant(s) (the "**STP**") and Faecal Sludge Management System, with a proposed Design Capacity of [Capacity of STP in MLD] MLD of STP and [***Capacity of FSTP in MLD***] MLD of Faecal Sludge Treatment Plant(s) (the "**FSTP**"), along with other Facilities and its Associated Infrastructure at ***[Location]***, on a PPP basis, through a hybrid annuity model.. While the Executing Agency i.e., ***[Executing Agency]*** will be the principal executing agency and bidding authority for the Project, [***Executing Agency***] / (Name of the National/State Level Agency, if any)[3] will be responsible for making payments to the Concessionaire.

C. The ***[Executing Agency]***,{(Name of the National/State Level Agency, if any)} [4] and the Concessionaire executed a Concession Agreement dated [•] to implement the Project (the **"Concession Agreement"**), which is annexed to this Escrow Agreement.

D. In consideration of the Concessionaire designing, developing, financing, constructing,operating and maintaining the Facilities and the Associated Infrastructure on the Site for the Term, [***Executing Agency***] /(Name of the National/State Level Agency, if any)[5] is required to pay the Concessionaire: (i) during the Construction Period, the Construction Payments upon satisfactory completion of works corresponding to Payment Milestones; and (ii) during the O&M Period, O&M Payments comprising the Capex Annuity (along with interest), the O&M Charges and the Power Charges for the Facilities at actuals (subject to a cap based on the Guaranteed Energy Consumption), and the Power Charges for the Associated Infrastructure at actuals.

E. As per the provisions of the Concession Agreement, {(Name of the National/State Level Agency, if any)}, the ***[Executing Agency]***, the Concessionaire are required to enter into an escrow agreement with an escrow bank and [***Executing Agency***] / (Name of the National/State Level Agency, if any)[6] is required to open an escrow account with such escrow bank and maintain the Minimum Escrow Balance for the payment of the Construction Payments and the O&M Payments.

F. The escrow account shall be funded by [***Executing Agency***][7] / (Name of the National/State Level Agency, if any) in accordance with the terms of this Escrow Agreement and such account shall serve to secure[***Executing Agency***] / (Name of the National/State Level Agency, if any)'s[8] payment obligations towards the Concessionaire under the Concession Agreement.

G. The Escrow Bank is willing to serve as an escrow bank in accordance with the terms andconditions of this Escrow Agreement.

NOW, THEREFORE, the Parties hereto agree as follows:

1. DEFINITIONS AND INTERPRETATION

[3] Delete whichever not applicable.
[4] Contents in the curly parenthesis may be deleted if not applicable.
[5] Delete whichever not applicable
[6] Delete whichever not applicable
[7] Delete whichever not applicable
[8] Delete whichever not applicable

1.1. Capitalized terms used but not defined in this Escrow Agreement shall have the meaning givento them in the Concession Agreement.

1.2. In this Escrow Agreement, unless the context otherwise requires:

(a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.

(b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.

(c) Headings in this Escrow Agreement are for convenience of reference only.

(d) The references to the word 'include' or 'including' or to the phrase 'in particular', shall be construed without limitation.

(e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.

(f) The references to any agreement or deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.

(g) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing. Where any notice, consent or approval is to be given by either of the Parties, the notice, consent or approval shall be given on their behalf only by any authorized persons.

(h) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.

(i) The provisions of the clauses of this Escrow Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the clauses.

(j) In the event of any ambiguities or discrepancies between two clauses of this Escrow Agreement, the provisions of the specific clause relevant to the issue under consideration shall prevail over those in other clauses.

(k) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Escrow Agreement.

2. ESCROW ACCOUNT

2.1. Appointment

(a) {(Name of the National/State Level Agency, if any)}[9], the ***[Executing Agency]*** and the Concessionaire hereby appoint the Escrow Bank to serve as the escrow bank for the purposes of this Escrow Agreement and the Escrow Bank hereby accepts this appointment.

(b) {(Name of the National/State Level Agency, if any}) hereby settles in trust with the Escrow Bank a sum of INR 1,000 (Rupees one thousand). The Escrow Bank has accepted the above amount of INR 1,000 (Rupees one thousand) in trust declared and, subject to the terms and conditions in this Escrow Agreement, agreed to act as trustee for the benefit of the Concessionaire, {(Name of the National/State Level Agency, if any)} and the ***[Executing Agency]***.

(c) The Escrow Bank shall hold and safeguard the Escrow Account and any monies heldtherein, during the term of this Escrow Agreement and shall treat the amount in the Escrow Account as monies deposited by [Executing Agency] / (Name of the National/State Level Agency, if any)[10] with the Escrow Bank in trust in accordance with the provisions of this Escrow Agreement. In performing its functions and duties under this Escrow Agreement, the Escrow Bank shall act as an agent of {(Name of the National/State Level Agency, if any)} [11] , the ***[Executing Agency]*** and the Concessionaire.

2.2. Escrow Account

(a) [***Executing Agency***]/(Name of the National/State Level Agency, if any) [12] has established a bank account in the name of **[●]** (*name of account and account number*), with **[●]** (*name of the bank*), which shall be an interest bearing, no lien account, denominated in Indian Rupees for the benefit of the Concessionaire (the **Escrow Account**).

(b) The Escrow Bank shall provide detailsof the Escrow Account in writing to the Concessionaire and the ***[Executing Agency]***, including the date of opening of the Escrow Account.

(c) The Parties agree and acknowledge that:

(i) the Escrow Account shall be opened pursuant to, and specifically for the purposes of, this Escrow Agreement and shall be used and operated only for the purposes and in the manner provided in this Escrow Agreement and for no other use or purposes and in no other manner;

(ii) the Escrow Bank shall maintain the Escrow Account in accordance with the terms

[9] Contents in the curly parenthesis may be deleted if not applicable.
[10] Delete whichever not applicable.
[11] Contents in curly parenthesis may be deleted if not applicable.
[12] Delete whichever not applicable.

of this Escrow Agreement and its usual practices and applicable regulations;

(iii) the Escrow Bank and the Concessionaire, after consultation with [Executing Agency] / (Name of the National/State Level Agency, if any)[13], shall agree on the detailed mandates, terms and conditions and operating procedures for the Escrow Account but in the event of any inconsistency between this Escrow Agreement and such mandates, terms and conditions or procedures in this Escrow Agreement shall prevail; and

(iv) noinstruction shall be given to the Escrow Bank which is not contemplated by or which is contrary to or inconsistent with this Escrow Agreement. In the event any such inconsistent or contrary instruction is given, the same shall be null and void and the Escrow Bank shall not be obliged to act upon, and shall ignore, such instructions and continue to comply with the provisions of this Escrow Agreement.

2.3. Deposits into Escrow Account

(a) Minimum Escrow Balance

At all times, to maintain the minimum balance in the Escrow Account (the **"Minimum Escrow Balance"**):

(i) [***Executing Agency***] / (Name of the National/State Level Agency, if any)[14] shall deposit in the Escrow Account an amount equivalent to the first 2 Payment Milestones prior to the Effective Date. From the Effective Date and during the Construction Period, [Executing Agency] / (Name of the National/State Level Agency, if any)[15] shall ensure that the Escrow Account is funded with an amount equivalent to the next 2 Payment Milestones until the Facilities COD; and

(ii) on and from the COD and during the O&M Period, [Executing Agency] / (Name of the National/State Level Agency, if any)[16] shall deposit the O&M Payments in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuities (along with interest), the O&M Charges and the estimated Power Charges for the next 2 years for the Facilities,

(b) [***Executing Agency***] / (Name of the National/State Level Agency, if any)[17] shall ensure that the minimum balance in the Escrow Account at all times during the Term is not less than the Minimum Escrow Balance.

If at any time during the Construction Period or the O&M Period, the balance in the Escrow Account falls below the Minimum Escrow Balance, [Executing Agency] / (Name of the National/State Level Agency, if any)[18] shall promptly, and in any event, no later than 90 days, fund the Escrow Account such that the Minimum Escrow Balance is maintained.

[13] Delete whichever not applicable.
[14] Delete whichever not applicable.
[15] Delete whichever not applicable.
[16] Delete whichever not applicable.
[17] Delete whichever not applicable.
[18] Delete whichever not applicable.

(c) The Parties agree that a failure to maintain the Minimum Escrow Balance for 90 days would be treated as a [***Executing Agency***] / (Name of the National/State Level Agency, if any)[19] Event of Default and in such case, the consequences set out in the Concession Agreement shall apply.

(d) It is clarified that any interest earned on the amounts deposited by [***Executing Agency***] / (Name of the National/State Level Agency, if any)[20] in the Escrow Account will be counted towards the Minimum Escrow Balance.

2.4. Withdrawals from Escrow Account during the Construction Period

(a) Upon successful completion and verification of a Payment Milestone as per the Concession Agreement, the ***[Executing Agency]*** is required to approve the Invoice raised by the Concessionaire within 10 days of receipt of the Invoice and issue a Payment Certificate to the Escrow Bank. The Payment Certificate shall convey the ***[Executing Agency]***'s approval for the release of the amount specified in the Invoice for the relevant Payment Milestone, less any necessary deductions or adjustments in accordance with the Concession Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws).

(b) If, within 10 days from the date of receipt of an Invoice, the ***[Executing Agency]*** does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the ***[Executing Agency]***, and the Concessionaire may issue instructions to the Escrow Bank (with a copy to the ***[Executing Agency]*** and (Name of the National/State Level Agency, if any))[21] to release the amounts specified in the Invoice, upon the expiry of the 10-day period. Any such instruction issued by the Concessionaire to the Escrow Bank shall be accompanied with the Invoice raised by the Concessionaire for the relevant Payment Milestone.

(c) Immediately upon receipt of a Payment Certificate from the ***[Executing Agency]*** in accordance
with clause 2.4(a) above or upon receipt of instructions from the Concessionaire in accordance with clause 2.4(b), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice to the bank account of the Concessionaire mentioned below:
Bank:
Account number: BIC (SWIFT):
Address of Bank:
[**Insert bank account details**]

The Concessionaire may change the above bank account details by giving a 5-day prior written notice to the Escrow Bank, (Name of the National/State Level Agency, if any)[22] and the ***[Executing Agency]***.

[19] Delete whichever not applicable.
[20] Delete whichever not applicable.
[21] Delete if not applicable.
[22] Delete if not applicable

(d) Upon any termination of the Concession Agreement during the Construction Period of the Facilities, [***Executing Agency***] / (Name of the National/State Level Agency, if any)[23] shall issue instructions to the Escrow Bank requesting it to release and transfer any amounts due and payable to the Concessionaire, including termination payments, if any, as certified by [***Executing Agency***] / (Name of the National/State Level Agency, if any)[24] in a statement and any remaining amounts standing to the credit of the Escrow Account shall be transferred to the following account of [***Executing Agency***] / (Name of the National/State Level Agency, if any)[25]:
Bank:
Account number: BIC (SWIFT):
Address of Bank:
[**Insert bank account details**]

[***Executing Agency***] / (Name of the National/State Level Agency, if any)[26] may change the above bank account details by giving 5 (five) day prior written notice to the Escrow Bank, the Concessionaire and the ***[Executing Agency]***.

2.5. Withdrawals from Escrow Account during the O&M Period

(a) For O&M Payments in each quarter, the ***[Executing Agency]*** is required to approve the Invoice raised by the Concessionaire within 10 days of receipt of the Invoice and issue a Payment Certificate to the Escrow Bank. The Payment Certificate shall convey the ***[Executing Agency]***'s approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with the Concession Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws).

(b) If, within 10 days from the date of receipt of an Invoice, the ***[Executing Agency]*** does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the ***[Executing Agency]***, and the Concessionaire may issue instructions to the Escrow Bank (with a copy to the ***[Executing Agency]***{and (Name of the National/State Level Agency, if any))}[27] to release the amounts specified in the Invoice, upon the expiry of the 10-day period. Any such instruction issued by the Concessionaire to the Escrow Bank shall be accompanied with the Invoice raised by the Concessionaire.

(c) Immediately upon receipt of a Payment Certificate from the ***[Executing Agency]*** in accordance with clause 2.5(a) above or upon receipt of instructions from the Concessionaire in accordance with clause 2.5(b), the Escrow Bank shall release the amount specified in the Payment Certificate, or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice to the bank account of the Concessionaire mentioned below:
Bank:
Account number:
BIC (SWIFT):

[23] Delete if not applicable
[24] Delete if not applicable
[25] Delete if not applicable
[26] Delete if not applicable
[27] Contents in curly parenthesis may be deleted if not applicable.

Address of Bank:
[Insert bank account details]

The Concessionaire may change the above bank account details by giving a 5-day prior written notice to the Escrow Bank, {(Name of the National/State Level Agency, if any)} and the ***[Executing Agency]***.

(d) Upon any termination of the Concession Agreement during the O&M Period, [***Executing Agency]*** / (Name of the National/State Level Agency, if any)[28] shall issue instructions to the Escrow Bank requesting it to release and transfer any amounts due and payable to the Concessionaire, including termination payments, if any, as certified by [***Executing Agency]*** / (Name of the National/State Level Agency, if any)[29] in a statement and any remaining amounts standing to the credit of the Escrow Account shall be transferred to the following account of [***Executing Agency***] / (Name of the National/State Level Agency, if any)[30]:
Bank:
Account number:
BIC (SWIFT):
Address of Bank:
[Insert bank account details]

[***Executing Agency***] / (Name of the National/State Level Agency, if any)[31] may change the above bank account details by giving 5 (five) - day prior written notice to the Escrow Bank, and the Concessionaire**.**.

2.6. Identification and Separation

The Escrow Bank shall clearly identify in its records the Escrow Account as an escrow account and shall keep the funds standing to the credit of the Escrow Account separated and segregated from the Escrow Bank's own funds or funds of any of its other customers or third parties.

2.7. Fees

[Executing Agency] / (Name of the National/State Level Agency, if any)[32] shall pay [Rs. [ ] per annum] as fees to the Escrow Bank for the establishment and management of the Escrow Account.[Executing Agency] / (Name of the National/State Level Agency, if any)[33] shall pay such fees to the Escrow Bank within 10 days of receipt of an invoice from the Escrow Bank.

2.8. Escrow Account Statements

The Escrow Bank shall provide monthly statements regarding the Escrow Account to{(Name of the National/State Level Agency, if any)}[34], the ***[Executing Agency]***and the Concessionaire.

[28] Delete whichever not applicable.
[29] Delete whichever not applicable
[30] Delete whichever not applicable
[31] Delete whichever not applicable
[32] Delete whichever not applicable
[33] Delete whichever not applicable
[34] Contents in the curly parenthesis may be deleted if not applicable.

3. ESCROW AMOUNT

3.1. Promptly upon ***[Executing Agency]*** / (Name of the National/State Level Agency, if any)[35] transferring any amount to the Escrow Account, the Escrow Bank shallsend a notice to the Concessionaire and the ***[Executing Agency]***notice informing them of the transfer.

3.2. The Escrow Bank shall hold all amounts in the Escrow for the benefit of both theConcessionaire and the ***[Executing Agency]***. Subject to clause 2.4(d) and clause 2.5(d) of this Escrow Agreement, the Escrow Bank shall notrelease any amount in the Escrow Account to any person other than the Concessionaire.

3.3. The Escrow Bank shall not apply any right of set-off against the amount in the Escrow Account,grant any lien over such amount, or apply any fee or deduction in relation to such amount.

4. RIGHTS, DUTIES AND OBLIGATIONS OFTHE ESCROW BANK

4.1. The Escrow Bank

(a) may, in the absence of bad faith, fraud, wilful default or gross negligence on its part, rely as to any matters of fact which might reasonably be expected to be within the knowledge of {(Name of the National/State Level Agency, if any) or}[36] the ***[Executing Agency]***, as the case may be, upon a certificate signed by or on behalf of {(Name of the National/State Level Agency, if any) or} the ***[Executing Agency]***, as the case may be;

(b) may, in the absence of bad faith, fraud, wilful default or gross negligence on its part, rely upon the authenticity of any communication or documents believed by it to be authentic;

(c) shall, within 5 days after receipt, deliver a copy to the ***[Executing Agency]***{and (Name of the National/State Level Agency, if any)} of anynotice or document received by the Escrow Bank from the Concessionaire or any other Person hereunder or in connection herewith;

(d) shall, within 5 days after receipt, deliver a copy to the Concessionaire of any notice or document received by the Escrow Bank from the ***[Executing Agency]***{or (Name of the National/State Level Agency, if any)} in connection herewith; and

(e) shall maintain all records of deposits and withdrawals from the Escrow Account for the term of this Escrow Agreement.

4.2. The duties of the Escrow Bank are only as herein specifically provided, and are purelyadministrative in nature. The Escrow Bank shall neither be liable for, nor chargeable with knowledge of, the terms and conditions of any other agreement, instrument or

[35] Delete whichever not applicable.
[36] Contents in the curly parenthesis may be deleted if not applicable.

document in connection herewith, including, without limitation, the Concession Agreement, and shall be required to act in respect of the amounts in the Escrow Account only as provided in this Escrow Agreement. This Escrow Agreement sets out all the obligations of the Escrow Bank with respect to any and all matters pertinent to the Escrow Account contemplated hereunder and no additional obligations of the Escrow Bank shall be implied from the terms of any other agreement. The Escrow Bank shall incur no liability in connection with the discharge of its obligations under this Escrow Agreement or in connection therewith, except such liability as may arise from the Escrow Bank's negligence, wilful misconduct or otherwise from any breach of this Escrow Agreement. Such liability, however, shall not exceed the amount in the Escrow Account at the date of the said breach by the Escrow Bank.

4.3. The Escrow Bank shall not be required to perform any act which will violate any ApplicableLaws.

4.4. In the event of any bankruptcy proceedings or enforcement proceedings against any of theParties pursuant to Applicable Laws, the Escrow Bank shall, notwithstanding the provisions of this Escrow Agreement, act and perform in accordance with Applicable Laws.

5. ESCROW AGREEMENT DEFAULTS

5.1. The following events shall constitute an event of default by the Concessionaire (an **Escrow Default**), unless such event of default has occurred as a result of any act or omission of{(Name of the National/State Level Agency, if any)or}[37] the ***[Executing Agency]***:

(a) in case the Concessionaire diverts funds drawn from the Escrow Account for a project/activity/usage other than the Project, and fails to cure such breach by not depositing an equal amount in the Escrow Account within 5 days; or

(b) in the case of any other breach, by failing to remedy the breach within 5 days to the satisfaction of the ***[Executing Agency]***{and (Name of the National/State Level Agency, if any)}.

5.2. The Parties agree that an Escrow Default in terms of this Escrow Agreement shall be treated asa Concessionaire Event of Default under the Concession Agreement, and the consequences of an Escrow Default shall be dealt with in accordance with the Concession Agreement.

5.3. Upon the occurrence of an Escrow Default, the Concessionaire agrees that [Executing Agency] / (Name of the National/State Level Agency, if any)[38] shall havethe right to direct the Escrow Bank to suspend withdrawals from the Escrow Account until further notice from [Executing Agency] / (Name of the National/State Level Agency, if any)[39].

[37] Contents in the curly parenthesis may be deleted if not applicable.
[38] Delete if not applicable.
[39] Delete if not applicable

6. MISCELLANEOUS

6.1. Representations and Warranties

Each Party represents and warrants that:

(a) it has the authority to enter into this Escrow Agreement;

(b) this Escrow Agreement constitutes a legally valid and binding obligation, enforceable against it in accordance with its terms;

(c) its entry into and/or performance under this Escrow Agreement will not be in breach of any express or implied terms of any contract with or other obligation to any third party; and

(d) it is solvent and able to perform all of its obligations under this Escrow Agreement.

6.2. Notices

Any notice or other communication to be given or made under this Escrow Agreement to the
Parties shall be in writing. Except as otherwise provided in this Escrow Agreement, such notice,request or other communication shall be delivered by registered mail or facsimile to the Party(ies) at the following addresses:

(Name of the National/State Level Agency, if any)[40]:

Attention: ----------
Tel:
Fax:
Email:

***[Executing Agency]*:**
Attention:
Address:
Email:

[Concessionaire]:
[ ] **Escrow Bank:**
[ ]

6.3. Entire Agreement

This Escrow Agreement and the Concession Agreement constitutes the entire agreement and understanding between the Parties with respect to its subject matter (i.e., escrow arrangement),and replaces and supersedes all prior agreements, arrangements, undertakings or statements regarding such subject matter.

[40] Delete if not applicable.

6.4. Amendments

No variation of or amendment to this Escrow Agreement shall be effective unless made in writing and executed by all the Parties hereto.

6.5. Harmonious Construction

For the purpose of giving full and proper effect to this Escrow Agreement, the Concession Agreement and this Escrow Agreement shall be read together and construed harmoniously. The terms of the Concession Agreement shall prevail in the event of any inconsistencies with this Escrow Agreement.

6.6. Assignment

Neither this Escrow Agreement nor any of the rights or obligations hereunder may be assigned by a Party without the prior written consent of the other Parties, provided that the Concessionaire shall be entitled, to the extent permitted by Applicable Law and as may be required under any Financing Documents entered into by the Concessionaire, to assign or create liens over its rights and interests under or pursuant to this Escrow Agreement.

6.7. Severability

Whenever possible, each provision of this Escrow Agreement shall be interpreted in such a way as to be effective and valid under Applicable Law, but if any provision of this Escrow Agreement is unenforceable or invalid under Applicable Law, such provision shall be ineffective only to the extent of such unenforceability or invalidity, and the remaining provisions of this Escrow Agreement shall continue to be binding and in full force and effect.

6.8. Confidentiality

The Parties, their employees, representatives and agents shall keep the provisions of this Escrow Agreement strictly confidential and, except as may be required by Applicable Laws, shall make no disclosure thereof to any Person, except the Parties' respective legal counsels and professional advisers, without the prior written consent of the other Parties.

6.9. Termination

This Escrow Agreement shall be automatically terminated upon the expiry of the Term or termination of the Concession Agreement and after disbursement of all amounts due and payable to the Concessionaire under the Concession Agreement, including Termination Compensation, if any, and any remaining amounts to [Executing Agency] / (Name of the National/State Level Agency, if any)[41] in accordance with clause 2.4(d) and clause 2.5(d) of this Escrow Agreement.

6.10. Dispute Resolution Mechanism

[41] Delete whichever not applicable.

(a) If any dispute arises out of or in connection with this Escrow Agreement, this dispute shall not affect the Parties' duty to continue the performance of all of their undisputed obligations.

(b) If any dispute arises, a Party shall give notice to the other Parties of the same, whereupon the Parties shall meet promptly and in good faith to attempt to reach an amicable settlement.

(c) All disputes not settled amicably pursuant to (b) above shall be heard by the competent courts of ***[State of Location]***.

6.11. Governing Law

This Escrow Agreement shall be governed by and construed in accordance with the laws of India.

IN WITNESS WHEREOF, the Parties hereto have caused these presents to be executed by its authorized representatives as of the date first written above.

For (Name of the National/State Level Agency, if any)[42]
By: ----------
Name:
Title:

For *[Executing Agency]*

By:
Name: [ ]
Designation:

For Concessionaire
By:
Name: [ ]
Designation: [ ]

For Escrow Bank

By:
Name: [ ]
Designation: [ ]

[42] Delete if not applicable

SCHEDULE 4: FORMAT OF THE MOBILIZATION ADVANCE GUARANTEE

[**on appropriate stamp paper**]

Guarantee No. : [●]
Amount of Guarantee : [●]

This Mobilization Advance Guarantee is executed on this [•] day of [•] at [•]

BY

[•] with its registered office at [•] and a branch office at [•] (hereinafter referred to as the "**Bank**", which expression shall unless repugnant to the context thereof, be deemed to include its successors-in-interest and permitted assigns)

IN FAVOUR OF

[Executing Agency], a statutory body constituted under the ***[Act under which the Executing Agency is established]***with its registered office at ***[Address of Executing Agency]***. (hereinafter referred to as ***[Executing Agency]***, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

WHEREAS

A. [_____[***insert name of the Concessionaire***] with its registered office at _____ [***insert address***], hereinafter referred to as the "**Concessionaire**", which expression shall unless repugnant to the context thereof, be deemed to include its successors-in-interest and permitted assigns) has executed a concession agreement dated [insert date.] with the ***[Executing Agency]***{and National/State level agency if any}[1] ("**Concession Agreement**") in relation to design, construction, operation and maintenance of sewage treatment plants along with other facilities and associated infrastructure at ***[Location]***by concessionaire.

B. In terms of Clause 5.21 of the Concession Agreement, the Concessionaire is required to furnish a Mobilization Advance Guarantee to the ***[Executing Agency]*** in the form of an unconditional, irrevocable and on demand bank guarantee for securing the Mobilization Advance made to the Concessionaire in accordance with the Concession Agreement ("**Mobilization AdvanceGuarantee**") for INR [***insert amount equal to 110 % of the Mobilization Advance***] (Rupees [•]) ("**Guaranteed Amount**").

C. At the request of the Concessionaire and for sufficient consideration, the Bank has agreed to issue this guarantee in favor of the ***[Executing Agency]***.

NOW THEREFORE THIS DEED WITNESSETH AS FOLLOWS:

1. Capitalised terms used herein but not defined shall have the meaning ascribed to them in theConcession Agreement.

2. The Bank shall upon a written demand from the ***[Executing Agency]*** informing the Bank of the Concessionaire's failure to fulfill its obligations under the Concession Agreement, pay to the ***[Executing Agency]***, within 5 (five) days of receipt of such written demand from the ***[Executing Agency]***, without further proof or conditions and without contest, recourse, demur

[1] Contents in the flower parenthesis may be deleted if not applicable.

or protest and without any enquiry to the ***[Executing Agency]*** or the Concessionaire, forthwith and in full amount, without any deductions or set off or counter claims whatsoever, the sum claimed by the ***[Executing Agency]*** in such demand not exceeding an amount equivalent to the Guaranteed Amount. The Bank will pay the amount specified in the demand notwithstanding any direction to the contrary given or any dispute raised by the Concessionaire or any other person.

The Bank agrees that this Mobilization Advance Guarantee does not limit the number of claims that may be made by the ***[Executing Agency]*** against the Bank provided that such claims taken together shall not exceed the Guaranteed Amount.

Any payment made hereunder shall be made free and clear of and without deduction for, or on account of, any present or future taxes, deductions or withholdings of any nature whatsoever and by whomsoever imposed, and where any withholding on a payment is required by any Applicable Law, the Bank shall comply with such withholding obligations and shall pay such additional amount in respect of such payment such that the ***[Executing Agency]***receives the full amount due hereunder as if no such withholding had occurred.

3. This Mobilization Advance Guarantee shall be a continuing guarantee during its currency and shall remain in force and effect until 21 months from the Effective Date or until the entire Mobilization Advance has been adjusted against the Construction Payments in accordance with the Concession Agreement, whichever is later, upon which the obligations of the Bank under this Mobilization Advance Guarantee shall stand discharged

4. The obligations of the Bank herein are absolute and unconditional, irrespective of the value, genuineness, validity, regularity or enforceability of the Concession Agreement or the insolvency, bankruptcy, reorganisation, dissolution or liquidation of the Concessionaire or any change in ownership of the Concessionaire or any purported assignment by the Concessionaire or any other circumstance whatsoever which might otherwise constitute a discharge or defence of a guarantor or a surety.

a. Further, this Mobilization Advance Guarantee is in no way conditional upon any requirement that the ***[Executing Agency]*** first attempts to procure the Guaranteed Amount from the Concessionaire or any other person, or resort to any other means of obtaining payment of the Guaranteed Amount.

5. The Bank hereby agrees that its liability under this Mobilization Advance Guarantee shall not be discharged by virtue of any agreement between the Concessionaire and the ***[Executing Agency]***, whether with or without the Bank's knowledge, or by reason of the ***[Executing Agency]*** showing any indulgence or forbearance to the Concessionaire.

6. The Bank's obligations under this Mobilization Advance Guarantee for the Guaranteed Amount is primary, independent and absolute and not by way of surety only.

7. The obligations of the Bank under this Mobilization Advance Guarantee shall not be affected by any act, omission, matter or thing which, but for this provision, would prejudice ordiminish the Guaranteed Amount in whole or in part, including (whether or not known to it or the ***[Executing Agency]***):

   (a) any time or waiver granted to, or composition with, the Concessionaire or any other person;

(b) any incapacity or lack of powers, authority or legal personality of or dissolutions or change in the status of the Concessionaire or any other person;

(c) any variation of the Concession Agreement so that references to the Concession Agreement in this Mobilization Advance Guarantee shall include each variation;

(d) any unenforceability, illegality or invalidity of any obligation of any person under the Concession Agreement or any unenforceability, illegality or invalidity of the obligations of the Bank under this Mobilization Advance Guarantee or the unenforceability, illegality or invalidity of the obligations of any person under any other document or guarantee, to the extent that each obligation under this Mobilization Advance Guarantee shall remain in full force as a separate, continuing and primary obligation, and its obligations be construed accordingly, as if there were no unenforceability, illegality or invalidity;

(e) any extension, waiver, or amendment whatsoever which may release a guarantor or the Bank (other than performance or indefeasible payment of a Guaranteed Amount); or

(f) any part performance of the Concession Agreement by the Concessionaire or by any failure by the [***Executing Agency***] / (National/State level agency if any)[2] to timely pay or any failure by {(and National/State level agency if any) or} the ***[Executing Agency]*** to timely perform any of its obligations under the Concession Agreement.

8. So long as any sum remains due from the Concessionaire to the ***[Executing Agency]***, the Bank shall not exercise any right of subrogation or any other rights of a guarantor or enforce any guarantee or other right or claim against the Concessionaire (whether in respect of its liability under this Mobilization Advance Guarantee or otherwise) or claim in the insolvency or liquidation of the Concessionaire or any such other person in competition with the ***[Executing Agency]***. If the Bank receives any payment or benefit in breach of this Clause 8, it shall hold the same in trust for the ***[Executing Agency]***.

9. The Bank represents, warrants and undertakes to the [***Executing Agency***] that:

(a) it has the power to execute, deliver and perform the terms and provisions of this Mobilization Advance Guarantee and has taken all necessary action(s) to authorize the execution, delivery and performance by it of this Mobilization Advance Guarantee;

(b) the Bank has duly executed and delivered this Mobilization Advance Guarantee, and this Mobilization Advance Guarantee constitutes its legal, valid and binding obligation enforceable in accordance with its terms except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, moratorium or other similar laws affecting the enforcement of creditors' rights generally and by general equitable principles;

(c) neither the execution, delivery or performance by the Bank of this Mobilization Advance Guarantee, nor compliance by it with the terms and provisions hereof will: (i) contravene any material provision of any law, statute, rule or regulations or any order, writ, injunction or decree of any court or governmental instrumentality; (ii) conflict or be inconsistent with or result in any breach of any of the material terms, covenants, conditions or provisions of, or constitute a default under any agreement, contract or

[2] Delete whichever not applicable.

instrument to which the Bank is a party or by which it or any of its property or assets is bound; or (iii) violate any provision of the Bank's constituent documents;

(d) no order, consent, approval, license, authorization or validation of, or filing, recording or registration with (except as have been obtained or made prior to the date hereof), or exemption by, any governmental or public body or authority, or any subdivision thereof, is required to authorize, or is required in connection with: (i) the execution, delivery and performance of this Mobilization Advance Guarantee; or (ii) the legality, validity, binding effect or enforceability of this Mobilization Advance Guarantee; and

(e) this Mobilization Advance Guarantee will be enforceable when presented for payment to a Scheduled Commercial Bank (as defined by the Reserve Bank of India Act, 1934) at ***[Location]***.

10. This Mobilization Advance Guarantee is a continuing one and all liabilities to which it applies or may apply under the terms hereof shall be conclusively presumed to have been created in reliance hereon. No failure or delay on the part of the ***[Executing Agency]*** in exercising any right, power or privilege hereunder and no course of dealing between the ***[Executing Agency]*** and the Bank, or the Concessionaire, shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, power or privilege.

11. If any one or more of the provisions contained in this Mobilization Advance Guarantee are or become invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby, and the Bank shall enter into good faith negotiations with the ***[Executing Agency]*** to replace the invalid, illegal or unenforceable provision.

12. The Bank hereby agrees to execute and deliver all such instruments and take all such actions as may be necessary to make effective fully the purposes of this Mobilization Advance Guarantee.

13. This Mobilization Advance Guarantee may be executed in one or more duplicate counterparts, and when executed and delivered by the Bank and the ***[Executing Agency]*** shall constitute a single binding agreement.

14. Any demand, notice, request or other communication to be given or made under this Mobilization Advance Guarantee shall be deemed to have been duly given or served:

(a) Upon, ***[Executing Agency]***,***[LOCAL ADDRESS OF THE Executing Agency]***, marked for the attention of the ***[OFFICER IN CHARGE]***;

(b) Upon a Scheduled Commercial Bank (as defined by the Reserve Bank of India Act, 1934), at***[Location]***,India.

15. The Bank:

(a) acknowledges that the Lenders will review this Mobilization Advance Guarantee and may require changes thereto as a condition of granting any Financial Assistance and/or providing political risk insurance; and

(b) shall consider any such requirements in good faith.

16. This Mobilization Advance Guarantee shall be governed by, and construed in accordance

with, the laws of India. The Bank irrevocably agrees that any legal action, suit or proceeding arising out of or relating to this Mobilization Advance Guarantee may be brought in the courts in ***[STATE OF Location]***.

17. The ***[Executing Agency]*** may assign or transfer all or any part of its interest herein together with theConcession Agreement to any other person with prior consent of to the Bank. The Bank may not assign or transfer any of its rights or obligations under this Mobilization Advance Guarantee.

IN WITNESS WHEREOF the Bank has set its hands hereunto on the day, month and year first hereinabove written.

Signed and delivered by [*insert name of Bank*] Bank by hand

SCHEDULE 5
DISCHARGE POINT

[map/layout/google image of the discharge point for the proposed site to be inserted]

SCHEDULE 6: SCOPE OF WORK OF THE PROJECT ENGINEER

The Project Engineer shall assist the ***[Executing Agency]*** in supervising the construction, rehabilitation, operation and maintenance of the Facilities and shall work closely with the ***[Executing Agency]*** to monitor compliance with the KPIs. The detailed scope of work of the Project Engineer, to be read in conjunction with the provisions of the Concession Agreement, is outlined below:

a) The Project Engineer shall review the Designs and Drawings to be provided by the Concessionaire. These will include, *inter-alia*, the site layout plan, process design, drawings, structural calculations, mechanical, electrical and instrumentation works, quality plans, implementation schedules, and the environment, health & safety plans for all Facilities. On the basis of its review, the Project Engineer shall provide its recommendations to the ***[Executing Agency]***.

b) During relevant Construction Periods, the Project Engineer shall inspect the relevant Facilities at least once a month and prepare an inspection report, setting out the progress of the construction of the relevant Facilities, defects or deficiencies, if any, and status of compliance with the Construction Plan, Technical Specifications and Designs and Drawings and the Guaranteed Interim Availability.

c) The Project Engineer shall be responsible to monitor the implementation of the approved environment, health & safety plan by the Concessionaire. The Project Engineer shall also verify the material safety data sheets of hazardous chemicals if any.

d) The Project Engineer shall review the construction progress of the project as per the Payment Milestones proposed by the Concessionaire and provide necessary recommendations to the ***[Executing Agency]*** for the purpose of issuance of Milestone Construction Certificates.

e) The Project Engineer shall assist ***[Executing Agency]*** in estimating the Interim Availability Liquidated Damages and Delay Liquidated Damages as applicable.

f) At the end of the Construction Period for different Facilities, the Project Engineer shall review the relevant Facilities and provide necessary recommendations to the ***[Executing Agency]*** with regards to the issuance of the respective Construction Completion Certificates to the Concessionaire to certify completion of construction of such Facilities, and the satisfaction of all other conditions required to be fulfilled by the Concessionaire.

g) The Project Engineer shall monitor the Trial Operations of different Facilities during their respective Trial Periods and provide necessary recommendations to the ***[Executing Agency]*** for the purpose of the issuance of the respective COD Certificates to the Concessionaire. The review shall be based on the Trial Operations Procedures outlined in the Concession Agreement and include the following.
   - Verify quality of installations, operation of equipment and workmanship;
   - Verify the Discharge Standard of the Treated Effluent, Treated Water and Facilities By-Products;
   - Verify the consumption of electricity and generation of power if any vis-à-vis the Guaranteed Energy Consumption.

h) The Project Engineer shall review the O&M Manual and the Scheduled Maintenance Program submitted by the Concessionaire and provide its recommendations to the ***[Executing Agency]***.

i) During the O&M Period, the Project Engineer shall inspect all the Facilities at least once a month and prepare an inspection report, setting out the defects or deficiencies, if any, and status of compliance with the relevant KPIs (including specifically, the Influent Standards and the Discharge Standards).

j) The Project Engineer shall review the reports generated form the Online Monitoring Systems of different Facilities to assess adherence to their relevant KPIs and submit the monthly KPI Adherence Reports to the ***[Executing Agency]***.

k) The Project Engineer shall assist ***[Executing Agency]*** in estimating the Availability Liquidated Damages, the Performance Liquidated Damages and the Power Consumption Liquidated Damages as applicable.

l) The Project Engineer shall inspect laboratories where tests are conducted on samples to ensure conformance and compliance with laboratory procedures and requirements.

m) During the Term, and as requested by the ***[Executing Agency]***, the Project Engineer shall provide its opinion and assessment on the implications of the events related to Emergency, Change in Law, Force Majeure, Fundamental Change in Law, Minor casualty, Total casualty, Variation and Unforeseen Site Conditions.

n) The Project Engineer shall participate in the survey to determine the Hand-back Conditions as per the Hand-back Requirements. It shall review the survey report of the Hand-back Conditions submitted by the Concessionaire and provide its recommendations to the ***[Executing Agency]*** on the compliance with the Hand-back Requirements.

SCHEDULE 7:LIQUIDATED DAMAGES

1. Availability of Main Pumping Stations

Parameter	Value
During construction period- Guaranteed Interim Availability	--
Guaranteed Availability of pumping station after COD	100%
Hours in the month for which a specific pumping station was not Available (A)	
Non-Availability for the specific pumping station (B)	=[(A) / 720] x100
LDs for non- adherence for the specific pumping station (INR)	= (B) x 2,000

2. Availability of [Location]STP/FSTP[1]

Parameter	Value
After COD - Guaranteed Availability	100%
Hours in the month for which the relevant Facilities were not Available (A)	----
Non-Availability (B)	= [(A) / 720] x100
LDs for non- adherence (INR)	(B) x 30,000

3. Treated Effluent and Digested/dewatered Sludge liquidated damages for [Location] STP/FSTP (Performance Liquidated Damages)

Parameter	Liquidated Damages (INR)
A. Liquidated Damages	
BOD	5,000
COD	5,000
TSS	5,000
Nitrogen Total	5,000
Phosphorus Total	5,000
Fecal Coliform	5,000
B. Sludge to be disposed	
Outlet Concentration of dewatered sludge	3,000
Volatile suspended solids	3,000
Faecal coliform	3,000
Salmonella	3,000
Viruses	3,000

[1]Availability Liquidated Damages for Faecal Sludge Collection and Transportation Vehicles or any other assets/faciltiies forming part of the Associated Infrastructure may be decided by the Executing Agency.

Helminth egg	3,000

SCHEDULE 8: APPLICABLE PERMITS[1]

1. Concessionaire Applicable Permits

S. No.	Applicable Permit	Authority
1.	Temporary Power Connection (During Construction Period)	Electricity Board/ other temporary sources
2.	Consent to Operate	State Pollution Control Board
3.	Consent for storage of hazardous materials	Director of Explosives
4.	Consent Firefighting system	Firefighting Department
5.	CEIG approval – stage 1 for construction & stage 2 on completion of project	Chief Electrical Inspector to Government

The Concessionaire will be liable to obtain all Applicable Permits (other than the ***[Executing Agency]*** Applicable Permits) that are necessary for construction, operation and maintenance of the Facilities.

[Executing Agency]shall assist the Concessionaire in obtaining all the required permits.

2. *[Executing Agency]* Applicable Permits

S No.	Applicable Permit	Authority
1.	Electricity Board approval during various stages – request for load sanction, remittance of deposit, installation of incomings, etc	Electricity Board
2.	Layout and building plan approval	ULB/DTCP
3.	Consent to establish	State Pollution Control Board (SPCB)
4.	Tree cutting	Forest Department
5.	Road cutting & crossing	Public Works Department
6.	Railway Crossing	Commissioner Railway safety
7.	Revenue road cutting & crossing	Panchayat/Local Authority
8.	Obtaining No Objection Certificate for various sewerage facilities under the ULB for handing them over to ***[Executing Agency]***	ULB/District Administration
9.	Construction of weirs/pipeline crossings	Irrigation Department/ULB
10.	Approach Road to new Facilities	Forest Department/ Panchayat/Local Authority/Irrigation Department

[1] The List of Applicable Permits provided herein is indicative and non-exhaustive.

11.	Consent to Operate for Existing Facilities	ULB and SPCB

The Concessionaire shall proactively assist the ***[Executing Agency]***in obtaining all the required permits.

SCHEDULE 9: ENVIRONMENT, HEALTH & SAFETY

1. Link to the Environment and Social Management Framework (ESMF) to be followed for Projects

Environmental and Social Management Framework of -------- Project:
http://----------

2. Requirements for preparation of ESHS Management Strategies and Implementation Plans (ESHS-MSIP)

The Concessionaire shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP). These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the Concessionaire, and its subcontractors.

In developing these strategies and plans, the Concessionaire shall have regard to the ESHS provisions of the Concession Agreement including those as may be more fully described in the following:

a. Works Requirements described in Concession Agreement;

b. Environmental and Social Impact Assessment (ESIA);

c. Environmental and Social Management Plan (ESMP);

d. Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

……

Metrics for Progress Reports

The following Metrics should be used for regular reporting:

a. environmental incidents or non-compliances with Concession Agreement requirements, including contamination, pollution or damage to ground or water supplies;

b. health and safety incidents, accidents, injuries and all fatalities that require treatment;

c. interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);

d. status of all permits and agreements:

i. *work permits: number required, number received, actions taken for those not received;*

ii. *status of permits and consents:*

- *list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);*
- *list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);*
- *identify major activities undertaken in each area this month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);*
- *for quarries: status of relocation and compensation (completed, or details of monthly activities and current status).*

e. *health and safety supervision:*

i. *safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;*

ii. *number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);*

f. *worker accommodations:*

i. *number of expats housed in accommodations, number of locals;*

ii. *date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;*

iii. *actions taken to recommend/require improved conditions, or to improve conditions.*

g. *HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);*

h. *gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);.*

i. training:

i. number of new workers, number receiving induction training, dates of induction training;

ii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;

iii. number and dates of HIV/AIDS sensitization training, no. workers receiving training (this month and in the past); same questions for gender sensitization, flaglady/flagman training.

j. environmental and social supervision:

i. environmentalist: days worked, areas inspected and numbers of inspections of each part of the Facilities created, highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;

ii. sociologist: days worked, number of partial and full site inspections of each part of the Facilities created, highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and

iii. community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.

k. Grievances: list this month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up (Cross-reference other sections as needed):

i. Worker grievances;

ii. Community grievances

l. Traffic and vehicles/equipment:

i. traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;

ii. accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;

iii. *overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).*

m. *Environmental mitigations and issues (what has been done):*

i. *dust: number of working bowsers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/muram/spoil lorries with covers, actions taken for uncovered vehicles;*

ii. *erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;*

iii. *quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken this month at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;*

iv. *blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);*

v. *spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination);*

vi. *waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;*

vii. *details of tree plantings and other mitigations required undertaken this month;*

viii. *details of water and swamp protection mitigations required undertaken this month.*

n. *compliance:*

i. *compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;*

ii. *compliance status of ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance*

iii. *other unresolved issues from previous months related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.*

3. Requirements for the preparation of the Code of Conduct

The Concessionaire shall submit the Code of Conduct that will apply to the Concessionaire's employees and subcontractors. The Code of Conduct shall ensure compliance with the ESHS provisions of the Concession Agreement, including those as may be more fully described in the following:

a. Works Requirements described in Concession Agreement;

b. Environmental and Social Impact Assessment (ESIA);

c. Environmental Management Plan (EMP);

d. Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

MINIMUM REQUIREMENTS FOR THE CODE OF CONDUCT

A minimum requirement for the Code of Conduct should be set out, taking into consideration the issues, impacts, and mitigation measures identified in:

- project reports e.g. ESIA/ESMP
- consent/permit conditions
- required standards including World Bank Group EHS Guidelines and Performance Standards
- national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines and PS)
- relevant standards e.g. Workers' Accommodation: Process and Standards (Indian Standards, and in the absence of such Indian Standards those of IFC and EBRD)
- relevant sector standards e.g. workers accommodation
- grievances redress mechanisms.

The types of issues identified could include risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining a safe environment etc.

A satisfactory code of conduct will contain obligations on all project staff (including sub-contractors and day workers) that are suitable to address the following issues, as a minimum.

Compliance with applicable laws, rules, and regulations of the jurisdiction

1. Compliance with applicable health and safety requirements (including wearing prescribed personal protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
2. The use of illegal substances
3. Non-Discrimination (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction)
4. Interactions with community members (for example to convey an attitude of respect and non-discrimination)
5. Sexual harassment (for example to prohibit use of language or behavior, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
6. Violence or exploitation (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior)
7. Protection of children (including prohibitions against abuse, defilement, or otherwise unacceptable behavior with children, limiting interactions with children, and ensuring their safety in project areas)
8. Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
9. Avoidance of conflicts of interest (such that benefits, Concession Agreement, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
10. Respecting reasonable work instructions (including regarding environmental and social norms)
11. Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
12. Duty to report violations of this Code
13. Non retaliation against workers who report violations of the Code, if that report is made in good faith.

The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:

- received a copy of the code;
- had the code explained to them;
- acknowledged that adherence to this Code of Conduct is a condition of employment; and

- understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.

4. Guidelines for staffing of a Core team of 3 people for implementation of the Concessionaire's ESHS obligations

S.No	Key Position	Minimum Qualifying Requirement		
		Total Work Experience (years)	**Experience in Similar Works (years)**	**Minimum Education Qualification**
1.	Health Expert & Safety Specialist*	10	5	B.E. /B. Tech or Equivalent with Specialization / additional qualification in EHS related field.
2.	Environmental Specialist *	10	5	B.E./B. Tech or Equivalent with Specialization / additional qualification in Environment related field
3.	Social Specialist*	10	5	Master's degree in Social Work or equivalent

* He/she should have worked as a sole expert for Urban Infrastructure projects. Experience in environment / safety / Social Risk Assessment, resettlement and rehabilitation and Management plans related to similar project would be preferred.

5. Minimum Requirements and Guidelines for the preparation of the Screening Report

The extent of assessment required to identify and mitigate the impacts largely depends upon the complexities of project activities. The scrutiny and screening will be based on a detailed Environment and Social Screening exercise, summarized in the following Format:

Environment and Social information format for screening			
	Project Title: Implementing agency: Project cost: Project components: Project location (Area/ district)		
	Screening Criteria	**Assessment of category (High/ low)**	**Explanatory note for categorisation**
1	Is the project in an eco-sensitive area or adjoining an eco-sensitive area? (Yes/No) If Yes, which is the area? Elaborate impact accordingly.		
2	Will the project create significant/ limited/ no social impacts? • Involuntary land taking resulting in loss of income from agricultural land, plantation or other existing land-use. • Involuntary land taking resulting in relocation of title holder or non-titleholder households. • Any reduction of access to traditional and river dependent communities (to river and areas where they earn for their primary or substantial livelihood). • Any displacement or adverse impact on tribal settlement(s). • Any specific gender issues.		
3	Will the project create significant / limited / no environmental impacts during the construction stage? (Significant / limited / no impacts) • Clearance of vegetation/ tree-cover • Direct discharge of construction run-off, improper storage and disposal of excavation spoils, wastes and other construction materials adversely affecting water quality and flow regimes. • Flooding of adjacent areas • Improper storage and handling of substances leading to contamination of soil and water • Elevated noise and dust emission		

	• Disruption to traffic movements • Damage to existing infrastructure, public utilities, amenities etc. • Failure to restore temporary construction sites • Possible conflicts with and/or disruption to local community • Health risks due to unhygienic conditions at workers' camps • Safety hazards during construction		
4	Will the project create significant / limited / no environmental impacts during the operational stage? (Significant / limited / no impacts) • Flooding of adjacent areas • Impacts to water quality due to effluent discharge • Gas emissions • Safety hazards		
5	Do projects of this nature / type require prior environmental clearance either from the MOEF&CC or from a relevant state Government department? (MOEF&CC/ relevant State Government department/ No clearance at all)		
6	Does the project involve any prior clearance from the MOEF&CC or State Forest department for either the conversion of forest land or for tree-cutting? (Yes/ No). If yes, which?		
7	Please attach photographs and location maps along with this completed Environmental Information Format For Screening.		
Overall assessment			

*Detailed explanation/ justification for arriving at specific category (high/ low) to be provided in the specified column

SCHEDULE 10: KEY PERFORMANCE INDICATORS

1. Availability

The Concessionaire shall ensure that the Availability of the Facilities and the Associated Infrastructure on every day during the O&M Period shall be 100% (one hundred per cent) (the **"Guaranteed Availability"**).

2. Treated Effluent Quality

The Treated Effluent shall meet the following requirements:

Parameter	Unit	Value for *[Location]* STP/FSTP
pH		5.5-9.0
BOD	mg/L	≤[1]0
TSS	mg/L	≤20
COD	mg/L	≤50
Nitrogen Total	mg/L	≤10
Phosphorus Total	mg/L	≤1.0
Faecal Coliform	MPN/100 mL	≤230

The Concessionaire shall not be responsible for adherence to the above requirements of Treated Effluent in an event the values of the Influent Standardsare as per table below.

Item/ Parameter/ Description	Units	Value for *[Location]* STP/FSTP
pH		>9.00
BOD	mg/L	<80 and >250
TSS	mg/L	>500
COD	mg/L	>500
TKN	mg/L	>60
Phosphorus Total	mg/L	>7

3. Digested/dewatered sludge

The Sludge to be disposed shall meet the following requirements.

Units	Value
Outlet Concentration of dewatered sludge	More than 20% solids
Volatile suspended solids	least 38% of reduction
Faecal coliform limit	≤1000 MPN / g

[The Sludge to be disposed shall meet the following requirements.][1]

Units	Value
Salmonella	≤3 MPN/4 g
Viruses	≤1 FPU/4 g
Helminth egg	≤1 helminth egg/4 g

4. Energy guarantee

The concessionaire shall guarantee the maximum number of units of power per MLD of treated sewage/faecal sludge/septage. This should be less or equivalent to consumption power units interms of units in each of during the O&M period (other than any units expected to be generated and consumed from any power plant proposed to be set up by the Concessionaire), to operate and maintain the Facilities including STP/FSTP, pump houses and other associated Infrastructure (at varying volumes and BOD of sewage).

5. Assessment of compliance to KPIs

The assessment of compliance to KPIs for each of the parameters shall be checked in accordance with the reports from online monitoring system or laboratory tests as set out in the Schedule 12 (Part D).

[1]If co-treatment of Faecal sludge is proposed.

SCHEDULE-11
PROJECT INFORMATION MEMORANDUM

[Project specific Information as available to be provided in this schedule for the Bidders. Indicative headings for the Schedule are as below:]

1. Project background

.....

2. [*Location*] town at a glance:

2.1. Introduction

…..

2.2. Geography :

……

2.3. Topography:

….

3. Population:

…

3.1.1.Zone-wise population projection:

Zone	Population			Sewage Generation		
	2020	**2035**	**2050**	**2020**	**2035**	**2050**
Zone WISE/ Ward wise						
Total City						
Total						

S. No.	**Sewerage Zone**	**Ward covered**
1	Zone No. 1	
2	Zone No. 2	

3.2. Existing water supply infrastructure:

3.2.1.Water Supply System

3.2.2.Source, supply levels and treatment facilities

3.3. Sewerage schemes under implementation

3.4. Details of existing drains

3.4.1.Flow Measured in The Drains

3.4.2. Wastewater Characteristics of Drains

3.5. Drain Catchment

4. Drain I&Ds

5. Existing Power Supply source

SCHEDULE 12:TECHNICAL REQUIREMENT

Contents

Part	Section	Title
A		Process requirements and design criteria of sewage/faecal sludge/septage work
B		Technical specifications
	G1	General requirement
	G2	Materials and workmanship
	G3	General civil specifications
	G4.1	General Mechanical Specifications
	G5.1	General Electrical Specifications
	G5.2	Technical specification for Diesel generator set
	G5.3	Erection, testing and commissioning
	G5.4	Instrumentation works
	G5.5	SCADA (Online Monitoring System) for STP(s)/FSTP(s) and LS/ PS
	G5.6	Inspection and testing at manufacturer's works
C		Testing and Commissioning
D		Specifications for Operation and Maintenance
E		Electrical load list

PART A - PROCESS REQUIREMENTS AND DESIGN CRITERIA OF SEWERAGE WORK

PART A - PROCESS REQUIREMENTS AND DESIGN CRITERIA OF SEWERAGE WORK

1. Flow and Raw sewage/faecal sludge/septage characteristic for *[LOCATION]*STP(s)/FSTP(s)

The Influent standards for STP(s)/FSTP(s) design purpose are stated below.

Item/Parameter/Description	Units	Design Capacity
Design capacity for sewage/faecal sludge/septage (Average)	MLD	***[xx]***

Item/Parameter/Description	Units	Proposed STP/FSTP
pH		5.5-9.0
BOD5 at 20°C	mg/L	80-250
TSS	mg/L	≤500
COD	mg/L	≤500
TKN	mg/L	≤60
Phosphorus Total	mg/L	≤7

Note:Influent standards provided above is the influent sewage/faecal sludge/septage characteristic. In addition to the above,The concessionaire must make sure that the treated effluent and digested sludge meet the disposal standards as mentioned in the KPI.

2. General design requirements

The Concessionaire shall design the Facilities in accordance with the provisions of the IS codes, Central Public Health and Environmental Engineering Organisation (CPHEEO) manual on Sewerage and Sewage Treatment, Good Industry Practices and Applicable Laws.

The precedence for process and hydraulics shall be CPHEEO manual followed by the IS codes and Good Industry Practices. The precedence for civil, structural, mechanical & electrical processes shall be ISO/BIS Codes followed by CPHEEO manual and Good Industry Practices.

The STP(s)/FSTP(s) shall be designed by the Concessionaire to receive and treat all combinations of sewage/faecal sludge/septage influent flows and loads in accordance with the Influent Standards specified above.

Concessionaire's plant design shall fully comply with the minimum retluirements specified in this schedule and other schedules,regardless of whether or not such requirements or any related components are shown in anydrawings included or document issued by the Employer.

All interconnecting channels, launders, pipe line shall be designed for peak flows.

2.1. Design life

The Facilities shall be designed and constructed to provide the minimum service life as prescribed in CPHEEO guidelines (2013) Chapter-2Table 2.1 Design period of sewerage components.

2.2. Per Capita Water Supply and Sewage/Faecal Sludge/SeptageGeneration

Per Capita water supply and Sewage/Faecal Sludge/SeptageGeneration shall be considered as per CPHEEO Sewerage manual.

2.3. Infiltration

Estimate of flow in sanitary sewers have to include flows due to infiltration of ground water. In light of general geological structure, ground water occurrence and topography, the ground water infiltration is considered for the proposed networks. For the design purpose, infiltration is considered as 10% (ten per cent).

2.4. Peak factors

The peak factor shall be considered as perCPHEEO guidelines (2013).

2.5. Design flows

Design flows are essentially peak dry weather flows. Peak dry weather flows would comprise of peak domestic sewage/faecal sludge/septage flow plus infiltration as per below.

Pipe	**SectionalAverage flow**	**CumulativeAverage flow**	**CumulativeInfiltration**	**Peakflow**
(a)	**(b)**	**(c)**	**(d)**	**(e)**
	= Sectional populationxsewage/faecal sludge/septage(watersupplyratexreturnfactor)	=Sectionalsewage/faecal sludge/septageAverageflow+cumulativeaverageflowfrompreviousconnecting node(s)	= 10%ofCumulativesewage/faecal sludge/septage Averageflow	=(c) xPeakFactor+ (d) =Cumulativesewage/faecal sludge/septageAverageflowx PeakFactor+Cumulative

				Infiltration

2.6. IS codes for Sewerage System

Proposed sewerage system shall generally conform to the following publications of the Indian Standards Institution and applicable Indian standards:

IS: 458	Precast Concrete Pipes (With and Without Reinforcement) – Specification
IS: 14333	High density polyethylene pipe for sewerage
IS: 15328	Un-plasticised Non-Pressure Polyvinyl Chloride (PVC-U) Pipes for use in Underground Drainage and Sewerage Systems
IS: 783	Code of Practice for Laying of Concrete Pipes
IS:4111 (Part 1)	Code of Practice for Ancillary Structures in Sewerage System: Part 1 Manholes
IS:4111 (Part 4)	Code of Practice for Ancillary Structures in Sewerage system: Part 4 Pumping stations and pumping mains (rising mains)
IS: 5455	Specification for Cast Iron Steps for Manholes
IS: 10151	Polyvinyl Chloride (PVC) and its Copolymers for its Safe Use in Contact with Foodstuffs, Pharmaceuticals and Drinking Water
IS: 6280	Specification for Sewage/Faecal Sludge/SeptageScreens
IS: 5600	Pumps- Sewage/Faecal Sludge/Septageand Drainage
IS: 8329	Centrifugally Cast (Spun) Ductile Iron Pressure Pipes for Water, Gas and Sewage/Faecal Sludge/SeptageSpecification``
IS: 11972	Code of practice for safety precautions to be taken when entering a sewerage System
IS: 12592	Precast Concrete Manhole Cover And Frame — Specification
IS: 13496	General Requirements of Suction Machine for Cleaning Sewers, Manholes and Ancillary Structures Provided On Sewer Line and Closed Storm Water Drains
IRC: 6	Standard Specifications and Code of Practice for Road Bridges – Section II – Loads and Stresses

2.7. Design parameters for gravity collection system

2.7.1. Design formula(As per CPHEEO)

Manning's formula is adopted for design of gravity sewers.

Q_f	=	$A \times V_f$
V_f	=	$1/N \times R^{2/3} \times S^{1/2}$
Where,		
Q_f	=	Flow rate when pipe flows full in cumecs

V_f	=	Velocity when pipe flows full in mps

2.7.2. Coefficient of Roughness

For sewers with diameters within range of 150-1400mm, RCC pipes with S&S joints have been proposed where Manning's coefficient 'n' is considered as 0.011. For HDPE pipes manning's coefficient 'n' is considered as 0.011. For design purpose, n/N is considered as constant.

2.7.3. Pipe Material for Gravity Sewers

RCC NP3 class pipes conforming to IS: 458 with Sulphate Resistant Cement and rubber ring joints shall be proposed. For highway crossings and pipe jacking, RCC NP4 pipes are proposed.

2.7.4. Design Capacity of Sewers

Sewers are designed to carry estimated peak flows generated in the design year. As far as possible, they will be designed to run maximum 80% full at ultimate peak flow as per the CPHEEO Manual. This is to ensure proper ventilation and to prevent the sewage/faecal sludge/septage getting septic.

2.7.5. Self Cleansing Velocities

To ensure that deposition of suspended solids does not take place, self-cleansing velocities using Shield's formula will be considered in the design of sewers.

$$V= (1/n) \times R^{1/6} \{K_S (S_S - 1) \times d_p\}^{1/2}$$

K_S = Dimensionless constant @ 0.04 to start motion of granular particle and @ 0.8 for adequate self cleansing velocity.

S_S = Specific Gravity of Particle

d_p = Particle size

The above formula indicates that velocity required to transport material in sewers is mainly dependent on the particle size and specific gravity and only slightly dependent on conduit shape and depth of flow.

The sewers are designed on the assumption that although silting might occur at minimum flow, it would be flushed out during peak flows. Erosion of sewers is caused by sand and other gritty material in the sewer and also by excessive velocity.

Based on above, the velocity criteria which is considered is as given below.

Minimum velocity	=	0.80 m/s
Maximum velocity	=	3.00 m/s

An attempt shall be made to obtain adequate self cleansing velocities in the design of sanitary sewer at the average or at least at the maximum flow at the beginning of the design period. If the velocity criteria do not meet for initial stretches of sewers due to less flow, these stretches will need to be flushed at regular intervals to avoid clogging of sewers.

2.7.6. Minimum size and gradient of sewers

The gradients adopted for the sewers shall be in concurrence with the CPHEEO manual. The gradients adopted for the sewers shall bebased on flow and velocity requirements. The crown levels of incoming and outgoing sewers shall bekept same.Whenever required drop manholes shall beprovided.

2.7.7. Depth of cover

Minimum depth of cover

To facilitate house sewer connections and future laterals connections to the street manholes and to provide sewer protection from external loads, the minimum depth of cover is considered as 1 m.

2.8. Design parameters for rising mains / pressure pipes (As per CPHEEO)

For Pressure pipe, Hazen William formula is adopted $V = 0.85 \times C \times R^{0.63} \times S^{0.54}$

for circular conduits, the expression becomes

$V = 4.567 \times 10^{-3} C D^{0.63} S^{0.54}$

where,

Q : Discharge in m3/hr

D : Internal diameter of pipe in mm

V : Velocity in m/s

R : Hydraulic radius in m

S : Slope of hydraulic gradient and
C : Hazen - Williams coefficient as in Table 3.14 (CPHEEO Manual)

For Rising Mains, Ductile Iron (DI) of Class K9 pipes with internally smooth cement mortar lining are proposed.

Minimum velocity	=	0.80 m/s
Maximum velocity	=	3.00 m/s

Losses in fitting shall be computed as per latest CPHEEO Manual.

2.9. Bedding for sewers

The type of bedding (Granular Bedding, Plain Cement Concrete Cradle Bedding, Reinforced Cement Concrete Cradle Bedding and Reinforced Cement Concrete Encasement) depends on the weight of soil above the pipe based on width of trench, depth at which the sewer pipe is laid and the class of superimposed vehicular load considered based on the traffic condition.

For RCC (NP3 class) pipes, the appropriate bedding shall be provided based on the bedding factor calculated considering load due to backfill, the superimposed (live) load and the three edge bearing strength of RCC pipes as per IS:458.

The bedding factor is calculated by following formula.

$$\text{Bedding Factor} = \frac{\text{Total Load (kN/m) x Factor of Safety}}{\text{Three Edge Bearing Strength (kN/m)}}$$

Where, Total load is sum of Earth load, Vehicular load and Water load

Three Edge Bearing Strength of RCC pipe is considered as per IS: 458

Factor of safety is considered as 1.1.

Impact factor for vehicular traffic depends on cover above top of pipes. For sewers, the depth of cover is more than 900mm, hence impact factor is considered as 1.0 as per IS:783.

The type of bedding to be used, depending on the bedding factor shall be as indicated.

Bedding factor	Type of bedding	Class of bedding
Up to 1.9	Granular Bedding with Carefully Compacted	B

Bedding factor	Type of bedding	Class of bedding
	Backfill (GRB)	
For more than 1.9 and upto 2.8	Concrete Cradle Bedding with Carefully Compacted Backfill (PCCB)	A b
For more than 2.8 and up to 3.4	Reinforced concrete cradle with percentage of reinforcement `p' equal to 0.4% with carefully compacted backfill (RCCB)	A c
For more than 3.4 and up to 4.8	Reinforced Concrete Encasement with percentage of reinforcement `p' equal to 1% (RCE)	A d

(Note: 'p' is the ratio of the area of transverse reinforcement to the area of concrete cradle at the pipe invert above the base)

2.10. Manholes

2.10.1. Ordinary manhole

Manholes are to be provided at all junctions, change of sewer size, gradient and direction. The sizes of manholes adopted are in line with the recommendations of CPHEEO Manual for Sewerage and Sewage treatment. In general, to facilitate the cleaning and maintenance the Manhole spacing is kept as per CPHEEO Manual.

The clear opening at the top in case of ordinary manholes is kept as 560 mm. The manhole frame and cover is proposed of Steel Fiber Reinforced Concrete (SFRC) capable of withstanding heavy-duty loads (HD-20 for side lanes), (HD-35 for main roads) conforming to IS: 12592-2002.

The street manholes will be circular in shape with concentric cone depending on the depth and diameter of sewers. Based on the sewer diameters CPHEEO Manual for Sewerage and sewage treatment recommends the internal diameter of the manhole should not be less than internal diameter of largest sewer plus 150mm of benching on both sides. However, from practical considerations the benching width for sewer diameter greater than 450mm is kept as 300mm on both sides. The internal diameters of manholes for varying depths as recommended by CPHEEO Manual for Sewerage and sewage treatment will be as follows.

Description	Dimension
For depths above 0.90m and up to 1.65m	900mm diameter
For depths above 1.65m and up to 2.30m	1200mm diameter
For depths above 2.30m and up to 9.00m	1500mm diameter
For depths above 9.00m and up to 14.0m	1800mm diameter

It is desirable to place the first pipe joint (S/S) outside the manhole as close as practicable. This pipe shall be built inside the wall of the manhole flush with the internal periphery protected with an arch of masonry or cement concrete to prevent it from being crushed.

The inside and outside of brickwork should be plastered with cement mortar (1:3) inside finished smooth with a coat of neat cement.

Due to availability of plenty of bricks locally and less cost, Brick Masonry manholes are proposed wherein house connections / lateral sewers can be done conveniently. However, RCC manholes are also considered for sub-soil water conditions. RCC manholes are considered as square for ease in construction as the cost difference between circular and square type of RCC manholes are marginal. Precast concrete manholes are also considered for congested and narrow lanes for speedy construction for manhole depth upto 1.65m for pipes upto 400mm dia.

The type and size of manholes (depth-wise) is given below.

Type and size of manholes for proposed sewerage works

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
BRICK MASONRY				
Rectangular				
R2-Type Manhole	For depth upto 2.5 m	Upto 400 mm	1200 X 900mm	560mm dia.
Circular				
A-Type Manhole	For depth 1.2 m and upto 1.65m	Upto 400 mm	900 mm dia	560mm dia.
B-Type Manhole	For depth 1.66 m and upto 2.0 m	Upto 600 mm	1200 mm dia	560mm dia.
	For depth 2.01 m and upto 2.3 m			
C-Type Manhole	For depth 2.31 m and upto 3.0 m	Upto 900 mm	1500 mm dia	560mm dia.
	For depth 3.01 m and upto 4.5 m			
	For depth 4.51 m and upto 6.0 m			
	For depth 6.01 m and upto 7.5 m			
	For depth 7.51 m and upto 9.0 m			
D-Type Manhole	For depth 3.01 m and upto 4.5 m	1000 to 1200 mm	1800 mm dia	560mm dia.
	For depth 4.51 m and upto 6.0 m			

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
	For depth 6.01 m and upto 7.5 m			
	For depth 7.51 m and upto 9.0 m			
	For depth 9.0 m and upto 12.0 m			
Scraper Manhole				
S1-Type Manhole	For depth upto 1.5 m	500 to 900mm	1500mm X1500 mm	2 nos. 900 x 600mm
	For depth 1.5 m and up to 3 m			
	For depth 3 m and up to 4.5 m			
	For depth 4.5 m and up to 6 m			
	For depth 6 m and up to 7.5 m			
	For depth 7.5 m and up to 9 m			
	For depth 9 m and up to 10.5 m			
	For depth 10.5 m and up to 12 m			
	For depth 12 m and up to 14 m			
S2-Type Manhole	For depth upto 1.5 m	1000 to 1200mm	1800mm X1500 mm	2 nos. 900 x 600mm
	For depth 1.5 m and upto 3 m			
	For depth 3 m and upto 4.5 m			
	For depth 4.5 m and upto 6 m			
	For depth 6 m and upto 7.5 m			
	For depth 7.5 m and upto 9 m			
	For depth 9 m and upto 10.5 m			
	For depth 10.5 m and upto 12 m			
	For depth 12 m and upto 14 m			
RCC MANHOLES				
Type-A	For depth upto 1.5 m	Upto 300mm Dia.	1500mm X1500 mm	560mm dia.
	For depth 1.5 m and upto 3.0 m	Upto 450mm Dia.		
Type-B	For depth 3.0 m and upto 4.5 m	Upto 600mm Dia.	1500mm X1500 mm	560mm dia.
	For depth 4.5 m and upto 6.0 m	Upto 900mm Dia.		
Type-C	For depth 6.0 m and upto 7.5 m	1000- 1200mm	1800mm X1800	560mm dia.

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
		Dia.	mm	
	For depth 7.5 m and upto 9.0 m			
Type-D0	For depth 9.0 m and upto 10.5 m	Above 1200mm Dia.	2200mm X2200 mm	560mm dia
	For depth 10.5 m and upto 12.0 m			
PRECAST CONCRETE MANHOLES				
Type-E	For depth 1.2 m and upto 1.65m	Upto 400 mm	1000 mm dia	560mm dia.

2.10.2. Drop arrangement

Drop arrangement is proposed for the laterals joining the manholes of main sewer wherein level between maximum water line (peak flow level) of main line and invert level of lateral/branch sewer is greater than 600mm.

3. Interception and Diversion of Nala

Interception and diversion of Nala shall be carried out as per the CPHEEO manual/ applicable standards.The design shall include Nala/drain Catchment area estimation, Design flood discharge, DWF, water way at weir, discharge per unit width, Head over weir, depth of cut-off and creep length required.Mechanical & manual screens shall be provided at each I&Ds. Periodic removal of trash and cleaning of screens need to be undertaken by the concessionaire during O&M period.Actuator gates and flow measuring instrument need to be provided at I&Ds.

Necessary power arrangement including standby need to be provided at the I&Ds.

DWF shall be considered as per actual flow measurement to be carriedout by the concessionaire for a minimum period 14 days at all Nalas/Drains. Peak flow shall be considered for the designing of the I&Ds.

4. Sewage pumping station(SPS)

i. Sewage Pumping Stations are provided to lift sewage so as to discharge into another gravity sewer or inlet chamber of treatment plant. Hydraulic criteria adopted in the design of Sewage Pumping Station will be follows:-

a) Peak Factors ranging from 2 to 3 are considered for design peak flows.

b) Velocity in pumping main range from 0.8m/sec (minimum) to 3 m/sec (maximum).

c) Wet well volume is generally computed based on the pump capacity & no. of starts and stops per hour as given below. Also it is calculated based on 3.75 minutes detention time at peak flow as per NRCD Guidelines.

Wet Well volume, V=0.25* Q / N (Considering design year flows)

Where Q – pumping rate in cum/hr of largest pump installed for parallel arrangement.

N- No. of starts & stops per hour considering manual start/stop also.

d) Velocity through the screen is 0.9 m/sec at peak flow.

e) Hazen William`s Coefficient will be considered as 120 for DI pipe.

f) Minimum residual head is considered as 2m for pump head design.

g) The Pumps, Electro-Mechanical Units and other related accessories are designed considering present and ultimate design peak flows.

ii. The selection of pumps , pumping main size, Electro-Mechanical Units design shall be based on the following criteria besides head & discharge requirements.

a) Submersible non clog pumps will be considered for medium/small PS (<= 50 MLD), whereas horizontal type non-clog centrifugal pumps with positive suction pumps as appropriate are proposed for large pumping station (>= 50 MLD).

b) The pumps shall have single speed with low rpm (less than 1000 rpm) & as far as possible, of equal capacities.

c) The pump configurations will be selected as per NRCD/MoEF Guidelines as given in following table.

Length of Rising Main	**Pumps**	**No. of Pumps**
Where rising main is long and where head losses are the dominant factor	Peak Flow/2 pumps	3 nos. (including 1 standby)
	Non Peak Flow pumps	2 nos. (including 1 standby)
Where rising main is short and static head is	Peak Flow/4 pumps	6 nos. (including 2 standby)

dominant		

d) In case the rising mains are long ,head losses are dominant factor, in case the rising mains length is short, static head is dominant factor.

e) Depending on present & future flows (minimum, average and peak) suitable capacity of pumps will be selected.

f) For small sewage pumping stations upto 15.00MLD, equal duty pumps of half peak flow with the provision of 100% standby peak flow shall be considered.

g) For medium & large pumping stations above 15.00MLD capacity, equal duty pumps of 1/4th of peak flow with 50% standby and 50% spare shall be provided. 10% additional capacity for pumps shall be considered. Parallel operation of more than four number of pumps shall be avoided. A/C deficiency (losses) due to parallel operation of pump shall be minimized.

h) For pumping station, provision should be made for automatic start & stop, the system would be capable of being operated manually.

i) A maximum of two starts & two stops per hour should be considered for manual operations of the pump. A higher no. of starts & stops shall be considered for the automatic operation.

j) Pump shall have semi open impeller having not more than two vanes.

k) MOC of pumps shall be as per mentioned below ,

Casing	Cast Iron as IS 210 Grade F260 with Ni 2%
Impeller	Stain less Steel (CF 8M)
Shaft	AISI 410

l) HT motors for more than 250 kW rating shall be considered. The incoming power supply for these pumps shall be preferable at 33 kV

m) Motor H.P rating shall be considered with additional margin over BKW at duty point as per section 11.1.9 latest CPHEEO Manual .

n) Mechanically operated Stainless steel screens for SPS would be provided ahead of the wet well to prevent large size solids entering the pump. Selection of rack shall vary on depth. Drum type screens shall be avoided. Rectangular screen to be installed on approx. 60° to 70° angles. Bar screens are to be avoided. Motors

provided for screens, clarifiers, Detroiters shall have sufficient margin for overloading due to foreign materials such as jutes, plastics, nylon ropes etc.

o) All the sluice gates in the SPS area will be made from Cast Iron –Flush bottom Rising Spindle type.

p) Natural or forced ventilation system would be provided for deep pumping station, with dry-wet well configuration.

q) Level indicators would be provided for SPS.

r) Overhead travelling cranes of capacity as required shall be electrically operated. Also adequate loading platform shall be provided for material handling.

s) The material for rising main is considered as Ductile Iron as per IS: 8239:2000.

t) Electrically operated overhead travelling cranes of adequate capacity shall be provided . Also, adequate loading platform shall be provided for material handling.

5. Process requirements of STP(s)/FSTP(s)

The following main treatment processes and requirements must be provided:

- ✓ Preliminary treatment (screenings & grit removal)
- ✓ Secondary biological treatment
- ✓ Sludge digestion
- ✓ Sludge thickening, dewatering & storage
- ✓ [Any other facilities as required for co-treatment of septage][1]
- ✓ Transportation of Screenings, Residual Grit and Digested Sludge from the Facilities and Associated Infrastructure to the Waste Disposal Site.
- ✓ Disinfection system

6. Description of process and facilities

This section outlines the major processes and Facilities that the Concessionaire is required to design, construct, and operate as per this Concession Agreement.

6.1. Stilling chamber

A stilling chamber shall be provided at the inlet of STP(s)/FSTP(s) to receive the raw

[1] If Co-treatment of faecal sludge is proposed.

sewage/faecal sludge/septage from the pumping station. The stilling chamber shall reduce the turbulence of raw water entering into it. The stilling chamber should be kept clean by removing silt, sand deposited and the algae growth at the bottom andsides.

6.2. Fine screens

The raw sewage/faecal sludge/septage from rising main shall flow to fine screen inlet channel by gravity. The mechanical fine screen shall be either bar/perforated screen. The screens shall have clear openings not exceeding 6 mm. The screens shall be equipped with an automatic cleaning system and can be controlled by both an adjustable timed cycle and a pre-set differential head across the screen using ultrasonic level sensors. All screens shall be provided with thimble mounted isolation sluice gates(actuator operated with manual override) both on upstream and downstream. The Concessionaire should provide bypass channel with manual screen considering the overall screening capacity shall be 100% peak flow with one screen out of service.

6.3. Grit basins with Grit washers and classifiers

The Concessionaire shall provide Grit separators downstream of the screens. The Grit separators shall be capable of removing at least 95% of particles with a specific gravity of 2.65 g/cm^{3}and with a diameter of at least 0.2 mm. A Parshall Flume shall be provided downstream of Grit separators. The flow measurement shall be instantaneous and capable to transmit the data automatically to SCADA

6.4. Primary clarifiers

If proposed, the primary clarifiers with scum removal shall be designed as per CPHEEO manual.

6.5. Aeration systems

The aeration system shall be designed to maximise oxygen transfer and to adapt to the changing oxygen demands in biological treatment systems. The aeration system shall be capable of complete and uniform mixing and suspension of mixed liquor suspended solids.

6.6. Disinfection

Disinfection shall be provided to comply with KPIs as required by the Concession Agreement, through chlorination systems or UV disinfection or ozonation. The Concessionaire shall ensure that disinfectants used shall not exceed the limits as per the provisions of the Environment (Protection) Rules, 1986. Such excess disinfectant levels, if any, need to be neutralized before disposal to inland surface water or land for irrigation.

6.7. Sludge Thickeners

The sludge thickeners may be either gravity thickeners or mechanical thickeners. All associated ancillaries such as all pumps and polymer dosing equipment shall be arranged. Required standby arrangement shall beprovided.

6.8. Sludge digestion

The design of the sludge digestion system shall ensure that maintenance of all equipment and components can be safely and easily accomplished from outside the digester and without draining its contents.

If anaerobic digestion is proposed, the Concessionaire shall provide gas holders and gas burners. If provided, the sludge heating system may be complete with heat exchangers, sludge re-circulation pumps, hot water pumps. The heat requirement of digesters during winter season will be met through the heat available from bio gas engine and additional requirement to be fulfil through boiler, if required.

The Concessionaire shall ensure safety and security of operation as the result of the presence of biogas in both normal and abnormal operation.

6.9. Dewatering system

Digested Sludge shall be dewatered to produce a cake concentration of at least 20% dry solids and the solids recovery shall not be less than 95%. The dewatering facility and associated ancillaries such as all pumps and polymer dosing equipment shall be arranged in at least two parallel streams (1 working + 1 standby), each sized to handle the average daily sludge quantities over not more than 16 hours perday.The dewatered sludge shall be disposed off .

The concessionaire shall ensure at least 38% of reduction of Volatile solids for Vector Attraction Reduction during sludge treatment. The Concessionaire shall also ensure less than 20,00,000 most probable number per gram of total dry solids (20,00,000 MPN/gTS) in sludge before disposal.

6.10. Facilities drain sump and pump station

A drain pump station shall be provided to collect recyclables such as filtrates from thickener/dewatering units and other miscellaneous waste flows such as sewage/faecal sludge/septage generated from Facilities, cleaning and wash-down flows and pump them back up to the inlet chamber of the Facilities.

6.11. Treated Effluent disposal pipe line

A Treated Effluent disposal pipe line shall be provided to discharge the effluent to the Discharge Point either by gravity or by pumping as per site codition.

6.12. Co-Treatment of septage in the Proposed STP(s)/FSTP(s)

Process involved in co-treatment of septage in the STP(s)/FSTP(s) shall be as per CPHEEO Manual. The facilities shall be designed with adequate capacity to accept the septage without hampering the functioning of the STP(s)/FSTP(s). Increase in hydralic and influent characteristic due addition of septage in liquid/solid stream of STP(s)/FSTP(s)should be considered in designing of facilities.

7. Facilities within STP(s)/FSTP(s)

7.1. Energy generation

The Concessionaire shallgenerate heat and electrical energy from the biogas produced by the sludge digestion process. The Concessionaire shall design the energy generation system to be capable of using the maximum biogas produced by the sludge digestion process at design loadings to produce energy. The Concessionaire shall utilize electrical power generated by the energy recovery system where possible within theFacilities.

The design and specification of the units shall take into account the contaminants that will be present in the biogas from the digesters, such as hydrogen sulphide (H_2S) and ammonia (NH_3), and any harmful effects resulting from their combustion. The Concessionaire shall provide a H_2S gas scrubbing system, to protect the engine and maintain its design life.

7.2. Gas holders

The gas holders shall as per CPHEEO manual. A flame arrestor and flow meter shall be provided on the gas line from each digester.

7.3. Biogas burner

The bio gas burner (if provided) shall be designed as per CPHEEO manual and should be provided in 2 numbers (1working /1 standby) for complete destruction of all contaminants in the gas. All gas pipework and weld on flanges shall be stainless steel 316L.

8. Flood protection:

The Finshed ground level (FGL) of the Facilities to be at or above the High flood level. Building plinth, top of wet wells , I&Ds ,and other structures shall be at 0.45 m above HFL.

PART-B
TECHNICAL SPECIFICATIONS

Section G1: General requirements

1. Executing Agency's drawings

The drawings listed in the Tender Document are the Executing Agency's drawings and are provided by the Executing Agency as illustrative of the Specification.

All data and information furnished in the drawings by the Executing Agency is given in good faith but the Executing Agency does not accept the responsibility for the completeness and accuracy thereof. The same shall be verified by the Concessionaire promptly pointing out errors or discrepancies thereof to the Executing Agency.

2. Drawing sheet format

All drawings provided by the Concessionaire shall be on standard size sheets, in the form of black or blue lines on a white background and shall show the following particulars in a title block located in the lower right hand corner, in addition to the name of Concessionaire and equipment manufacturer, date, scale, drawing number, revision number (RO for drawings submitted initially, R1, R2. etc. for drawings submitted subsequently)

A blank space of 90 mm x 100 mm shall be provided for the Executing Agency's approval stamp and provision shall be made for details of revisions to be recorded.

All drawings submitted by the Concessionaire shall use the English language and preferably SI units. All drawings shall be clearly and fully cross referenced to the other drawings as relevant.

3. Operation and maintenance manuals

The operation and maintenance manuals shall be arranged to provide separate volumes for each principal section of the Works and they shall relate to a "As-built" conditions and shall include all necessary drawings and diagrams for a proper understanding of the works.

The operation and maintenance manual shall be approved in draft form initially prior to commencement of erection by the Executing Agency and shall cover all items of the Works. For this purpose, three draft copies shall be submitted to the Executing Agency. A mere collection of manufacturers' descriptive leaflets will not be acceptable in satisfaction of this Clause. The operation & maintenance manual shall comprise both operating instructions and maintenance instructions.

The manuals shall include, but not be limited to the following information:

(a) Descriptive overview of the whole of the works.

(b) Descriptions of all systems installed, including mechanical, electrical, instrumentation, control systems with relevant design and operating parameters.

(c) Descriptions of all equipment supplied including manufacturer's leaflets, which shall be scheduled for easy reference.

(d) Schedules and manufacturer's catalogues for all equipment supplied, giving duties, electrical load, etc.

(e) Schedules of all equipment suppliers (and their local agents) including names, addresses, telephone, fax and e-mail numbers.

(f) Start-up, operation and shutdown instruction for all parts of the Works. These shall include step-by-step directions on setting the Plant to work listing all adjustments and settings necessary for the current functioning of the Plant.

(g) Instructions on monitoring of Plant performance and sample log sheets for each Plant item, to be filled by operators on a routine basis.

(h) "Dos" and "Don'ts" in Plant operation. Operator's attention shall be drawn to all operations considered dangerous to operators or likely to cause damage to the Plant.

(i) Procedures to deal with breakdown and emergencies.

(j) Safety requirements.

(k) Checking, testing and replacement procedures to be carried out on all Plant items on a daily, weekly and monthly basis or at longer intervals to ensure trouble free operation. Full maintenance instructions for all equipment including planned maintenance schedules or charts giving daily, weekly, monthly, quarterly, half yearly annually and overall instructions, together with recommended lubricants and spares. These shall also include details of routine maintenance work that will be within the competence of the normal maintenance staff and notification of maintenance work that will have to be done by the manufacturer, his agent or other specialist operator.

(l) Fault locations and remedy charts to facilitate tracing the cause of malfunctions or breakdown and correcting faults.

(m) Complete list of recommended lubricants and lubrications charts.

(n) A "Spares Schedule", which shall consist of a complete list of item wise spares for all Plant items with ordering references and part numbers.

(o) A complete list of manufacturer's instructions for operation and maintenance of all bought out equipment. The list shall be tabulated in alphabetical order, giving the name of supplier / manufacturer, identification of the Plant item, giving the model number and the literature provided including instruction leaflets and drawing numbers.

(p) Step by step procedure for the dismantling, repair and re-assembly of all items of equipment.

(q) Part-list and drawings or exploded diagrams for each item of Plant with construction particulars, materials of construction, mating components, clearances and tolerances, maximum wear permitted before replacements are to be done, etc.

(r) Record drawings of all systems installed, including general arrangements, conduit and wiring trunking systems, wiring diagrams, control schematics and valve charts etc., to a reduced scale.

(s) Certified suppliers' drawings of all equipment supplied, which shall be scheduled for easy reference.

(t) Site test reports for all mechanical, electrical and instrumentation systems. Site test process reports for proving tests, commissioning reports, and supplier's test certificates.

(u) Copies of performance curves.

Each volume shall be durable and permanently bound within a stiff binder of a design to be approved by the Executing Agency.

4. Protection and Packing for Transportation

Before any Plant is dispatched from manufacturer's works, it shall be properly prepared and packed and the Concessionaire shall give the Executing Agency at least fourteen (14) days' notice that these preparations are to commence.

Prior to dispatch, the Plant shall be adequately protected by painting or by other approved means for the whole period of transit, storage and erection, against corrosion and incidental damage, including the effects of vermin, sunlight, rain, high temperatures and humid atmosphere. The Concessionaire shall be responsible for the Plant being so packed and / or protected as to ensure

that it reached the Site intact and undamaged. The Plant shall be packed to withstand rough handling in transit and all packages shall be suitable for storage including possible delays in transit.

The Concessionaire shall be deemed to have included in the schedule of prices for all materials and packing cases necessary for the safe package, conveyance and delivery and storage of the Plant with all protective and preservation measures.

Cases containing rubber rings, bolts and other small items shall not normally weigh more than 50 kg, gross per case. No one package or bundle shall contain items of Plant intended for incorporation in more than one section of the Works. All items of Plant shall be clearly marked for identification against the packing list.

Eyebolts, lifting hooks and brackets shall be provided for lifting the boxes, crates and packages. Every crate or package shall contain a packing list in a waterproof envelope. A duplicate copy of the packing list shall be sent by post to the Executing Agency at site. Consignments imported by ocean freight shall be packed and preserved as stipulated above.

All crates, packages, etc. shall be clearly marked with a waterproof material to show the weight and where the slings should be attached, and shall also have an indelible identification mark relating them to the packing lists. Packing cases shall be non-returnable. Concessionaire shall have to clear the site including packing material.

Electrical equipment shall be enclosed in sealed airtight package with hygroscopic material, before being placed in packing cases on shock absorbent materials and secured by means of battens.

5. Delivery, Unloading and Storing at Site

The Concessionaire shall be responsible for checking all materials delivered to site and shall keep the Executing Agency's Representative fully informed of the state of deliveries. The Concessionaire shall carry out, at his cost, all instructions of Executing Agency for proper unloading, preservation, maintenance, storage and security of materials delivered to site until he fulfills all his obligations under the Contract.

The Concessionaire shall erect and maintain on the site any temporary storage facility as required and approved by the Executing Agency. If built up shed or area is provided by the Executing Agency depending upon availability, the Concessionaire shall have to pay rent as finalised by the Executing Agency.

Multiple handling and movement of materials during storage and retrieval shall be avoided.

6. Spare Parts

Spares during pre-commissioning trials, commissioning tests / maintenance, guarantee etc. shall be provided by the Concessionaire. The spares also include the consumables such as bulbs, fuses, wires, lubricating oil, gaskets, packing seals etc. The necessary spares shall be brought by the Concessionaire prior to the pre-commissioning test so as to avoid the downtime of equipment due to non-availability of them. All the spares have to be provided as required, by Concessionaire free of cost.

All spare parts shall be new, unused and strictly interchangeable with the parts for which they are intended to be replacements and shall be treated and packed for long storage under the climatic conditions prevailing at the site. Each spare part shall be clearly marked or labelled on the outside of its packing with its description, number and purpose. When more than one spare is packed in a single case or other container, a general description of its contents shall be shown on the outside of such case or container and a detailed list enclosed. All cases, containers and other packages shall be marked and numbered in an approved manner for the purpose of identification. Spares shall be delivered to site after the completion of erection but before start of commissioning of Plant along with technical leaflets and details. Spare parts shall be indicated in the assembly drawing showing clearly the part numbers.

All cases, containers or other packages are liable to be opened for such examination as the Executing Agency may require and packing shall be designed to facilitate opening and thereafter repacking. In the event of the some specific spares offered in the Contract being withdrawn from manufacture owing to changes in design of equipment or similar reasons viz., model being obsolete etc., the Concessionaire shall inform the Executing Agency before such withdrawal, so that the Executing Agency can take timely alternative steps.

7. Tools

Tools shall be delivered to site just prior to Tests on Completion.

The specified tools shall not be used for the erection of the Plant being supplied and except that the Executing Agency may call upon the Concessionaire to demonstrate their use or effectiveness, they must be handed over to the Employer in a completely new and unused condition. Should the Concessionaire require any such tools at site for erection, he shall provide his own.

The test equipment shall include special purpose items essential to the testing or recalibration of related items of Facilities.

8. Works to be kept clear of water

The Concessionaire shall keep the Works well drained until the Executing Agency certifies that the whole of the Works is substantially complete and shall ensure that so far as is practicable, work is carried out in the dry condition. Excavated areas shall be kept well drained and free from standing water.

Notwithstanding any approval by the Executing Agency of the Concessionaire's arrangements for the exclusion of water, the Concessionaire shall be responsible for the sufficiency thereof and for keeping the Works safe at all times, particularly during any floods and for making good at his own expense any damage to the Works, including any that may be attributable to floods. Any loss of production or additional costs of any kind that may result from floods shall be at the Concessionaire's own risk.

9. Assistance for the Engineer's Staff

The Concessionaire shall provide all necessary assistance to the Executing Agency and his staff in carrying out their duties of checking the setting out, inspecting and measuring the Works. The Concessionaire shall provide staff men, office attendants and labourers, as may be needed, from time to time by the Executing Agency.

The Concessionaire shall provide for the Executing Agency and his staff such protective clothing, safety helmets and rubber boots of suitable sizes, hand lamps and the like, as may reasonably be required by them. These articles shall remain the property of the Concessionaire. No separate payment shall be made on this account.

Section G2
Materials and workmanship

Section G2: Materials and Workmanship

1. Introduction

This part of the Specification sets out the general standards of materials to be supplied and the workmanship required to be ensured by the Concessionaire. All components parts of the Works shall, unless otherwise specified, comply with the provisions of this part or be subject to the approval of the Executing Agency. Particular attention shall be paid to a neat orderly well-arranged installation carried out in a methodical competent manner.

2. Reference Specifications and Standards

Where reference is made in the Specification to a British Standard Specification (hereinafter abbreviated to 'B.S') issued by the British Standards Institution of 2, Park street, London W.I., or to an Indian Standard Specification (I.S.) issued by the Bureau of Indian Standards, (earlier known as Indian Standard Institution), Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002 or American Society for testing and materials (ASTM) issued by ASTM 1916 Race Street, Philadelphia, P.A., 19103, U.S.A. or American National Standards Institute (ANSI) issued by ANSI 1430, Broadway, New York, N.Y., 10018, U.S.A. or Japanese Industrial Standards (JIS) issued by Japanese Standards Association, 4-1-24, Akasaka, Minato-Ku, Tokyo 107, Japan or to any other equivalent Standard it shall be to the latest revision of that Standard at the Tender opening date.

The Concessionaire may propose at no extra cost to the Executing Agency, the use of any relevant authoritative internationally recognised Reference Standard, including Indian Standard (IS).

All details, materials and equipment supplied and workmanship performed shall comply with these Standards. If Concessionaire offers equipment to other Standards, the equipment/material should be equal or superior to those specified and full details of the difference shall be supplied.

In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decision of Project Engineer in such case shall be final and binding onthe Concessionaire.Certain specifications issued by national or other widely recognised bodies are referred to in this Specification. Such specifications shall be defined and referred to hereinafter as Standard Specification. In referring to the Standard Specifications the following abbreviations are used:

IS : Indian Standard

ANSI	:	American National Standards Institute
API	:	American Petroleum Institute
ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society of Testing and Materials
AWS	:	American Welding Society
AWWA	:	American Water Works Association
ISO	:	International Organisation for Standardisation
JIS	:	Japanese Industrial Standard
DIN	:	Deutsches Institute for Normung
BS	:	British Standards
JWWA	:	Japanese Water Works Association
IEC	:	International Electro technical Commission
IEE	:	Institution of Electrical Engineers
IEEE	:	Institution of Electrical and Electronic Engineers
NEMA	:	National Electrical Manufacturer's Association
AGMA	:	American Gear Manufacturer's Association

3. Materials - General

All materials incorporated in the Works shall be the most suitable for the duty concerned and shall be new and of reputed make/approved quality, free from imperfections and selected for long life and minimum maintenance. Non-destructive tests, if called for in the Specification, shall be carried out. All submerged moving parts of the Plant, or shafts and spindles, etc. of the submerged moving parts or the faces etc. in contact with them shall be of corrosion resistant materials. All parts in direct contact with various chemicals, shall be completely resistant to corrosion, or abrasion by these chemicals, and shall maintain their properties without ageing due to the passage of time, exposure to light or any other cause.

4. Workmanship - General

Workmanship and general finish shall be of first class quality and in accordance with best workshop practice.

All similar items of the Plant and their component parts shall be interchangeable. Spare parts shall be manufactured from the same materials as the originals and shall fit all similar items. Machining fits on renewable parts shall be accurate and to specified tolerances so that replacements can be readily installed. All equipment shall operate without excessive vibration and with minimum noise. All revolving parts shall be truly balanced both statically and dynamically so that when running at normal speeds at any load upto the maximum there shall be no vibration due to lack of balance.

All parts, which can be worn or damaged by dust, shall be totally enclosed in dust proof housings. All materials incorporated in the Works shall be the most suitable for the duty concerned, free from imperfections and selected for long life and minimum maintenance. All necessary accessories required for satisfactory and safe operation of the Plant shall be supplied by the Concessionaire unless it is specifically excluded from his scope. Suitable provision by means of eyebolts or other means are to be provided to facilitate handling of all items that are too heavy or bulky for lifting and carrying by two men.

If, after installation, the operation or use of the materials or equipment furnished by the Concessionaire proves to be unsatisfactory, the Executing Agency shall have the right to operate or use such materials or equipment until correction of defects, errors or omissions, by repair or by partial or complete replacement, can be made without interfering with the Plant operations.

5. Welding

Welding shall comply with the latest revision of the BS 5135 Code.

Welders shall be qualified in accordance with the requirement of the appropriate section of BS 4871. The Executing Agency shall have the right to call for further qualifications from time to time from any welder who in the opinion of the Engineer does not produce weld in accordance with the qualifications. Each welder shall be assigned a number and letter. Each weldments shall clearly be identified as to its welder marking the welder's Code adjacent to the welds. A record chart shall be maintained for each welder showing the procedures for which he has qualified, the date of such qualification, the type of defects produced and their frequency. The Executing Agency shall disqualify the welder whose Work requires disproportionate repairs.

Inspection and quality of surveillance shall not be limited to the examination of finished welds. The techniques employed shall be based on methods which are known to produce good results and which have been verified at Site by actual demonstration.

Haphazard striking of the electrodes for establishing an arc shall not be permitted. The arc shall be struck either on the joint or on a starting tag, The starting tag shall be of the same material or a material compatible with the base metal base being welded. In case of any inadvertent strike on place other than the welding, the area affected shall be ground flushed and examined by liquid penetration method.

Generally, a stringer bead technique shall be used with a slight oscillation if necessary to avoid slag and to minimise the number of beads needed to fill exceed 3 times the wire diameter. Vertical welds shall be made in upward direction. For all pipes above 300 mm dia, welding shall be done wherever possible, by two (2) welders working simultaneously along both sides of the pipe.

The root pass shall have less than 1.5 mm internal reinforcement.

Final welds shall be suitable for appropriate fabrication of the non-destructive examination of the weld. If grinding is necessary, the weld shall be blended into the parent metal without gouging or thinning of the parent metal in any way. Uneven and excessive grinding may be a cause for rejection. Fillet weld shall preferably be convex and free from undercutting and overlap at the toe of weld. Convexity and concavity shall not exceed 1.5 mm. The leg lengths shall not exceed the specified size by more than 1.5 mm.

All attachments such as lugs, brackets and other non-pressure parts shall also be done by qualified welders in accordance with the design details and materials specifications. Temporary attachments shall be removed in a manner that will not damage the parent metal. Area of temporary attachments shall be dressed smooth and examined by ultrasonic or liquid penetration methods.

All tack welds shall be made using qualified procedure and welders, the number of size of tack welds shall be kept as small as to consist of adequate strength and joint alignments. All tack welds shall be examined visually for defects and if found defective shall be completely removed. As welding proceeds, tack welds shall be either removed completely or shall be properly prepared by grinding or filling their starting ends so that they may be satisfactorily incorporated in the welds. Unacceptable defects shall be removed by grinding machine or chipping or gouging. Flame gouging may be permitted provided gouged surfaces are ground at least by 1.0 mm below the deepest indentation.

All weld repairs shall be carried out using the approved welding procedures and welders. Re-welded areas shall be re-examined by the methods specified for the original welds and repair procedures shall be duly qualified by the Executing Agency's Representative.

6. Pre-heating and Post-heating Treatment

Pre-heating and post heating treatment shall conform to the relevant application Codes. Pre-heating not exceeding 121 deg. C for all carbon steel construction above 25 mm thickness would be mandatory. Such pre-heating would be maintained during flame cutting, flame or arc gouging, welding and repairs and may be done by gas heating by gas torches/gas rings with neutral flame. The temperature shall be checked by temperature indicating crayons. However, such pre-heating will not be necessary for welds less than 6 mm size.

7. Electrodes

All electrodes shall be stored in their original sealed containers under dry conditions. Electrodes shall remain identified until consumed. All electrodes shall be dried before use. Drying ovens shall be provided in Work areas for drying purposes. Electrodes withdrawn from oven shall be promptly used and excess unused electrodes shall be promptly returned to oven.

8. Examination / NDT / Radiography

The various stages of examination and types shall be as stipulated in the respective fabrication Codes subject to the Executing Agency's approval.

9. Stainless Steel welding

All welding consumable such as electrodes, filler weirs, argon gas for shielding and purging shall be of high quality and the proposed brand shall be furnished for approval of the Executing Agency. Weld deposits shall have similar or higher physical properties and similar chemical composition to the members joined.
All electrodes shall be purchased in sealed containers only and stored in their packing intact. The packets opened shall be consumed as early as possible. The electrodes removed from the containers shall be kept in holding ovens at temperatures recommended by electrode manufacturer. Special care shall be taken in avoiding mixing of electrodes in the oven. The electrodes and filling wires shall be free from rust, oil, grease, earth and other foreign matter.

Argon gas with purity 99.5% shall be used for shielding and purging. The purity of gas shall be certified by the gas manufacturers.

Non-destructive examination of the welds shall be carried out to ensure quality of weld.

The electric current for welding shall be direct current, straight polarity (electrode negative). The welding current shall be kept minimum possible to ensure minimum heat affected zone in the parent material. Other side of the weld joint shall be periodically flushed with argon gas.

10. Castings

Cast iron shall be of standard grey close-grained quality. The structure of the castings shall be homogeneous and free from non-metallic inclusions and other injurious defects. All surfaces of castings which are not machined shall be smooth and shall be carefully fettled to remove all foundry irregularities.

Minor defects in depth not exceeding 12.5 percent of total metal thickness and which will not ultimately affect the strength and serviceability of the casting may be repaired by approved welding techniques. The Executing Agency shall be notified of large defects and no repair

welding of such defects shall be carried out without prior approval of the Executing Agency. If the removal of metal for repair should reduce the stress resisting cross section of the casting by more than 25 percent, or to such extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then casting shall be rejected. Test coupons cast simultaneously with the main castings shall be identified to check physical, chemical analysis of casting. Major defects on casting are not acceptable. Castings repaired by welding for minor defects shall be stress-relieved after such welding. Non-destructive tests as directed by the Executing Agency will be required for any casting containing defects whose extent cannot otherwise be judged, or to determine where repair welds have been properly made.

11. Forging

All major stress-bearing forging shall be made to a Standard Specification. Forging shall be subjected to magnetic particle testing or dye penetration test at the areas of fillets and change in section. The testing shall be conducted after rough machining (10 microns). Any defect which will not machine out during the final machining, will be gouged out fully, inspected by dye penetration or magnetic particle inspection to ensure that the defect is fully removed and repaired using an approved repair procedure. Any indication, which proves to penetrate deeper than 2.5% of the finished thickness of the component, shall be reported to the Executing Agency giving the details like location, length, width and depth. For the magnetic particle inspection, the choice of wet or dry particles shall be at the Concessionaire's discretion.

All forging shall be demagnetised after test and shall be heat treated for the relief of residual stresses.

12. Design life

The Works as a whole shall be new, of sound workmanship, robustly designed for a long reliable operating life and shall be capable of 24 hours per day continuous operation for prolonged period in the climatic and working conditions prevailing at the Site, and with the minimum of maintenance. Particular attention shall be given to temperature changes, the stability of paint finish for high temperatures, the rating of engines, electrical machinery, thermal overload services, cooling systems and the choice of lubricants for possible high and prolonged operating temperatures. The Concessionaire shall be called upon to demonstrate this for any component part either by service records, or evidence of similar equipment already installed elsewhere or relevant type tests. Routine maintenance and repair shall as far as possible not require the services of highly skilled personnel. All equipment covered by this specification shall be designed to provide a minimum design service life of 20 years.

The plant shall be designed to provide easy access to and replacement of components parts, which are subject to wear, without the need to replace whole units. No parts in contact with water shall

have a life from new to replacement or repair of less than five years. Where major dismantling is unavoidable to replace a part, the life of such part shall not be less than ten years.

Design features shall include the protection of Plant against damage caused by vermin, dirt, dust and dampness and to reduce risk of fire. Plant shall operate without undue vibration, and parts shall be designed to withstand the maximum stresses under the most severe condition of normal service. Materials shall have a high resistance to change in their properties due to the passage of time, exposure to light, temperature and any other cause, which may have a detrimental effect upon the performance of life of the Works.

Plant located outside lockable areas/building shall have additional features to prevent unauthorised operation.

13. Lubrication

A complete schedule of recommended oils and other lubricants shall be furnished by the Concessionaire. The number of different types of lubricants shall be kept to a minimum. The schedule and the name of the supplier of the lubricants shall be submitted to the Executing Agency.

Concessionaire shall indicate indigenously available equivalent lubricants, with complete specification, to enable the Executing Agency to arrange for regular supply.

Where lubrication is effected by means of grease, preference shall be given to a pressure system, which does not require frequent adjustment or recharging. Frequent, for this purpose, means more than once in a month and grease systems having shorter periods between greasing should be avoided. Where necessary for accessibility grease nipples shall be placed at the end of the extension piping, and, when a number of such points can be grouped conveniently, the nipples shall be brought to a battery plate mounted in a convenient position. All grease nipples shall be of the same size and type for every part of the Plant. Arrangements shall be provided to prevent bearings being overfilled with either grease or oil.

Where more than one special grease is required, a grease gun for each special type shall be supplied and permanently labelled.

Oil containers shall be supplied complete with oil level indicators of the sight glass type, or where this is not practicable, with dipsticks. The indicators shall show the level at all temperatures likely to be experienced in service. The levels shall be clearly visible in the sight glass type from the normal access floor to the particular item of Plant and they shall be easily dismantled for cleaning. All sight glasses shall be firmly held and enclosed in metal protection in such manner that they cannot be accidentally dislodged.

All lubrication systems shall be designed so as not to cause a fire or pollution hazard and particular care shall be taken to prevent leakage of lubricants and to avoid leaking lubricants coming into contact with any electrical equipment, heated surfaces or any other potential source of fire.

14. Name Plate

Each item of the Plant shall have permanently attached to it in a conspicuous position, a nameplate and rating plate. Upon these shall be engraved or stamped, the manufacturer's name, type and serial number of Plant, details of the loading any duty at which the item of Plant has been designed to operate, and such diagrams as may be required by the Executing Agency. All indicating and operating devices shall have securely attached to them or marked upon them designations as to their function and proper manner of use.

Nameplates, rating plates and labels shall be of a no flame propagating materials, either non-hygroscopic or transparent plastic with engraved lettering of a contrasting colour. Fixing shall be by means of non-corrosive screws; drive rivets or adhesives shall not be used.

Warning labels shall be provided where necessary to warn of dangerous circumstances or substances. Inscriptions or graphic symbols shall be black on a yellow background.

Instruction labels shall be provided where safety procedures such as wearing of protective clothing are essential to protect personnel from hazardous or potentially hazardous conditions. These labels shall have inscriptions or graphic symbols in white on a blue background.

15. Nuts, Bolts, Studs and Washers

Nuts, bolts, studs and washers for incorporation in the Plant shall conform to the requirements of the appropriate standard. Nuts and bolts shall be of the best quality of specified grade, machined on the shank and under the head and nut. Bolts shall be of one piece construction and shall be of sufficient length so that only one thread shall show through the nut in the fully tightened condition.
Fitted bolts shall be a light driving fit in the reamed holes they occupy, shall have the screwed portion of such a diameter that it will not be damaged in driving and shall be marked in a conspicuous position to ensure correct assembly at Site.

Washers, locking devices & anti-vibration arrangements shall be provided where necessary. Jointing hardware for the entire Plant shall be provided with sufficient spares to cater for site losses.

Where bolts pass through structural members taper washers shall be fitted, where necessary, to ensure that no bending stress is caused in the bolt. Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and washers which are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel-bearing stainless steel.

The Concessionaire shall supply all holding down, alignment and levelling bolts complete with anchorage, nuts, washers and packaging's required to attach the Plant to its foundations, and all bedplates, frames and other structural parts necessary to spread the loads transmitted by the Plant to concrete foundations without exceeding the design stresses.

16. Allowance for Wastage

The Concessionaire shall supply reasonable excess quantities to cover wastages of those consumable, which will be normally subject to waste during erection, commissioning and setting to Work.

17. Painting - General

The Concessionaire shall be responsible for the cleaning, preparation for painting and priming or otherwise protecting, as specified, all parts of the plant at the place of manufacture prior to packing.

Parts may be cleaned but surface defects may not be filled in before testing at the manufacturer's works. Parts subject to hydraulic test shall be tested before any surface treatment. After test, all surfaces shall be thoroughly cleaned and dried out, if necessary by washing with an approved dewatering fluid prior to surface treatment. Except where the specification provides to the contrary all painting materials shall be applied in strict accordance with the paint manufacturer's instructions.

All protective coatings shall be suitable for use in warm humid climates. All primers, under coats and finishes shall be applied by brush or airless spray, except where otherwise specified. Consecutive coats shall be in distinct but appropriate shades. All paints shall be supplied from the store to the painters, ready for application, and addition of thinners or any other material shall be prohibited.

18. Painting at Place of Manufacture

Steel and cast iron parts shall be sand blasted to near white cleaning before painting. Edges, sharp curves etc. shall be ground to a curve before sand blasting. A primer coat of zinc rich epoxy resin-

based coating with atleast a 50 microns dry film thickness is to be provided. In addition, the parts are to be provided with adequate number of coats coal tar epoxy polyamine coating to dry the thickness of 150 microns including primer coating.

19. Painting at Site

Immediately on arrival at the site, all items of plant shall be examined for damage to the paint coat applied at the manufacturer's works, and any damaged portions shall be cleaned down to the bare metal, all rust removed and the paint coat made good with similar paint.

Before final painting is commenced, the Concessionaire shall submit for the approval of Executing Agency's Representative, full details of the paints he proposes to use together with colour charts for the gloss finishes. After erection, such items, which are not finish painted, shall be done so and, items that have been finish painted at the manufacturer's works shall be touched up for any damaged paintwork.

The dry paint film thickness shall be measured by Electrometer or other instruments approved by the Executing Agency. In order to obtain the dry film thickness specified, the Concessionaires shall ensure that the coverage rate given by the paint manufacturer will enable the thickness to be obtained. Painted fabricated steel work which is to be stored prior to erection shall be kept clear of the ground and shall be laid out or stacked in an orderly manner that will ensure that no water or dirt can accumulate on the surface. Suitable packagings shall be laid between the stacked materials. Where cover is provided, it shall be ventilated.

20. Noise and Vibration

The Concessionaire shall provide a quiet installation. All items of Plant and equipment shall be carefully chosen with a view to minimising sound levels.

The Concessionaire shall provide and fix all material for the prevention of transmission of noise and vibration through the structure. Where appropriate Plant shall be mounted on resilient mountings in such a manner that the Plant foundations are isolated from the floor or structure. In addition, all rotating Plant shall be statically and dynamically balanced. Mechanical vibration shall be eliminated by the use of anti-vibration mountings and flexible connections to ensure an isolation efficiency of 95% from the building structure.

21. Galvanising

Wherever galvanising has been specified, the hot dip process shall be used. The galvanised coating shall be of uniform thickness. Weight of zinc coatings for various applications shall not be less than those indicated below:

(a) Fabricated steel

Thickness less than 2 mm but not less than 1.2 mm	340 gms/sq.m
Thickness 2 mm and above	460 gms/sq.m

(b) Fasteners

Up to nominal size M10	270 gms/sq.m
Over M10	300 gms/sq.m

Galvanising shall be carried out after all drilling, punching, cutting, bending and welding operations have been carried out. Burrs shall be removed before galvanizing. Any site modification of galvanised parts should be covered well by zinc rich primer and aluminium paint.

22. Support for pipework & Valves

All necessary supports, saddles, slings, fixing bolts and foundation bolts shall be supplied to support the pipe work. Valve and other facilities mounted in the pipe work shall be supported independent of the pipes to which they connect.

Section G3
General Civil Specifications

Section G3: General civil specifications

Sl. No.	Sub-Section	Title
1.	C1	Earthwork in grading, excavation and backfilling
2.	C2	Technical specifications for properties, storage and handling of common building materials.
3.	C3	Technical specifications for Cast-in-situ concrete & allied works
4.	C4	Technical specifications for masonry & allied works
5.	C5	Technical specifications for plastering & allied works
6.	C6	Technical specifications for flooring and other allied works
7.	C7	Technical specifications for roof water proofing insulation and allied works
8.	C8	Technical specifications for painting, white washing etc.
9.	C9	Technical specifications for fabrication and erection of structural steel works
		Annexure B - Inspection, testing and quality checklist along with addendum.
10.	C10	Technical specifications for Glass and Glazing
11.	C11	Technical specifications for MS doors, windows, ventilators and louvers
12.	C12	Technical specifications for rolling steel shutters / grills
13.	WS1	Technical specifications for laying of pipes and fittings / specials
14.	WS2	Technical specifications for laying and jointing of cast iron pipes and fittings (Cast iron).

Sub-section - C1
Technical specification for excavation and backfilling

Sub Section - C1

Technical specification for excavation and backfilling

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Sub Section - C1: Technical specification for excavation and backfilling

1.1 Scope

This section of the specification covers the technical requirements for excavation and filling for industrial plots in & around structures, buildings, pipes, foundations, trenches, pits, drains, channels, cable ducts, underground facilities & similar works. It also covers filling areas and plinths with selected materials, conveyance and disposal of surplus soils and/or stacking them properly as directed by the Project Engineer and Executing Agency.

The Concessionaire shall be fully responsible for proper setting out of works, profiling in excavation, stacking, etc., taking adequate safety measures etc. The Concessionaire shall carry out all works meant within the intent of this specification even if not explicitly mentioned herein. All work shall be executed to the satisfaction of the Project Engineer and Executing Agency.

Existing trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, drains, sewers, or other surface or subsurface systems/drains/facilities within or adjacent to the works being carried out which are not to be disturbed, shall be protected from damage by the Concessionaire shall provide and install suitable safeguards approved by the Project Engineer and Executing Agencyfor this purpose.

During excavation, the Concessionaire shall take all necessary precautions against soil erosion, water & environmental pollution and where required to undertake additional works to achieve this objective. Before start of operations, the Concessionaire shall submit to the Project Engineer and Executing Agencyfor approval, his work plan and the procedure he intends to follow for disposal of waste materials etc. and the schedule for carrying out temporary and permanent control works. However, the approval of the Project Engineer and Executing Agency to such plans and procedures shall not absolve the Concessionaire of his responsibility for safe and sound work.

1.2 General requirements

The Concessionaire shall make his own surveying arrangements for locating the coordinates and positions of all work and establishing the reduced levels (RL's) at these locations based on two reference grid lines and one benchmark, which will be furnished by the Executing Agency. The Concessionaire has to provide at site all the required survey instruments, along with qualified surveyors, to the satisfaction of the Project Engineer and Executing Agency so that the work can be carried out accurately and according to the specification and drawings.

The Concessionaire shall furnish all skilled and unskilled labour, plant, tools, tackle, equipment, men, materials required for complete execution of the work in accordance with the drawings and as described herein and/or as directed by the Project Engineer and Executing Agency.

The Concessionaire shall control the grade in the vicinity of all excavations so that the surface of the ground will be properly sloped or dyed to prevent surface water from running into the excavated areas during construction.

All materials obtained from excavation shall remain Executing Agency's property. All salvaged materials of archeological importance or of value (in the opinion of the Project Engineer and Executing Agency) shall be segregated from the other materials and both stacked separately and in regular manner at locations indicated by the Project Engineer and Executing Agency.

Excavation shall include removal of trees including roots & organic remains, vegetation, grass, bushes, shrubs, plants, poles, fences, etc. that are in the area to be excavated as well as beyond the excavation line so as to ensure safety of the excavated side slopes, and of men and equipment operating in the area. Before start of excavation work, joint measurements of ground level shall be taken after cleaning all grass, vegetation, etc.

Excavation shall include the removal of all materials required to execute the work properly and shall be made with sufficient clearance as decided by the Project Engineer and Executing Agency to permit the placing and setting of forms, inspection and completion of all works to the satisfaction of the Project Engineer and Executing Agency for which the excavation was done.

Wherever reference is made to 'drawings' in this specification it shall mean the latest issue of the approved drawings.

1.3 Codes and standards

All standards, specifications, acts, and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

In case of conflict between this specification and those (IS standards, codes etc.) referred to herein (in para 3.3) the former shall prevail.

Some of the relevant Indian standards, Acts and Codes are referred to here below:

IS:383 - Specification for coarse and fine aggregates from natural sources for concrete.

IS:2720 - (Part - II, IV to VIII, Methods of tests for soils - determination of water XIV, XXI, XXIII, XXIV content etc. XXVII to XXIX, XL)

IS:3764 - Safety code for excavation work
IS:4081 - Safety code for blasting and related drilling operations
IS:4701 - Code of Practice for earth work on canals
IS:9759 - Guide lines for Dewatering during construction.
IS:10379 - Code of practice for field control of moisture and compaction of soils for embankment and sub-grade.
IS:3812 - Pulverized fuel ash - specification part 2 for use as admixture in cement mortar and concrete

1.4 Excavation

Excavation in all types of soils, soft and disintegrated rock (ordinary rock), and hard rock shall be done up to the required level. Excavation shall also include breaking of existing concrete RCC, Masonry work, tar and bitumen surfaces, and paving works etc. In case blasting is required, the same shall be subject to the approval of Project Engineer and Executing Agency. Sides and bottoms of excavation shall be cut sharp and true to line and level. Undercutting shall not be permitted. When machines are used for excavation, the last 300 mm before reaching the required level shall be excavated manually or by such equipment that soil at the required final level will be left in its natural condition. Suitability of strata (at the bottom of excavations) for laying the foundation thereon shall be determined by the Project Engineer and Executing Agency.

Excavation for foundations shall be to the bottom of lean concrete and as shown on drawings or as directed by the Project Engineer and Executing Agency. The bottom of all excavations shall be trimmed to required levels and when excavation is carried below such levels, by error, it shall be brought back to specified level by filling with concrete of nominal mix 1:3:6/1:4:8 (cement & Fly ash (20% replacement ratio of cement with fly ash): coarse sand : 20 mm down aggregates) as directed by the Project Engineer and Executing Agency.

The Concessionaire shall ascertain for himself the nature of materials to be excavated and the difficulties, if any, likely to be encountered in executing this work. Cofferdams, Sheeting, shoring, bracing, maintaining suitable slopes, draining etc. shall be provided and installed by the Concessionaire, to the satisfaction of the Project Engineer and Executing Agency.

All excavation for installation of underground facilities, such as piping, sewer lines, drain lines, etc. shall be open cuts. For deep and huge excavations and in other excavations, if required by the Project Engineer and Executing Agency, the Concessionaire shall submit for Project Engineer and Executing Agency's approval showing the methodology to be adopted for excavation in order to maintain the stability of side slopes, means for ensuring safety of existing facilities nearby, dewatering as required etc. However, the Concessionaire shall be fully responsible for the scheme irrespective of any approvals granted. Benching shall be provided for deeper excavation wherever required.

When excavation requires bracing, sheeting or shoring etc., the Concessionaire shall submit drawings to the Project Engineer and Executing Agency, showing arrangements and details of proposed installation. The Concessionaire shall also furnish all supporting calculations as called for and shall not proceed until he has received written approval from the Project Engineer and Executing Agency. However, the responsibility for adequacy of such bracing, sheeting, shoring etc. will rest with the Concessionaire, irrespective of any approval of the Project Engineer and Executing Agency. All precautions shall be taken while excavations near existing structures are to be carried out till the backfilling is completed.

The Concessionaire shall have to constantly pump out any water collected in excavated pits and other areas due to rain water, ground water, springs etc. and maintain dry working conditions at all times until the excavation, placement of reinforcement, shuttering, concreting, backfilling is completed. The Concessionaire shall remove all slush/muck from the excavated areas to keep the work area dry. Sludge pumps, if required, shall be employed by the Concessionaire for this purpose.

The Concessionaire shall remove all materials arising from excavations from the vicinity of the work either for direct filling, stacking and subsequent filling or for ultimate disposal as directed by the Project Engineer and Executing Agency. In no case shall the excavated soil be stacked within a distance of 1.5m from the edge of excavation or one third the depth of excavation whichever is more. Material to be used for filling shall be kept separately as directed by the Project Engineer and Executing Agency.

1.5 Filling

1.5.1 Materials

a) Materials to be used for filling purposes shall be stone, sand or other inorganic materials and they shall be clean and free from shingle, salts, organic, large roots and excessive amount of sod. Lumps concrete or any other foreign substances which could harm or impair the strength of the substructure in any manner. All clods shall be suitably broken to small pieces. When the material is mostly rock boulders, these shall be broken into pieces not larger than 150 mm size. Sand used for filling shall be clean, medium grained and free from impurities. Fines less than 5 microns shall not be more than 20%. In any case, the materials to be used for filling purposes shall have the prior written approval of the Project Engineer and Executing Agency.

b) If excavated materials are to be used for filling, then the Concessionaire shall select the materials from the stockpile, load and transport this material and execute the filling. This

shall include excavation of earth which may become hard due to laying in stack yard for a long period of time.

c) In case the materials have to be brought from pits/quarries, then it shall be the Concessionaire's responsibility for identification of such quarry areas, obtaining approval for their use from concerned authorities, excavation/quarrying, loading and carriage of such material, unloading and filling at specified locations. The Concessionaire shall pay any fees, royalties etc. that may have to be paid for utilization of borrow areas.

1.5.2 Filling procedure

a) After completion of foundation, footings, walls and other construction below the elevation of the final grades, and prior to filling, all temporary shoring, timber, etc. shall be sequentially removed and the excavation cleaned of all trash, debris and perishable materials. Filling shall begin only with the written approval of the Project Engineer and Executing Agency. Also, areas identified for filling shall be cleared of all soft pockets, vegetation, bushes, slush etc. In case of plinth and similar filling the ground shall be dressed and consolidated by ramming and light rolling.

b) Fill materials shall not be dropped directly upon or against any structure or facility where there is danger of displacement or damage. Filling shall be started after the concrete / masonry has fully set and shall be carried out in such manner so as not to cause any undue lateral thrust on any part of the structure.

c) All space between foundation (concrete or masonry) and the sides of excavation shall be filled to the original surface after making allowance for settlement. Fill shall be placed in horizontal layers not exceeding 200 mm loose thickness. Each layer shall be watered and compacted with proper moisture content and with such equipment as may be required to obtain a compaction/density as specified. Trucks or heavy equipment for depositing or compacting fill shall not be used within 1.5 metres of building walls, piers or other facilities which may be damaged by their weight or operations. The methods of compaction shall be subject to the approval of the Project Engineer and Executing Agency. Pushing of earth for filling shall not be adopted under any circumstances.

d) Fill adjacent to pipes shall be free of stones, concrete, etc. and shall be hand placed and compacted uniformly on both sides of the pipe and where practicable up to a minimum depth of 300 mm over the top of pipes. While tamping around the pipes, care should be taken to avoid unequal pressure.

e) Filling shall be accurately finished to line, slope, cross section and grade as shown on the drawings. Finished surface shall be free of irregularities and depressions and shall be within 20 mm of the specified level.

f) Where filling with stone from excavated materials is required, as per design and functional requirements, it shall be from broken pieces of boulders. At first a 75mm thick cushion of selected earth shall be laid over which the 200 mm thick graded stones shall be laid in loose layers of 200 mm and then the interstices filled with properly graded fine materials consisting of selected earth brought from borrow areas. Each layer shall be watered and compacted to the required density as per design and functional requirements before the next layer is laid. However, no cushion shall be required where filling is over non-rocky surface.

g) Where clean stone fill is required as per design and functional requirements it shall consist of clean selected stone metal of 40 mm nominal size. It shall be laid in layers not exceeding 150 mm (loose) and lightly tamped before the next layer is laid. No compaction shall be required for this type of stone filling.

1.5.3 Compaction

a) Where compaction of 90% Standard Proctor Density is called for, such compaction shall be by mechanical means but the Concessionaire may be permitted to adopt manual means only if the Project Engineer and Executing Agency finds that the desired compaction is achievable in the field.

b) Where compaction to 95% Standard Proctor Density is called for, it shall be by mechanical means only. Where access is possible, compaction shall be 12 tonne rollers smooth wheeled, sheep foot or wobbly wheeled and directed by the Project Engineer and Executing Agency. A smaller weight roller may be permitted by the Project Engineer and Executing Agency in special cases, but in any case not less than 10 passes of the roller will be accepted for each layer. Each layer shall be wetted or the material dried by aeration to a moisture content of 3-5% above the Optimum Moisture Content to be determined by Concessionaire. Each layer shall be watered, rammed and compacted to the density as specified in the Schedule of Quantities.

c) For compacting each sand layer, water shall be sprayed over it to flood it and it shall be kept flooded for 24 hours to ensure maximum compaction. Vibro-compactors shall also be used if necessary to obtain the required degree of compaction. Any temporary works required to contain sand under flooded condition shall also be undertaken. The surface of the consolidated sand shall be dressed to required levels or slope.

d) After the compacted fill has reached the desired level, the surface shall be flooded with water for 24 hours, allowed to dry and then rammed and consolidated to avoid any settlement, at a later date. The compacted surface shall be properly shaped, trimmed and consolidated to an even gradient or level. All soft spots shall be excavated, filled and consolidated.

e) The degree of compaction of compacted fill in place will be subject to tests in accordance with relevant Indian Standards as desired by the Project Engineer and Executing Agency. As the work progress, the Concessionaire shall provide the necessary facilities to make such tests. If any test indicates that the compaction achieved is less than the required as per design and functional requirements degree of compaction, the Project Engineer and Executing Agency may require all fill placed subsequent to the last successfully test to be removed and re-compacted by the Concessionaire. Compaction procedure shall be amended as necessary to obtain satisfactory results.

f) When semi-compacted fill is required as per design and functional requirements by the Project Engineer and Executing Agency, the Concessionaire shall fill up such areas with available earth from stockpiles or borrow pits or directly from excavation without special compaction except that obtained by moving trucks, etc.

1.6 Sampling testing and quality control

1.6.1 General

a) The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International Standards and shall conduct such tests as are called for by the Project Engineer and Executing Agency. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Project Engineer and Executing Agency. Tests shall be done in the field and at a laboratory approved by the Project Engineer and Executing Agency and the Concessionaire shall submit to the Project Engineer and Executing Agency, the test results in triplicate within three days after completion of a test. The Project Engineer and Executing Agency may, at his discretion, waive some of the stipulations given below, for small and unimportant operations.

b) Work found unsuitable for acceptance shall be removed and replaced by the Concessionaire. The work shall be redone as per specification requirement and to the satisfaction of the Project Engineer and Executing Agency.

c) Only as a very special case and that too in non-critical areas, the Project Engineer and Executing Agency may accept filling work which is marginally unacceptable as per the

criteria laid down. For such accepted work, payment shall be made at a reduced rate prorate to the compaction obtained against that stipulated.

1.6.2 Quality assurance programme

The Concessionaire shall submit and finalize a detailed field Quality Assurance Programme of the Contract according to the requirements of the specification. This shall include setting up of a testing laboratory, arrangement of testing apparatus / equipment, deployment of qualified/experienced manpower, preparation of format for record, Field Quality Plan, etc. On finalized field quality plan, the Executing Agency shall identify customer hold prints beyond which work shall not proceed without written approval from the Project Engineer and Executing Agency. Frequency of sampling and testing including the methods for conducting the tests are given in Table - 1. The testing frequencies set forth are the desirable minimum and the Project Engineer and Executing Agency shall have the full authority to carry out or call for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications.

1.6.3 Acceptance criteria

Following acceptance criteria shall be followed.

a) All individual samples collected and tested should pass without any deviation when only one set of sample is tested.
b) For re-test of any sample two additional samples shall be collected and tested, and both should pass without any deviation.
c) Where a large number of samples are tested for a particular test than 9 samples out of every 10 consecutive samples tested shall meet the specification requirement.
d) Tolerance on finished levels for important filling areas at approved intervals shall be + 20 mm. However, for an unimportant area, tolerance upto + 57 mm shall be acceptable at the discretion of the Project Engineer and Executing Agency. However, these tolerances shall be applicable for localized areas only.

Table 1: Frequency of sampling and testing

Sl. No.	Nature of test/ characteristics	Methods of test	No. of samples & frequency of test	Remarks
I.	**Suitability of fill materials**			
(a)	Grain size analysis	IS:2720 (Part-IV)	One in every 2000 Cum. for each type and each source of fill material subject to a minimum of	Test for and sand
(b)	Liquid limit and plastic limit	IS:2720 (Part-V)	two samples	Test for soil

Sl. No.	Nature of test/ characteristics	Methods of test	No. of samples & frequency of test	Remarks
(c)	Shrinkage limit	IS:2720 (Part-VI)	One in every 5000 cum. for each type	The frequency of Test shall be
(d)	Free sweel index	IS:2720 (Part-XL)	And each source of fill materials.	increased depending on type of soil
(e)	Chemical Analysis	IS:2720		
	i. Organic matter	Part XXII	One in every 5000 Cum for each type and each source of	Test for sand and soil.
	ii. Calcium carbonate	Part XXIII	Fill materials.	
	iii. pH	Part XXVI		
	iv. Total soluble sulphate	Part XXVII		
II.	**Standard proctor test**	IS:2720 (Part VII)	One in every 2000 cum. for each type and each source of fill materials	Test for soil for determining optimum moisture content, Dry Density etc.
III.	**Moisture content of fill before compaction.**	IS:2720 (Part II)	-do-	Test for soil
IV.	**Degree of compaction of fill**		(i) For foundation filling, one for every ten foundations for each	Test for soil
(a)	Dry density by core cutter method	IS:2720 (Part XXIX)	Compacted layer. However, each layer for location of important and heavily loaded	
	or			
	Dry density in place by sand displacement method	IS:2720 (Part XXVIII)	Foundations resting on fill shall be tested.	
			(ii) For area filling one for every 1000 Sqm. Area for each compacted layer.	
(b)	Relative density index	IS:2720 (Part XIV)	-do- (i) & (ii)	Test for sand
(c)	Dry density by proctor needle penetration	Standard Practice	Random checks to be carried out for each compacted layer in addition to tests	Test for soil

Sl. No.	Nature of test/ characteristics	Methods of test	No. of samples & frequency of test	Remarks
			mentioned under IV (a) above.	

Sub section - C2

Technical specification for properties, storage and handling of common building materials

Sub Section - C2

Technical specification for properties, storage and handling of common building materials

Contents

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Sub Section - C2: Technical specification for properties, storage and handling of common building materials

2.1 Scope

The scope of this section of the specification is to specify the properties, storage and handling of common building materials namely, coarse aggregates, cement, water, sand masonry units, reinforcement and structural steel.

Properties of the materials in general have been discussed. Specific requirements of the materials have been stipulated separately under specification for relevant items of work.

2.2 General requirements

The work shall include, providing of all necessary plants and equipment, providing adequate engineering supervision and technical personnel, skilled and unskilled labour etc. as required to carry out the entire work as directed by the Project Engineer and Executing Agency to his complete satisfaction.

All materials proposed for use in the work shall conform to the requirements laid down in this section, and also subject to the approval of the Project Engineer and Executing Agency. After specific materials have been accepted, the source of supply of such materials shall not be changed without prior approval of the Project Engineer and Executing Agency.

Approval of any material by the Project Engineer and Executing Agency shall not relieve the Concessionaire of his responsibility, for the requisite quality and performance of the material used.

Any material considered to be sub-standard, or not upto satisfaction of the Project Engineer and Executing Agency, shall not be used by the Concessionaire and shall be removed from the site immediately.

Representative samples shall be procured by the Concessionaire and submitted to the Project Engineer and Executing Agency, for approval before bulk procurement. The representative samples shall be retained by the Project Engineer and Executing Agency for future comparison and reference.

2.3 Codes and standards

In the event that state, city or other local governmental bodies have requirements more stringent than those set forth in this specification, the former shall govern.

All applicable standards, acts, specifications, codes of practice, hand books, referred to herein shall be the latest editions, including all official amendments and revisions.
In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decision of Project Engineer in such case shall be final and binding on the Concessionaire.
Any special materials used, but not covered here, shall conform to relevant Indian Standards, if any, or as specified by the Project Engineer and Executing Agency for any special purpose.

Some of the applicable Indian standards, codes are referred to here below:

IS:226 Specification for structural steel (standard quality).

IS:269 Specification for ordinary Portland cement, 33 grade.

IS:383 Specification for coarse and fine aggregates from natural sources for concrete.

IS:432 (Parts 1 & 2) Specification for mild steel and medium tensile steel bars and hard-drawn steel wires for concrete reinforcement.

IS:455 Specification for Portland slag cement.

IS:712 Specification for building limes.

IS:1077 Specification for common burnt clay building bricks.

IS:1077 Specification for Burnt clay bricks/Fly ash bricks.

IS:1127 Recommendations for dimensions and workmanship of natural building stones for masonry work.

IS:1129 Recommendation for dressing of natural building stones.

IS:1489 Specification for Portland pozzolana cement
(Part-I) Fly ash based
(Part-II) Calcined clay based

IS:1542 Specification of sand for plaster.

IS:1566 Specification hard-drawn steel wire fabric for concrete reinforcement.

IS:1597 Code of Practice for construction of stone masonry, rubble stone masonry.

IS:1786 Specification for high strength deformed bars for concrete reinforcement.

IS:2062 Specification for hot rolled medium and high tensile structural steel.

IS:2116 Specification for sand for masonry mortars.

IS:2386 Testing of aggregates for concrete. (Part I to VIII)

IS:3495 Methods of test of Burnt clay bricks/Fly ash bricks (Part-I to IV)

IS:4031 Methods of physical tests for hydraulic cement.

IS:4032 Methods of chemical analysis of hydraulic cement.

IS:4082 Recommendations on stacking and storage of construction materialsat site.

IS:7969 Safety code for handling and storage of building materials.

IS:8112 High strength ordinary portland cement.

IS:8500 Medium and high strength structural steel.

IS:12269 43/53 grade ordinary Portland cement.

IS:12330 Sulphate resisting Portland cement.

IS:12600 Portland cement, low heat.

IS:12894 Fly Ash Lime Bricks - specification.

IS: 3812-2 Specification for pulverized fuel ash for use as admixture in cement mortar and concrete

2.4 Burnt clay Bricks

Burnt clay bricks, for general masonry work, shall conform to IS:1077 and for face brick work, shall conform to IS:2691. Fly ash lime bricks shall conform to IS:12894.

Bricks for general masonry work shall be table moulded/machine made, well burnt without being vitrified, of uniform size, shape, having sharp edges and cherry red colour. These shall be free from cracks, flaws or nodules of free lime and shall emit clear ringing sound (metallic sound) when struck. These shall not show any signs of efflorescence either when dry or subsequent to soaking in water. Fractured surface shall show uniform texture free from girts, lumps, holes etc.

Unless otherwise specified, minimum compressive strength shall correspond to class designation 75 as per IS: 107 with a minimum crushing strength of 75 kg/sq.cm. for general masonry work. However, for non-load bearing walls, bricks pavements, etc. bricks of class designation 50 shall only be used, wherever specified or shown on the drawings. Water absorption after 24 hours immersion shall not exceed 20% by weight for common bricks and 15% for face bricks.

On the basis of finish and dimensional tolerance, the bricks shall be classified as sub class A and B. Dimensional tolerance shall not exceed 3% and 8% of the size, of common bricks for sub-class A & B respectively and 3% for face bricks. All bricks shall have rectangular faces and sharp straight edges. Maximum permissible chip page for the face bricks shall be 6mm at the edges and 10mm for corners. The face bricks shall show no efflorescence after soaking in water and drying in the shade.

The size of the bricks used shall be either modular size as per IS:1077 or locally available conventional size as approved by the Project Engineer and Executing Agency.

Each brick shall have the manufacturer's identification mark clearly marked on the frog. The colour and texture of face bricks shall be limited to the range of samples submitted. Any brick not found upto the satisfaction of the Project Engineer and Executing Agency shall be removed immediately from site by the Concessionaire.

2.5 Fly Ash Bricks

Fly ash bricks (cement bonded) shall be locally made. Bricks shall have smooth rectangular faces with sharp and square corners. Bricks shall be hand or machine moulded and shall be made from the admixture of suitable good quality of fly ash, sand and cement as per the composition mentioned below:

- Fly ash : 50-60%
- Sand : 32-40%

- Cement : 8-12%

The fly ash bricks will be as per latest relevant IS code. The bricks will be of dimension as per standard clay brick, suitable for making 230 mm thick full brick wall, 115 mm thick half brick wall and 75 mm thick minor partition walls, as applicable, as per drawing/specification/BOQ. A maximum tolerance of (+/-) 2 mm shall be allowed as the manufacturing tolerance. The bricks shall have frog of 100 mm in length 40 mm in width and 10 to 20 mm deep of one of its flat sides.

The bricks when tested in accordance with the procedure laid down in IS 3495 (part 2): 1992 after immersion in cold water for 24 hrs. Water absorption shall be within 13-15% by weight. Similarly, the porosity of the fly ash bricks shall be within 12-20%. The bricks shall have a minimum crushing strength of 80 Kg/Sqcm.

Fly ash bricks, for general masonry work, shall conform to IS:2212-1991

Unless otherwise specified, minimum compressive strength shall correspond to class designation 80 as per IS: 107 with a minimum crushing strength of 80 kg/sq.cm. For general masonry work. However, for non-load bearing walls, bricks pavements, etc. bricks of class designation 50 shall only be used, wherever specified or shown on the drawings. Water absorption after 24 hours immersion shall not exceed 20% by weight for common bricks and 15% for face bricks.

On the basis of finish and dimensional tolerance, the bricks shall be classified as sub class A and B. Dimensional tolerance shall not exceed 3% and 8% of the size, of common bricks for sub-class A & B respectively. All bricks shall have rectangular faces and sharp straight edges. Maximum permissible chip page for the face bricks shall be 6 mm at the edges and 10 mm for corners. The face bricks shall show no efflorescence after soaking in water and drying in the shade.

The size of the bricks used shall be either modular size as per IS:1077 or locally available conventional size as approved by the Project Engineer and Executing Agency.

Each brick shall have the manufacturer's identification mark clearly marked on the frog. The colour and texture of face bricks shall be limited to the range of samples submitted. Any brick not found upto the satisfaction of the Project Engineer and Executing Agency shall be removed immediately from site by the Concessionaire.

2.6 Stones

All stones shall be from approved quarries. These shall be hard, tough, and durable, compact grained, uniform the texture and colour and free from decay, flaws, veins, cracks and sand holes. The surface of a freshly broken stone shall be bright, clean and sharp and hall show uniformity of

texture, without loose grains and free from any dull, chalky or earthy appearance. Stone with round surface shall not be used.

Stones showing mottled colours shall not be used for face work. A stone shall not absorb more than 5% of its weight of water after 24 hours immersion. The type of stone shall be as specified or shown on drawings and/or as instructed by the Project Engineer and Executing Agency. Stones used for masonry work shall conform to IS:1597 (Part – I) No soft stone shall be used for masonry or for filling purpose.

Any stone not found up to the satisfaction of Project Engineer and Executing Agency shall be removed immediately from site by the Concessionaire.

2.7 Lime

Lime shall be stone lime and it shall conform to IS:712. Hydrated lime shall be mixed with water to form a putty. This shall be stored with reasonable care to prevent evaporation of water for at least 24 hours before use. Quick lime shall be slaked with enough water to make a cream and then stored with reasonable care to prevent evaporation of water for at least seven days before use. Type of lime to be used for different purposes such as concreting, plastering, white washing etc. shall be according to the satisfaction made hereunder:

Class – A Eminently hydraulic lime used for structural purposes.

Class – B Semi-hydraulic lime used for masonry mortars, lime concrete and plaster undercoat

Class – C Fat lime used for finishing coat in plastering, white washing, composite mortars, etc. and with addition of pozzolanic materials for masonry mortar.

Class – D Magnesium/dolomite lime used for finishing coat in plastering, whitewashing, etc.

Class – E Kankar lime used for masonry mortar.

Class – F Siliceous dolomite lime used for undercoat and finishing coat of plaster

2.8 Cement and fly ash

Cement shall be Portland pozzolana cement conforming to IS:1489 or Portland slag cement conforming to IS:455 or sulphate resistant cement confirming to IS 12330 as per the specific site condition and exposure. As per CPHEEO Maunal guideline, all civil works in contact with sewage/faecal sludge/septage shall be constructed with either brick work or RCC and in both cases sulphate resistant cement alone shall be used. However, any lower grade of OPC, PPC and PSC should never be mixed with higher grade cement.

Fly ash is generated by burning of coal in coal fired power plants. It has the characteristic of pozzolonic additive to cement. Continuous research studies by various engineering research laboratories revealed its varied usefulness as an additive for enhancing the various qualities of concrete including its workability, strength and durability if handled and cared properly. Partial replacement of cement with fly ash in concrete save much of the energy required for production of OPC and also facilitates the economical disposal of millions of tons of fly ash.

At present most of the fly ash blended cements commercially produced in India has 18 to 25% fly ash by weight and addition of fly ash to this extent has a beneficial effect on the workability and economy of concrete. It has been found that in order to improve the other qualities of concrete like resistance of sulfate attack and thermal cracking, larger percentage of fly ash is to be used in concrete.
Indian standard specification No. 3812-2003, Specification for Pulverized Fuel Ash, Part 2: For Use as Admixture in Cement Mortar and Concrete [CED 2: Cement and Concrete] covers the extraction and the physical and chemical requirements of pulverized fuel ash for use as admixture in cement mortar and concrete. Fly ash confirming to this standard shall be used in place of cement.

The chemical, physical requirements and testing of fly ash shall be in accordance with the IS 3812-2003

2.9 Water

Water used for cement concrete, mortar, plaster, grout, curing, washing of coarse aggregate, soaking of bricks, etc. shall be clean and free from injurious amount of oil, acids, alkalis, organic matters or other harmful substances in such amounts that may impair the strength or durability of the structure. Potable water shall generally be considered satisfactory for all masonry and concrete works, including curing. The Concessionaire shall carry out necessary tests in advance to prove the suitability of the water proposed to be used. As a guide, the following concentrations represent the maximum permissible values:

a. To neutralize 200 ml sample of water, it should not require more than 2ml of 0.1 normal NaOH.
b. To neutralize 200 ml sample of water, it should not require more than 10ml of 0.1 normal HCL.
c. Percentage of solids shall not exceed the following :

1.	Organic	0.02
2.	Inorganic	0.30
3.	Sulphates	0.05

4.	Chlorides	0.10
5.	Suspended matter	0.20

2.10 Aggregates

Aggregates mean both coarse and fine inert materials used in the preparation of concrete. Aggregates shall consist of natural sands, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, hard, strong, durable against weathering, of limited porosity and free from such quantities of deleterious materials as may cause corrosion of reinforcement or may impair the strength and / or durability of the concrete. Total percentage of all deleterious materials, including coal, lignite, clay lumps, and materials finer than 75 microns, soft fragments and shale but excluding mica shall not exceed 5%. However, for crushed fine aggregate, total percentage of coal and lignite and clay lumps, shall be limited to 2%. Both coarse and fine aggregates shall conform to IS:383 for concrete, shotcreting etc. unless otherwise mentioned.

Sample of aggregates for mix design and determination of their suitability shall be sent to the laboratory well in advance in scheduled placing of concrete. Sampling, testing, and interpretation of test results shall be subject to the approval of the Project Engineer and Executing Agency. Aggregates shall be properly graded.

2.11 Sand

Sand shall be hard, durable, clean and free from adherent coatings of organic matter and shall not contain clay balls or pellets. The sand shall be free from impurities such as iron pyrites, alkalis, salts, coal, mica, shale, or other laminated materials, in such forms or quantities as to affect adversely the hardening, strength, durability or appearance on mortar, plaster, etc. or to cause corrosion of any metal in contact with such mortar, plaster etc. In no case, the cumulative percentage of Impurities in sand shall be more than 5% by weight. All sand shall be properly graded. Unless otherwise directed by the Project Engineer and Executing Agency, sand for masonry mortars shall conform to IS:2116 and sand for plaster shall conform to IS:1542. Sand, when used as fine aggregate, in concrete, shall conform to IS:383. For filling, medium grained sand (having fines less than 75 microns not exceeding 20%) shall be used.

2.12 Reinforcement steel, structural steel (including embedded steel) and wire mesh

Billet: (Primary steel)

A semi-finished product obtained by forging or rolling, usually square and not exceeding 125 x 125 mm in cross section with rounded corners and is intended for further processing into suitable finished product by forging or re-rolling.

Steel shall be manufactured by open hearth, electric, duplex, basic oxygen or a combination of these processes. In case any other process is employed by the manufacturer, prior approval of the purchaser should be obtained.

The ladle analysis of the material when analyzed in accordance with the various parts of IS: 228, shall be confirmed with IS: 8056-1976- Table 1 (Chemical composition).

Table 1 Chemical Composition (As per IS: 8056-1976 clauses 3.1 & 6.1)	
Constituent	**Percent**
Carbon	0-45 to 0.80
Silicon	0.15 to 0.35
Manganese	0.40 to 1.00
Sulphur, Max	0.050
Phosphorus, Max	0.050

In case of continuous cast billets, the billet analysis shall be taken as ladle analysis.

Permissible variation in case of product analysis from the limits specified in IS: 8056-1976 clause-6.1 shall be as follows:

Constituent	**Variation Over the Specified Maximum or Under the Minimum Limits in %**
Carbon	0.03
Silicon	0.03
Manganese	0.04
Sulphur, Max	0.005
Phosphorus, Max	0.005

Note: *Variations shall not be applicable both over and under the specified limits in several determinations in a heat.*

Sampling

At least one ladle sample analysis shall be taken per cast.

If required, the samples for product analysis shall be prepared by forging or rolling down to 30-mm round section.

In case of wire rods the test piece size shall be the size of wire rods.

Drilling shall be taken from the sample representing two-thirds, half and one-third of height from bottom of the billet separately.

In case of continuous cast billets and billets produced from ingots of masses 3 tonnes and more, the sample may be taken from anywhere from the billets.

Freedom from defects

The billets and continuous cast billets shall be free from harmful defects, such as pipe, laminations, segregation, inclusions and cracks.

Subject to agreement between the purchaser and the manufacturer, the billets and continuous cast billets may be supplied with suitable surface dressing.

billets shall either be supplied free from harmful segregation, piping, cracks, inclusions, and blow-hole by appropriate top and bottom discard and dressing or supplied with suitable surface dressing only, without top and bottom discard if agreed to between the purchaser and the manufacturer, to ensure the requirements of freedom from defects specified in the relevant product specifications.

If agreed to between the purchaser and the manufacturer the following tests may be carried out from the samples prepared under IS: 8056-1976

Dimensions

The size and tolerance of billets shall be subject to agreement between the purchaser and the manufacturer. However, the nominal sizes of billets generally supplied as per guidance given in IS: 8056-1976

The preferred sizes of billets shall be 50, 63, 71, 80, 90, 100 and 125 mm.

The sizes other than those specified may be supplied by agreement between the purchaser and the manufacturer.

A tolerance of the billets shall be confirmed with IS: 8056-1976
The ends of ingots and billets shall be painted with a suitable colour code conforming to IS: 2049-1963.

Each ingot and billet shall be legibly stamped or painted with the cast number, grade and the name or trade-mark of the manufacturer.

The material may also be marked with the IS1 Certification Mark.

All steel for reinforcement shall be clean and free from loose mill scales, dust, loose rust, oil, grease, paint or other harmful matters, which may affect its bond with concrete. Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement shall conform to grade-1 of IS:432 (Part-1). High strength deformed steel bars shall conform to grade Fe 415 of IS:1786. All steel bars shall be of tested quality. Actual grade and type steel, to be used, shall be as specified or shown on drawings.

Structural steel (including embedded steel) shall be straight, sound, free from twists, cracks, flaws, laminations and all other defects. Structural steel shall be of tested quality conforming to IS:226, IS:2062 or IS:8500. These shall be free from lamination defects. Grade and type of steel to be used shall be as specified.

Hard drawn steel wire fabric shall conform to IS:1566. Wire fabric shall be electrically cross welded.

2.13 Storage and handling of materials

Generally, all materials shall be stacked and stored by the Concessionaire as described in IS:4082 unless otherwise mentioned and in a manner affording convenient access for identification and inspection at all times. The storage area and arrangements shall be subject to the approval of the Project Engineer and Executing Agency. Any material rendered unserviceable during the Concessionaire's custody, shall be replaced or repaired by the Concessionaire as determined by the Project Engineer and Executing Agency.

All materials shall be as stored as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work. Any material, which has deteriorated or has been damaged or is otherwise considered defective by the Project Engineer and Executing Agency, shall not be used and shall be removed.

Bricks shall not be dumped at site. These shall be stacked on dry firm ground in regular tiers even as they are unloaded to minimize breakage and defacement of bricks. Bricks of different class, selected for various categories of use in the work, shall be stacked separately. Each stack shall contain equal number of bricks, preferably not more than 3000.

Dressed stone for all facing, paving etc. shall be stored with special care to avoid defacement of faces and edges or damp and rust stains.

Lime shall be stored in weather-proof sheds. Lime which has been damaged by rain, moisture or air slaking, shall not be used. If the lime is supplied as hydrated lime, it shall be stored in the same manner as cement.

2.13.1 Cement and fly ash

a. Consignments of cement shall be stored as received and shall be consumed in the order of their delivery. Cement held in storage for more than ninety days shall invariably be tested, and only if test results are satisfactory, the Project Engineer and Executing Agency may consider permitting its use.

b. Different consignments of different types of cement, i.e. OPC, PPC, PSC shall be stacked separately with clear identifiable stack number.

c. The cement shall be stored in dry, leak proof and weather proof are closed sheds. Storage under tarpaulins shall not be permitted. The cement bags shall be stored well away from the walls and insulated from the floor, using

d. Planks etc. to avoid contact with moisture. The cement shall be stacked in easily countable stacks and in a place of easy access so as to facilitate proper inspection and removal on a first in first out basis. Not more than 15 bags shall be stacked in any tier to prevent lumping up under pressure. However, in stacks more than 8 bags high, the cement bags shall be arranged alternately lengthwise and crosswise so as to tie the stacks together and minimize the danger of toppling over. The cement bags shall be gently kept to avoid leakage of cement from the bags. Substandard or partially set cement shall be immediately removed from the site as soon as it is detected.

e. The Concessionaire shall make his own arrangements for the storage of adequate quantity of cement. Cement in bulk may be stored in bins or silos which will provide adequate protection against dampness, contamination, etc. The bins or silos, shall be cleaned periodically.

f. Pulverized fuel ash (Fly ash) shall be stored in accordance with the recommendation given in IS 4082. Additionally, during bulk storage, the fly ash should be suitably covered to avoid getting airborne.

g. Supplies of pulverized fuel ash (Fly ash) may be made in bulk in suitable quantities or in bags (jute, jute-laminated, multiple paper or polyethylene lined) bearing the net mass (may be 15 kg, 30 kg, 300 kg, 600 kg as agreed by the Concessionaire)

h. Pulverized fuel ash in bulk storage for more than 6 months or in bags for more than-3 months after completion of tests, may be re-tested before use and standard. May be rejected, if it fails to conform to any requirements of this standard.

i. Pulverized fuel ash may be rejected if it does not comply with any of the requirements stipulated in IS 3812 Part 2 of 2003

2.13.2 Coarse and fine aggregates/sand

a. Coarse and fine aggregates shall be stacked separately. Contamination with foreign materials and earth during storage and while heaping the materials shall be avoided. Coarse aggregates shall be stacked in layers not exceeding 120 cm in height such that corning and segregation do not occur. Each layer shall cover the entire area of the stock pile before succeeding layers are placed. Segregated aggregates from stock-pile shall be rejected.

b. Aggregates shall be stored on brick soling or an equivalent platform so that they do not come in contact with dirt, clay, grass or any other injurious substance, at any stage. For lifting aggregates from stock piles, rakers shall be used. Aggregates of different sizes shall be kept in separate and easily measurable stacks. If so desired by the Project Engineer and Executing Agency, aggregates from different source shall be stacked separately with proper care to prevent intermixing.

2.13.3 Reinforcement and Structural Steel (including steel required for embedment)

a. Reinforcement and structural steel (including steel required for embedment) shall be stored consignment wise and size wise, off the ground by at least 150mm and protected by the suitable cover, or as desired by the Project Engineer and Executing Agency. The steel shall be protected from rusting, oil grese and distortions. The reinforcing steel shall be coated with cement wash before stacking to prevent scale and rust, in areas having accelerating corrosion effect like marine atmosphere. The stacks shall be easily measurable. Steel needed for immediate use only shall be removed from storage. Fabricated steel shall be carefully stored to prevent damage, distortion, corrosion and deterioration.

b. Reinforcement shall be stored according to the diameter, grade and length in such a place as to permit easy approach for inspection and identification.

c. The area shall be such that water does not accumulate and reinforcement does not get distorted or corroded. It shall not be stacked directly over ground or near any harmful materials. It shall be cleaned of excessive rust before use.

d. Steel plates of different specifications shall be stacked separately. Steel of IS:2062 and IS:8500 quality shall be given a grade wise, distinctive identification mark. Passage and space between the stacks shall be sufficient for rigging operations.

2.14 Testing

All materials provided by the Concessionaire shall be tested for conformity of the specification and the test results shall be submitted to the Project Engineer and Executing Agency for acceptance. In addition to above, the Concessionaire shall carry out the relevant tests at site as specified under different items of work.

Sub-section - C3

Technical specification for cast-in-situ concrete AND allied works

Sub Section - C3

Technical specification for cast-in-situ concrete and allied works

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Sub Section - C3: Technical specification for cast-in-situ concrete and allied works

3.1 Common requirement

3.1.1 Scope

The work shall include providing of materials, all necessary plant and equipment, providing adequate engineering supervision and technical personnel, skilled and unskilled labour, etc. as required to carry out the entire work as indicated on the drawings and/or described herein subsequently and/or as directed by the Project Engineer and Executing Agency.

The Concessionaire shall carry out all works meant within the intent of this specification even if not explicitly mentioned herein. All works shall be executed to the satisfaction of the Project Engineer and Executing Agency.

This specification is divided into 13 sections. The Section - 1 deals with common requirements and the other 12 sections deal with specifications for 12 different items/activities. The stipulations contained in Section-1, '**Common Requirements**' shall form a part of the specifications of 12 different items/activities described in section 2 to 13.

All these eight sections are as follows:

Section - 1	Common requirement
Section - 2	Cast-in-Situ Concrete
Section - 3	Reinforcement
Section - 4	Formwork and staging
Section - 5	Embedded parts
Section - 6	Foundation bolt assembly
Section - 7	Shotcreting
Section - 8	Grouting
Section - 9	Encasement of steel structures/elements
Section - 10	Joints in Concrete
Section - 11	Water proofing / damp proofing of underground concrete structures.
Section - 12	Dismantling / Demolishing works - RCC and PCC.
Section - 13	Cement Additives/Admixtures in concrete.

3.1.2 General

Any approval, instructions, permission, checking, review, etc. whatsoever by the Project Engineer and Executing Agency, shall not relieve the Concessionaire of his responsibility and obligation regarding adequacy, correctness, completeness, safety strength, quality, workmanship, etc.

The Concessionaire shall make his own surveying arrangements for locating the coordinates and positions of all work and establishing the reduced levels (RLs) at these locations, based on two reference grid lines and one bench mark, which will be furnished by the Executing Agency. The Concessionaire has to provide at site, faction of the Engineer so that the work can be carried out accurately and according to the specifications and drawings.

3.1.3 Codes and standards

All applicable standards, specifications, etc. and codes of practice shall generally be the latest editions, including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the Concessionaire.

All work shall be carried out as per the stipulations contained in various sections of these specifications and the latest Indian Standards, Acts, Codes and best practices.

In case of conflict between the stipulations contained in various sections of these specifications and stipulations of Indian Standards, Codes, etc. the requirements of stipulations contained in various sections of these specifications, shall prevail over that of Indian Standards, Codes, etc.

Some of the applicable Indian Standards, Codes, etc. are referred to here below:

IS:73 - Specification for paving bitumen
IS:2062 - Specification for structural steel
IS:269 - Specification for Ordinary Portland cement, 33 grade.
IS:280 - Specification of mild steel wire for general engineering purposes
IS:383 - Specification for coarse and fine aggregates from natural sources for concrete.
IS:432 - Specification for mild steel and medium tensile steel (parts I & II) bars and hard drawn steel wire for concrete reinforcement.
IS:455 - Specification for Portland slag cement
IS:456 - Code of practice for plain and reinforced concrete.
IS:457 - Code of general construction of plain & reinforced concrete for dams & other massive structures.
IS:516 - Method of test for strength of concrete
IS:650 - Specification for standard sand for testing of cement
IS:702 - Specification for industrial bitumen
IS:816 - Code of practice for use of metal arc welding for general construction in mild steel.
IS:1199 - Method of sampling and analysis of concrete
IS:1200 - Method of measurement of building (Part-II and civil engineering works. V, VIII, XVIII)

IS:1367 - Technical supply conditions for threaded steel fasteners.

IS:1489 - Specification for Portland-pozzolana cement (Part-I) Fly ash based (Part-II) Calcined clay based

IS:1566 - Specification for Hard-drawn steel wire fabric for concrete reinforcement.

IS:1609 - Code of practice for laying damp proof treatment using bitumen felts.

S:1786 - Specification for high strength deformed steel bars and wires for concrete reinforcement

IS:1791 - General requirements for batch type concrete mixers.

IS:1838 - (Part 1) Specification for preformed fillers for expansion joints in concrete pavements and structures (non extruding and resilient type)

IS:2204 - Code of practice for construction of reinforced concrete shell roof.

IS:2210 - Criteria for the design of reinforced concrete shell structures and folded plates.

IS:2386 - Methods of test of aggregates for (Parts concrete I to VIII)

IS:2438 - Specification for roller pan mixer

IS:2502 - Code of practice for bending and fixing of bars for concrete reinforcement

IS:2505 - General requirements for concrete vibrators, immersion type.

IS:2506 - General requirements for concrete vibrators, screed board type.

IS:2514 - Specification for concrete vibrating tables.

I:2571 - Code of practice for laying in-situ cement-concrete flooring.

IS:2645 - Specification for Integral cement water proofing compounds.

IS:2722 - Specification for portable swing weigh batchers for concrete. (Single and double bucket type)

IS:2750 - Specification for Steel scaffoldings

IS:2751 - Code of practice for welding of mild steel plain and deformed bars for reinforced concrete structures.

IS:3025 - Methods of sampling and test waste water.

IS:3067 - Code of practice for general design details and preparatory work for damp proofing & water proofing of buildings.

IS:3150 - Specification for hexagonal wire netting for general purposes.

IS:3366 - Specification for Pan vibrators.

IS:3370 - Code of practice for concrete (Part I structures for the storage of to IV) liquids.)

IS:3384 - Specification for bitumen primer for use in water proofing & damp proofing.

IS:3414 - Code of practice for design and installation of joints in buildings.

IS:3550 - Methods of test for routine control for water used in industry

IS:3558 - Code of practice for use of immersion vibrators for consolidating concrete.

IS:3696 - Safety code for scaffolds (Part I ladders & II)

IS:3812-2 - Specification for pulverized fuel ash for use as admixture in cement mortar and concrete

IS:4014 - Code of practice for steel tubular scaffolding (Parts I & II)

IS:4031 - Methods for physical tests for hydraulic cement.

IS:4130 - Safety Code for demolition of buildings.
IS:4326 - Code of practice for earthquake resistant design and construction of buildings.
IS:4461 - Code of practice for joints in surface hydro-electric power stations.
IS:4656 - Specification for form vibrators for concrete.
IS:4925 - Specification for batching and mixing plant.
IS:4990 - Specification for plywood for concrete shuttering work.
IS:4995 - Criteria for design of reinforced concrete bins for the storage of granular and powdery materials. (Parts I & II)
IS:5121 - Safety code for piling and other deep foundations.
IS:5256 - Code or practice for sealing joints in concrete lining on canals.
IS:5525 - Recommendations for detailing of reinforcement in reinforced concrete work.
IS:5624 - Specification for foundation bolts.
IS:6461 - Glossary of terms relating to cement concrete.
IS:6494 - Code of practice for water proofing of underground water reservoirs and swimming pools.
IS:6509 - Code of practice for installation of joints in concrete pavements.
IS:7193 - Specification for glass fiber base coal-tar pitch and bitumen felts.
IS:7293 - Safety code for working with construction machinery.
IS:7861 - Code of practice for extreme weather concreting (Parts I&II)
IS:9012 - Recommended practice for Shotcreting.
IS:9103 - Specification for admixtures for concrete.
IS:9417 - Recommendations for welding cold-worked steel bars for reinforced concrete construction.
IS:959 - Recommendations for metal-arc welding of carbon and carbon manganese steels.
IS:10262 - Recommended guidelines for concrete mix design.
IS:11384 - Code of practice for composite construction in structural steel and concrete.
IS:12118 - Specification for two-parts poly sulphide.
IS:12200 - Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams.
IS:12269 - 43/53 Grade ordinary Portland cement.
IS:12600 - Portland cement, low heat.
SP:23 - Handbook of concrete mixes
SP:24 - Explanatory Handbook on IS:456-1978
SP:34 - Handbook on concrete reinforcement and detailing

3.1.4 Sampling, testing and quality assurance

Facilities required for sampling materials, concrete, reinforcement, formwork, etc. in the field and in the laboratory shall be provided by the Concessionaire. The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International

Standards and this specification. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Project Engineerand Executing Agency. Tests shall be done in the field in the presence of the Project Engineer and Executing Agency or his authorized representative and at a laboratory, approved by the Project Engineer and Executing Agency, and the Concessionaire shall submit to the Project Engineer and Executing Agency the test results in triplicate within three days after completion of any test.

The Concessionaire shall maintain records of all inspection and testing, which shall be made available to the Project Engineer and Executing Agency. The Project Engineer and Executing Agency at his discretion, may waive some of the stipulations for small and unimportant concreting operations and other works.
Work found unsuitable for acceptance shall be removed and replaced by the Concessionaire. The work shall be redone as per specification requirements and to the satisfaction of the Project Engineer and Executing Agency at no extra cost to the Executing Agency.

Quality assurance programme

a) The Concessionaire shall submit and finalize a detailed field Quality Assurance Programme within 30 days from the date of award of the contract, before commencement of work at site, according to the requirements of the specification. This shall include setting up of a testing laboratory, arrangement of testing apparatus / equipment, deployment of qualified/experienced manpower, preparation of format for record, field quality plan, etc. On finalized field quality plan, the Executing Agency shall identify, customer hold points, beyond which work shall not proceed without written approval from the Project Engineer. The testing apparatus/equipment installed in the field laboratory shall be calibrated /corrected by the authorized persons as frequently as possible to give accurate testing results.

b) Frequency of sampling and testing, etc. and Acceptance Criteria are given in respective sections. However, the testing frequencies set forth are the desirable minimum and the Project Engineer and Executing Agency shall have the full authority to carry out or call for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications.

3.2 Cast-in-situ concrete

3.2.1 Scope

This section of the specification deals with plain or reinforced cement concrete for general use and in structures and covers the requirements for concrete, materials, their properties, storage,

handling, grading, mix design, strength and quality, pouring at all levels, testing, casting, protecting, curing, finishing, etc.

3.2.2 General requirement

The provision of IS:456 shall be followed as general guidance, along with all other relevant Indian Standards, unless otherwise specifically mentioned.

Before starting a concrete pour, the Concessionaire shall obtain the approval of the Project Engineer and Executing Agency on a 'Pour Card' maintained for this purpose. He shall obtain complete instructions about the materials and proportions, water cement ratio, etc. to be used, slump/workability, number of test cubes/samples to be taken, type of finishing to done, any admixture to be added, any limitation on size of pour and location for interruption of a pour in case of premature stopping of pour, etc.

The mixers and weigh-batchers, shall be maintained in clean and serviceable condition. Accuracy of all equipment shall be periodically checked. All concrete shall be mixed in mechanically operated batch mixers complying with IS:1791 and these shall be of approved make, with suitable provision for correctly controlling the water delivered to the drum. Weigh batchers shall conform to IS:2722 and shall be capable of controlling the weights to within one percent of the desired value.

The Concessionaire's procedures for casting massive concrete sections (as noted on the drawings or as identified by the Project Engineer and Executing Agency) shall take account of the release of the heat of hydration, drying shrinkage behavior. The procedures shall be such that cracking or loss of strength of the concrete from these effects is prevented. At least one week before commencing the construction of any massive concrete section, the Concessionaire shall submit, for approval of the Project Engineer and Executing Agency, detailed proposals for placing the concrete together with supporting calculations to demonstrate the suitability of the methods.

3.2.3 Materials

In general, all the materials used in the manufacture of concrete shall be in accordance with the Technical specification for properties, storage and handling of common building materials, (vide module C2) which shall be deemed to form a part of this specification.

The Project Engineer and Executing Agency shall have the right to inspect the sources of materials, method of procurement and storage of materials, method of procurement and storage of materials, quality control procedures, etc.

- **Cement**

The cement used shall be the Ordinary Portland cement conforming to IS:269 or Portland Pozzolana cement conforming to IS:1489 or Portland slag cement conforming to IS:455 or any other type of cement, specified in IS:456 with the prior approval of the Project Engineer and Executing Agency. However, any special type of cement such as High strength cement or sulphate resisting cement, may be used under special circumstances.

- **Aggregates**

a) For reinforced concrete work, aggregates conforming to IS:383 & IS:2386 having a maximum size of 20 mm shall be used. For certain reinforced concrete works, aggregates having a maximum size other than 20 mm size shall also be used as called for in the drawings. However, for lean concrete provided as mud mat below structural concrete, maximum size upto 40 mm shall be used.

b) Aggregates (coarse or fine) with a specific gravity below 2.6 shall not be used without special permission of the Project Engineer and Executing Agency. Machine-made sand will be acceptable provided the constituent (rock/gravel) is sound, hard, dense and is acceptable to the Project Engineer and Executing Agency. Sand, natural gravel and crushed rock shall be prepared for use by such screening or washing, or both, as necessary to remove all objectionable foreign matter.

c) **Type of aggregates:** Petro graphic examination shall be carried out to ascertain the structure and rock type of aggregate including presence of strained quartz and other reactive minerals. Moreover, in case the coarse aggregate sample is of composite nature, the proportions (by weight) of different rock types in the composite sample and petrographic evaluation of each rock should also be ascertained. While determining different rock type is in the composite sample, special emphasis should be given on identification of known reactive rocks like chalcedony, opal etc. and procedure laid down in IS:2430 for sampling of aggregates may be followed. The sample should not contain weathered rock and reduced to required quantity by quartering and coning.

The results of petro graphic test shall be submitted to the Project Engineer and Executing Agency. The Project Engineer and Executing Agency shall review the results on consultation with some specialist agencies, if required, to determine potential activity of the aggregate (siliceous minerals) which may lead to reaction of silica in aggregate with the alkalis of cement. In additional, potential of some aggregate like lime stone to residual expansion due to repeated temperature cycle is also to be reviewed. Further, the Concessionaire shall submit the results of Alkali aggregates reactivity carried out as per IS:2386 (Pt. VII).

In case of any apprehension about the properties of the aggregate, the Project Engineer and Executing Agency shall ask the Concessionaire to send samples of coarse and fine aggregate to any of the established research laboratory including National Council for Cement and Building Materials (NCB).

In case, it is established from the tests that the aggregates contain reactive silica which would react with alkalis of the cement, the Concessionaire shall be asked to change the source of supply of the aggregate and take additional measures as suggested. In case aggregates indicate residual expansion, under repeated temperature cycle test, the material shall not be used for concreting of equipment foundations, which are likely to be subjected under repeated temperature cycle. The Concessionaire shall use different type of aggregate as approved by the Project Engineer and Executing Agency.

- **Admixtures**

Admixtures in concrete for promoting workability, improving strength, entraining air for similar purposes may be used only after the written permission from the Project Engineer and Executing Agency is obtained. These shall be free from injurious amount of chloride, etc. Addition of admixtures should not reduce the specified strength or durability of concrete and should not have detrimental effect on reinforcement. The admixtures shall conform to IS:9103 and shall be of proven make and from a reputed manufacturer. Calcium chloride as accelerating admixture is not permitted to be used other than in mass concrete works. The Concessionaire shall produce latest test results carried out at approved Government Test Houses for the approval of the Project Engineer and Executing Agency.

3.2.4 Water

Water used for mixing and curing shall be clean and free from injurious amounts of oils, acids, alkalis, sugar, organic materials or other substances that may be deleterious to concrete or steel. Potable water is generally considered satisfactory for mixing concrete. The maximum permissible values of impurities shall be as given in Clause no. 4.3 of IS:456-1978.

In case of doubt regarding development of strength, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time tests specified in IS:456.

Average 28 days compressive strength of atleast three 150 mm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water. The cubes shall be prepared, cured and tested in accordance with IS:456.

The initial setting time of a concrete test block made with the appropriate cement and the water proposed to be used shall not be less than 30 minutes and shall not differ by ± 30 minutes from the initial setting time of control test block prepared with the same cement and distilled water. The test shall be carried out as per IS:4031.

Where concrete, made from water, proposed to be used does not satisfy the above requirements and/or contains an excess of acid, alkali, sugar, salt or other deleterious, substances, then the Project Engineer and Executing Agency may refuse to permit its use. Sea water shall not be used for curing besides mixing in concrete.

3.2.5 Grades of concrete

All concrete shall be "design mix concrete" as defined in IS:456, unless an nominal mix concrete such as 1:2:4, 1:3:6, 1:4:8 of 1:5:10 proportion is specified. The proportion referred to is by weight (mass). The grades for 'design mix' concrete shall be designated M-15, M-20, etc. as specified in IS:456. (20% replacement ratio of cement with fly ash shall be considered):

- **Nominal mix concrete**

a) Nominal mix concrete shall be used only for plain Cement concrete works and where shown on drawings or specifically allowed by the Project Engineer and Executing Agency. Such concrete shall not require preparation of trial mixes and all such concrete shall be mixed in a mechanical mixer. Proportions for nominal mix concrete shall be according to Table-3 of IS:456-1978. In addition, standard proportion by volume shall be used wherever specified.

b) In proportioning concrete, the cement & fly ash shall be measured by (mass) weight. The quantities of fine and coarse aggregates may be determined by volume (for corresponding weight) but preferably by weight. If fine aggregates are moist, the amount of surface water shall be determined. Also an allowance shall be made for bulking in case of volume batching, in accordance with IS:2386 (Part-III). Allowance shall also be made for surface water present in the aggregates, when computing the water requirement. All the above data shall be maintained properly, to the satisfaction of the Project Engineer and Executing Agency.

c) The recommended maximum water cement ratios are specified in **Table 1.**

Table 1: Recommended water - Cement ratio

Nominal mix concrete	Quantity of water per 50 Kg. of cement (max.)
1:5:10	60 litres

1:4:8	45 litres
1:3:6	34 litres
1:2:4	32 litres

d) Nominal mix concrete 1:5:10 shall correspond to grade M5, 1:4:8 shall correspond to grade M7.5, 1:3:6 to grade M10 and 1:2:4 to grade M15 of IS:456.

e) If Nominal mix concrete made in accordance with specified proportions does not yield the specified strength of the corresponding grade and fails to satisfy the requirements of "acceptance criteria for concrete" as specified in IS:456. Such concrete shall be treated in the following manner:

i) In case the Project Engineer and Executing Agency is satisfied that lower strength of concrete is attributed to material and workmanship of the Concessionaire, then such concrete shall be replaced by concrete of specified strength. The Project Engineer and Executing Agency may however, also accept such lower strength concrete but such lower strength concrete shall be classified as belonging to the appropriate lower grade proportion.

ii) In case the Project Engineer and Executing Agency is satisfied that lower strength of concrete is not attributable to the Concessionaire, he may direct in writing to increase the cement content to obtain specified strength. The use of richer mix shall be continued until the Project Engineer and Executing Agency instructs otherwise.

f) Nominal mix proportion shall not be classified as higher grade proportion either on the ground that the test strengths are higher than the minimum specified or in the case where the Project Engineer and Executing Agency directs use of additional cement over the quantity specified for the particular mix proportion to achieve the minimum specified strength.

- **Design mix concrete**

a) Design mix concrete shall be used on all concrete works, except where specified otherwise or specially permitted by the Project Engineer and Executing Agency. The mix shall be designed for all grades of concrete (except those specified under Nominal Mix Concrete (20% replacement ratio of cement with fly ash):) such as to obtain for works cubes, the required workability and the characteristic strength not less than the appropriate values given in Table 2. Using Standard Deviation specified in IS:10262 corresponding to good quality control, the Minimum value of target strength of design mix of various grades of concrete shall be as per Table 2.

However, the Project Engineer and Executing Agency may allow to change the target strength values based on adequate numbers of works test results.

Table 2: Grades of concrete
Compressive strength of a 15 cm cube at 28 days (N/Sq.mm)

Grade designation of concrete	Preliminary test strength (target of trial mix)	Characteristic strength on strength works cubes
M 15	20.8	15
M 20	27.6	20
M 25	33.7	25
M 30	39.9	30
M 35	45.4	35

b) In proportioning concrete, the quantity of cement, fly ash and aggregates shall be determined by mass. However, only in some exceptional cases including concreting in some isolated areas, the Project Engineer and Executing Agency may allow the quantity of aggregates to be determined by an equivalent volume basis after the relationship between weight and volume is well established by trials and the same shall be verified frequently. Water shall be either measured by volume in calibrated tanks or weighed. All measuring equipment at site, shall be maintained in a clean and serviceable condition, and their accuracy shall be periodically checked.

c) To keep the water-cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and coarse aggregates and determination of the same in accordance with IS:2386 Part (III) shall be made as frequently as directed by the Project Engineer and Executing Agency.

In some of the structures, water-cement ratio shall be restricted even below 0.45. To increase the workability, plasticizer may have to be used in such cases. Trial mix shall be carried out accordingly.

d) With the permission of the Project Engineer and Executing Agency, for any of the above mentioned grades of concrete, if the water quantity has to be increased, proportionately cement quantity shall also be increased, to keep the ratio of water to cement same as adopted in Preliminary tests for the corresponding grade of concrete. The extra cement required on account of this shall also be considered for reconciliation purposes.

- **Mix design**

a) IS:10262 shall be followed as general guidance for mix design. Preliminary tests/trial mix, as specified or as required by the Project Engineer and Executing Agency, shall be carried out sufficiently ahead of the actual commencement of the work with different grades of concrete made from representative samples of aggregates and cement & fly ash expected to be used on the works. These tests are to be conducted to arrive at the grading of aggregates, water cement ratio, workability and the quantity of cement required to give Preliminary (target) compressive strengths as specified in Table - 2.

b) Minimum cement contents, from durability consideration, or different exposures and sulphate attack shall be as given in Table - 19 and 20 of IS:456. In case, higher value is obtained from trial mix from strength consideration, same shall be considered.

c) At least four trial mixes are to be made and minimum. Six test cubes taken for each trial mix noting the slump for each type of mix. The cubes shall then be properly cured and three cubes for each mix shall be tested in a laboratory (approved by the Project Engineer and Executing Agency) at 7 days and others at 28 days and others at 28 days for obtaining the compressive strength. The test reports shall be submitted to the Project Engineer and Executing Agency. The design mix particulars shall indicate, with the help of graphs and curves etc. the extent of variation in the grading of aggregates which can be allowed. While designing mixes, over wet mixes shall be avoided. For chimney, natural draft cooling tower, etc. where assessment of early strength is required, the concrete cubes shall also be tested for early age strength at 1 day and 3 days for establishing the values.

d) The Concessionaire shall submit the test reports of mix design to the Project Engineer and Executing Agency for his view, indicating design criteria, analysis and proportioning of materials, etc. On the basis of the above test reports, a mix proportion by mass and the water cement ratio, shall be determined by the Concessionaire such that concrete prepared with this mix yield the desired characteristic strength and shall have suitable workability. The mix design to be adopted on the works shall be subject to the approval of the Project Engineer and Executing Agency. The proportions, once decided for different grades of concrete, shall be adhered to, during all concreting operations as long as the quality of the materials does not change. If, however, at any time, the quality of materials being used has changed from those for Preliminary mix design, or there is a change either in the required strength of concrete, or water cement ratio or workability, the Concessionaire shall have to make similar trial mixes and Preliminary tests to ascertain the revised mix proportions and water cement ratio to be used for obtaining the desired strength and consistency.

e) In the situations, like casting of piles, where the compaction of concrete is not possible by vibration, the method of compacting concrete cubes of Preliminary / trial mixes and work tests shall be in the same manner as the method of compacting concrete at site is proposed.

- **Workability of concrete**

a) The workability of concrete shall be checked at frequent intervals. The workability of concrete measured in accordance with IS:1199 for every sample taken for testing shall be recorded with the corresponding cube test result.

b) The degree of workability necessary to allow the concrete to be well compacted and to be worked into the corners of formwork and round the reinforcement to give the required surface finish shall depend on the type and nature of the structure and shall be based on experience and tests. The suggested ranges of values of workability for concrete for some placing conditions, measured in accordance with IS:1199 as stipulated under Clause No. 6.0 of IS:456, are given below in Table - 3, for guidance only. In addition, in some special cases like casting of pile, very high degree of workability (up to 180 mm slump) shall be used.

Table 3: Limits of workability

Placing	Degree of workability	Value of workability
Concreting of shallow sections with vibration factor	Very low	20-10 seconds, Vee-bee time or 0.75-0.80 compacting.
Concreting of lightly reinforced section with vibration	Low	10-5 seconds, Vee-bee time or 0.80-0.85 compacting factor.
Concreting of lightly reinforced section without vibration, or heavily reinforced sections with vibration	Medium	5-2 seconds, Vee-bee time or 0.85-0.92 compacting factor or 25-75mm, slump for 20 mm aggregate (for smaller aggregate the values will be lower).
Concreting of heavily reinforced sections without vibration	High	Above 0.92 compacting factor or 75-125 mm slump for 20 mm aggregate (for smaller aggregate the values will be lower)

Note: *Notwithstanding the values given above, the slump to be maintained for work in progress shall be as per directions of the Project Engineer*and Executing Agency.

- **Mixing of concrete**

a) Concrete shall be mixed in a mechanical mixer conforming to IS:1791. However, mixing shall preferably be done at a single central batching plant, conforming to IS:4925, situated within the area allocated for the Concessionaire's particular use as shown on the drawing or as directed by the Project Engineer and Executing Agency. The plant shall have a mechanically operated mixer of an approved size and type, capable of ensuring a uniform distribution of the materials throughout the mass and the mass is uniform in colour and consistency.

b) Water shall not be added into the drum of the mixer, until all the cement and aggregates constituting the batch are already in the drum and dry mixed for at least one minute and are uniformly distributed. Water shall then be added and mixing of each batch shall be continued until there is a uniform distribution of the materials and the mass but in no case shall mixing be done for less than two minutes and for atleast 40 revolutions after all the water and materials are in the drum. When absorbent aggregates are used or when the mix is very dry, the mixing time shall be extended as directed by the Project Engineer and Executing Agency. Mixers shall not be loaded above their rated capacity as this prevents thorough mixing.

c) The entire contents of the drum shall be discharged before the ingredients for the next batch are fed into the drum. No partly set or remixed or excessively wet concrete shall be used and it shall be immediately removed from site. Each time if the work stops for more than 30 minutes, the mixer shall be thoroughly cleaned and when the next mixing commences, the first batch shall have 10% additional cement.

d) In exceptional circumstances and/or work in remote areas, hand mixing may be allowed by the Project Engineer and Executing Agency, subject to adding 10% extra cement which shall be considered for reconciliation purposes. The mixing shall be carried out on watertight platform and mixing shall be continued till a uniform colour and consistency of the mix is achieved.

- **Concrete conveying**

a) Concrete shall be handled and conveyed as rapidly as practicable, from the place of mixing to the place of final laying, by approved means, before the initial setting of the cement starts. Concrete shall be conveyed in such a way that there is no segregation or loss of any of the ingredients and maintaining the required workability. If segregation does occur during transport, the concrete shall be remixed.

During very hot or cold weather, if directed by the Project Engineer and Executing Agency, concrete shall be transported in deep containers, which will reduce the rate of water loss by evaporation in hot weather and heat loss in cold weather, at no extra cost to the Executing Agency.

b) Conveying equipment for concrete shall be mortar tight, well maintained and thoroughly cleaned before commencement of concrete mixing. Such equipment shall be kept free from set concrete. Chutes shall not be used for transport of concrete without the written permission of the Project Engineer and Executing Agency. The chute in case permitted to be used shall be of such size and design as to ensure practically continuous flow. Slope of the chute shall be so adjusted that the concrete flow without the use of an excessive quantity of water and without segregation of its ingredients. The delivery end of the chute shall be as close as possible to the point of deposit.

c) Concrete may be conveyed and places by mechanically operated equipment, e.g. pumps or pneumatic placers only with the written permission of the Project Engineer and Executing Agency, who shall also review the entire scheme for which comprehensive details shall be furnished by the Concessionaire.

- **Concrete placing**

a) Concrete shall be placed and compacted in its final position before the cement reaches the initial set and normally concrete shall be compacted in its final position within minutes of leaving the mixer.

b) Where direct placement is not possible, the Concessionaire shall provide suitable arrangements such as chutes, tremie, elephant trunks, etc. to confine the movement of concrete as directed by the Project Engineer and Executing Agency. Concrete shall not be dropped from a height or handled in a manner which may cause segregation.

c) If concrete is placed by pumping, the consistency shall be the minimum necessary for such conveyance of concrete. Before commencement of regular pumping, the pipeline shall be lubricated by cement mortar (1:2), and once pumping commences, stoppages shall be avoided.

d) Concrete shall not be placed in foundations on soft areas or where there is standing water or debris. Such soft areas shall be removed and filled with 1:4:8/1:3:6 nominal mix concrete, as directed by the Project Engineer and Executing Agency.

For rock surfaces, it shall be ensured that the rock is not unsound. On sloping rock faces, rough steps or benches shall be formed and concrete shall not be placed on a sloping rock

surface. Prior to pouring concrete, the rock surface shall be cleaned with a high pressure water and air jet and kept wet for three hours. Also, before placing concrete, water shall be removed from depressions, the rock surface shall be dried and a 10mm thick cement sand mortar (1:6) layer shall be placed and worked into all crevices, cracks, depression, etc.

e) The placing of concrete shall be a continuous operation with no interruption in excess of 30 minutes between the placing of continuous portions of concrete. Concrete shall be placed in continuous horizontal layers of 150 mm or higher thickness as directed by the Project Engineer and Executing Agency and thoroughly compacted before placing next layer. The thickness of each layer shall be such that it will be deposited before the previous layer has stiffened. When placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregates.

f) Approval by the Project Engineer and Executing Agency of any of the materials and/or work as required herein shall not relieve the Concessionaire of his obligation to produce finished concrete in accordance with the drawings and specifications. Slots, openings, holes, pockets, etc. shall be provided in the concrete as directed by the Project Engineer and Executing Agency.

g) Slabs, beams and similar members shall normally be poured in one operation. In special circumstances, with the approval of the Project Engineer and Executing Agency, these can be poured in horizontal layers, but it must be ensured that the under layer is not already hardened. Bleeding of under layer, if any, shall be effectively removed. Molding, throating, drip course, etc. shall be poured as shown on the drawings or as desired by the Project Engineer and Executing Agency.

h) After the concrete has been placed, it shall be spaded and thoroughly compacted by approved mechanical vibrators to a maximum subsidence without segregation and thoroughly worked around reinforcement or other embedded fixtures into the correct form and shape. Hand tamping in some cases may be allowed subject to the approval of the Project Engineer and Executing Agency. Care must be taken to ensure that the inserts, fixtures, reinforcement and formwork are not displaced or disturbed during placing of concrete.

i) Whenever vibration has to be applied externally, the design of formwork and the disposition of vibrators shall receive special consideration to ensure efficient compaction and to avoid surface blemishes. Surface vibrators and form attached vibrator shall not be permitted under normal conditions. Their use shall require written approval of the Project Engineer and Executing Agency.

j) Vibrators shall penetrate both the layer poured and the under layer to ensure good bond homogeneity and to prevent the formation of cold joints. Immersion vibrators shall not be allowed to come in contact with steel reinforcement after start of initial set. Also, they shall not be allowed to come in contact with forms or finished surfaces.

k) Immersion vibrators shall have a 'no load' frequency, amplitude and acceleration as per IS:2505 depending upon the size of the vibrator. Immersion vibrators shall be operated by experienced men. These vibrators shall be immersed not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Such vibrators shall in no case be used to push concrete inside the forms and vibrators shall be withdrawn slowly.

l) No concrete shall be placed in wet weather or on a water covered surface. If there have been any signs of washing of cement or sand, the concrete shall be entirely removed immediately. Suitable precautions shall be taken in advance to guard against possible rains before leaving the fresh concrete unattended.

m) Mass concrete shall be poured in lifts not exceeding 1.0 m in height unless otherwise indicated on drawings or as directed by the Project Engineer and Executing Agency. Horizontal lift shall not be more than 150 cm in thickness, according to provision of IS:457.

n) Formwork and reinforcement shall be approved in writing by the Project Engineer and Executing Agency before concrete is placed. Concrete shall be placed only after all preparations for casting have been approved by the Project Engineer and Executing Agency and approval given to proceed with the casting in writing on pour card to be maintained by the Concessionaire for this purpose

o) Concrete, when deposited, shall have a temperature of not less than 5 degrees Centigrade and not more than 40 degree Centigrade. When depositing concrete in very hot weather, precautions shall be taken so that the temperature of wet concrete does not exceed 40 degrees Centigrade while placing. This shall be achieved by stacking aggregates under the shade and keeping them moist, starting curing before concrete dries out, etc. However, before mixing / placing concrete, when the above temperature conditions vary on either side, approval of the Project Engineer and Executing Agency shall be obtained for the method of execution.

- **Protection and curing of concrete**

a) Newly place concrete shall be protected by approved means from rain, sun and wind. Concrete placed below ground level, shall be protected from falling earth, during and after placing. Concrete placed in ground containing any deleterious substances, shall be kept free from contact with such ground or with water draining from such ground, during placing of

concrete and for a period of atleast three days or as otherwise instructed by the Project Engineer and Executing Agency.

b) The ground water around newly poured concrete shall be kept down to an approved level by pumping or other approved means of drainage. Adequate steps shall be taken to prevent floatation or flooding. Steps, as approved by the Project Engineer and Executing Agency, shall be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion, mixing with earth or other deleterious materials, etc. that may impair the strength and durability of the concrete.

c) As soon as the concrete had hardened sufficiently for the surface not to be marked, it shall be kept in a damp or wet condition by pounding or by covering with a layer of sacking, canvas, hessian or similar materials and kept continuously wet for atleast seven days after final setting. This period may be extended, at the discretion of the Project Engineer and Executing Agency, upto fourteen days. Curing of horizontal surfaces exposed to drying winds shall begin immediately after the concrete has hardened. Concrete slabs and floors shall be cured for the periods mentioned above by flooding with water of minimum 25mm depth.

d) Approved curing compounds may be used in lieu of moist curing with the permission of the Project Engineer and Executing Agency. However, such permission may be granted only in specific cases. Such compounds shall be applied to all exposed surfaces of the concrete, as soon as possible after the concrete has set.

e) Quantity of water applied shall be such as to prevent erosion of freshly placed concrete.

- **Construction joints**

a) When work has to be interrupted, the concrete shall be rebated and/or keyed at the joint to such shape and size as may be required by the Project Engineer and Executing Agency or as shown on the drawings. All vertical construction joints shall be made with stop boards, which are rigidly fixed and slotted to allow for the passage of the reinforcing steel. In the case of water retaining structures, basements, tunnels, etc. water stop of approved material shall be provided, if so specified on the drawings or as directed by the Project Engineer and Executing Agency.

b) Construction joints shall be located as shown or described on the drawings. Where it is not described, the joints shall be in accordance with the following guidelines.

i) In a column, the joints shall be formed about 75 mm below the lowest soffit of the beams framing into it, including haunches, if any. In flat slab construction, the joint shall be 75 mm below the soffit of the column capital.

ii) Concrete in a beam shall be placed throughout without a joint. If unavoidable, the joint shall be vertical and within the middle-third of the span. When a beam intersects a girder, the joints in the girder shall be given an offset equal to a distance twice the width of the beam and additional reinforcement provided for shear. The joints shall be vertical throughout the full thickness of the concrete member with suitable shear key wherever shown on the drawing.

iii) A joint in a suspended floor slab shall be vertical at one quarter points of the span and at right angle of the principal reinforcement.

iv) Construction joints in equipment foundations shall not be provided without specific concurrence of the Project Engineer and Executing Agency.

v) Vertical construction joints in water retaining structures shall not be permitted unless shown on the drawings.

However, if the Concessionaire desires any adjustments in the location of construction joints (to suit site conditions) from those shown on drawings or from those explained above, he shall obtain prior approval from the Project Engineer and Executing Agency.

c) Before fresh concrete is placed, the cement skin of the partially hardened concrete which was poured earlier shall be thoroughly removed and the surface made rough and aggregate exposed, by wire brushing, hacking, water jetting, air jetting or any other method as directed by the Project Engineer and Executing Agency. The rough surface shall be thoroughly wetted for about ½ hour and shall be dried and coated with 10 to 15 mm thick layer of 1:1 freshly mixed cement and sand slurry. Special care shall be taken to see that the first layer of concrete placed after a construction joint is thoroughly rammed against the existing layer.

d) In forming a joint, concrete shall not be allowed to slope away to a thin edge. The locations of construction joints shall be planned by the Concessionaire well in advance of pouring and they will have to be approved by the Project Engineer and Executing Agency. The Concessionaire's proposals shall include atleast the location of construction joints, the sequence of pouring, formwork details and their stripping times.

e) Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes. Care being taken to avoid dislodgement of particles of aggregates. The surface shall be thoroughly wetted and all free water removed.

The surface shall then be coated with neat cement slurry. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be placed shall be well rammed against old work, particular attention being to corners and close spots. Work thereafter, shall proceed in the normal way.

f) For multiple lift work a suitable gap shall be maintained between setting of the earlier placed concrete and the commencement of concrete pour. After depositing concrete in columns, piers or walked time gap of minimum 4 hours, preferably 24 hours shall be maintained before depositing concrete in beams, girders or slabs, supported there in order to avoid cracking due to settlement.

- **Work in extreme weather conditions**

During hot weather (atmospheric temperature above 40 degree centigrade) of cold weather (atmospheric temp at 5 degree centigrade and below) the concreting shall be done as per the procedures and precautions set out in IS:7868 (Parts I and II).

- **Cleaning and finishing of concrete**

a) All concrete surfaces shall have an even and clean finish free from honeycombs, air bubbles, fins or other blemishes unmarred, reasonable smooth. The formwork joint marks on concrete work exposed to view shall be rubbed with carborandum stone and defects patched up with paste of cement sand mortar (1:2) and cured. The finish shall be made to the satisfaction of the Project Engineer and Executing Agency. Concrete surfaces to be subsequently plastered or where brickwork is to be built against them, shall be adequately hacked as soon as the form is stripped off so that proper bond can develop.

b) Immediately after removal of forms, the concrete shall be inspected and defective areas as pointed out by the Project Engineer and Executing Agency shall be removed partially or entirely as directed. Holes, left by form bolts, etc. shall be filled-up and made good with cement sand mortar of approved mix. All superficial defects such as honeycombing, rough patches, etc. shall be similarly made good. If the defective area is at a vulnerable location, e.g. at the ends of beams & columns etc then it may be necessary to cut out the member completely or in part and reconstruct as directed by the Project Engineer and Executing Agency. If epoxies have to be used, the same shall be subject to the approval of the Project Engineer and Executing Agency. Poured concrete affected by faulty formwork shall be removed totally and replaced. If so directed, the Concessionaire shall have to resort to grouting / shotcreting.

c) A smooth finish shall be obtained with the use of forms having smooth and even surfaces and edges. Panels and form linings shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms, the joint marks shall be smoothened off and all blemishes, projections etc. removed leaving the surfaces reasonably smooth and unmarred.

d) Where integral cement concrete finish is called for, the surface shall be compacted and then floated and treated with a straight edge and any high and low spots eliminated. The work shall be carried out as per IS:2571

3.2.6 Sampling, testing and quality assurance including construction tolerances

- **General**

a) Concrete cubes for works tests shall be cured under laboratory conditions, except when in the opinion of the Project Engineer and Executing Agency, extreme weather conditions prevail at which time, these may require curing under job conditions.

b) For the purposes of statistical analysis, any substandard cube result, which in the opinion of the Project Engineer and Executing Agency, is due to improper sampling, molding or testing shall be discarded and a dummy result shall be substituted. The value of a dummy result shall be equivalent to the average value of the cubes from the same grade of concrete tested immediately before and after the discarded result. The number of such substandard cubes shall not exceed 5%.

c) If the 'strength' of the laboratory controlled cubes, for any portion of the concrete work, falls below the compressive strength specified, the Project Engineer and Executing Agency shall have the right to order a change in the proportions or the water content for the remaining portion of the surface.

d) If the 'strength' of the works cured test cubes falls below the specified strength, the Project Engineer and Executing Agency shall have the right to require provisions for temperature and moisture control during the period of curing as necessary to secure the required strength, and may require retest in accordance with the standard method of securing, preparing and testing specimens from hardened concrete for compressive and flexural strengths, or load tests to be made on the portion of the building so affected. All such tests shall be made at the Concessionaire's expense.

e) Unacceptable concrete work shall be dismantled by the Concessionaire and replaced by fresh work, meeting the specification requirements. In the course of dismantling, if any damage is done to the embedded items or adjacent structures, the same shall be made good, by the Concessionaire, to the satisfaction of the Project Engineer and Executing Agency, at no extra cost to the Executing Agency.

f) Only as a very special case and that too in non-critical areas, the Project Engineer and Executing Agency may accept concrete work which is marginally unacceptable as per the criteria laid down in IS:456.

g) Before placing concrete, the inside of forms shall be checked to ensure that they are clean and thoroughly wetted or adequately treated. So as to prevent absorption of water from the concrete.

h) Ultrasonic tests on the foundations of major equipment to ascertain the quality and grade of concreting shall be carried out. The Executing Agency shall arrange for the specialized agency for conducting the test at his cost. The Concessionaire shall provide all the necessary facilities and arrangement for conducting the test at site in terms of access, scaffolding etc. In case of any defects, the Concessionaire shall rectify the same as directed by the Project Engineer and Executing Agency.

i) Rebound hammer test shall be carried out for ascertaining the quality of concrete work, as directed by the Project Engineer and Executing Agency.

j) Test shall be conducted for the water tightness of the liquid retaining structures as per IS:3370 and IS:6494. The details and sequence of tests shall be as given hereunder:

i) All arrangements, including supply of water for testing purposes, shall be kept ready when the tank is nearing completion.

ii) Water supply to the tank shall be in stages of 300 to 450 mm height in order to check the water tightness of the tank and location of leakage of various levels.

iii) The permissible drop in level in 24 hours shall be 6 mm in case of covered reservoir/tank and 12 mm in the case of open reservoir/tank.

iv) The leakage points shall be marked and separately treated after dewatering.

v) The reservoir / tank shall be retested for water tightness after rectification.

vi) For basement type structures like cable vault, track-hopper, tunnel, neutralizing pit, etc. the Concessionaire shall examine the water tightness against ingress of sub-soil water.

- **Sampling of concrete**

Samples from fresh concrete shall be taken according to IS:1199 and tested as per IS:516.

a) Normally only compressive test shall be performed but the Project Engineer and Executing Agency may require other tests to be performed in accordance with IS:516.

b) **i) Trial Mixes:**

Atleast four trial mixes shall be made with; min. 6 test cubes for each mix.

ii) Works Tests:

The min. frequency of sampling of concrete of each grade shall be according to clause 14.2.2 of IS:456-1978. However, after getting continuous satisfactory results and in the case of voluminous concrete works, the Project Engineer and Executing Agency, may at his discretion reduce the frequency of sampling as follows.

For each grade of concrete, and for each 8 hours (shift) of work or part thereof, atleast one sample consisting of six specimens shall be taken from each 150 cum. of concrete or part thereof, 3 specimens shall be tested at 7 days and remaining 3 shall be tested at 28 days. However, in all cases, the 28 days compressive strength shall alone be the criterion for acceptance or rejection.

c) To control the consistency of concrete from every mixing, slump tests and compaction factor tests in accordance with IS:1199 shall be carried out by the Concessionaire every two hours or as directed by the Project Engineer and Executing Agency. Slumps corresponding to the test specimens shall be recorded for reference.

d) The strength of sample shall be the average of the strength of three specimens. The individual variation should not be more than ±15% of the average.

- **Unless otherwise specified, the tolerance in construction shall be as follows:**

The dimensions of concrete as cast when compared with those on the drawings shall be within the tolerance given below:

Description of item / structural element	**Permissible deviation in mm**	
Faces of concrete in foundations and structural members against which backfillis placed.	+25	-10
Location of footing (for RCC framed structures only).	+25	-25
Eccentricity of footing	2% of footing width of direction of misplacement but limiting to 50mm	
Top surface of slabs and of concrete to receive base plates to be grouted.	+5	-5
Alignment of beams, lintels, columns, walls, slabs and similar structural elements	+5	-5
Deviation from specified dimensions of cross-sections of columns and beams	+12	-6
Alignment of holding down bolts without sleeves.	+1.5	-1.5
Alignment of holding down bolts with sleeves.	+5	-5
Level of holding down bolt assemblies.	+10	-10

Description of item / structural element	Permissible deviation in mm	
Embedded parts (in any direction).	+5	-5
Centres of packets or holes with greatest lateral dimension not exceeding 150 mm. Variation in steps:	+10	-10
Riser	+1.5	-1.5
Tread	+3.0	-3.0
Plumb	3mm for every metre subject to a maximum of 10mm.	

- **Acceptance criteria**

The acceptance criteria of concrete shall be in accordance with Clause no.15 of IS:456. However, in exceptional circumstances, the Project Engineer and Executing Agency may, at his discretion, accept a concrete of lower strength than that specified at reduced rates. The concrete shall be deemed to comply with the strength requirements if:

a) Every sample has a test strength not less than the characteristic value or
b) The strength of one or more samples, though less than the characteristic value, in each case is not less than the greater of :
   i) The characteristic strength minus 1.35 times the Standard Deviation and
   ii) 0.80 times the characteristic strength; average strength of all the samples, is not less than the characteristic strength + [1.65 - 1.65/ square root of (No. of samples)] times the standard deviation.

- **Load test**

If any work is found unacceptable whereupon the Project Engineer and Executing Agency requires its removal and reconstruction, the Concessionaire may request that it should be load tested in accordance with the provision of Clause no. 16.50 of IS:456-1978 as given below:

a) The test load shall be 125 percent of the maximum superimposed load for which the structure or element was designed. This load shall not be applied earlier than 28 days after the effective hardening of concrete. This test load shall be maintained for 24 hours and during the entire duration of the test, struts, strong enough to take the whole superimposed, dead and other loads shall be placed in position, leaving a small gap under the members.

b) The maximum deflection shall be measured after the test load is in position for 24 hours. Thereafter, the test load shall be removed.

c) If 24 hours after the removal of the load, the structure does not show a recovery of atleast 75 percent of the maximum deflection, registered as in (b) above, the test shall be repeated after a lapse of 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not atleast 80% of the maximum deflection during the second test.

d) If the maximum deflection in mm, shown during 24 hours under load, is less than 40 l sq / D, where I is the effective span in metres and D is overall depth of the section in mm, it is not necessary for the recovery to be measured and the recovery position of the above mentioned clause (c) will not apply.

3.3 Reinforcement

3.3.1 Scope

This section of the specification deals with reinforcement for all reinforced concrete works and covers the requirement of materials, their properties, storage, handling, furnishing of bar bending schedules and the cleaning, bending, binding and placing of reinforcement with suitable cover blocks. This shall also include the supply of reinforcement, wherever required.

3.3.2 General requirements

The Concessionaire shall prepare and furnish to the Project Engineer and Executing Agency, bar bending schedules for all RCC works for his review and approval. No work shall commence without the approval of bar bending schedule by the Project Engineer and Executing Agency, in writing.

The Concessionaire shall have to obtain prior written approval from the Project Engineer and Executing Agency, if he desires any adjustments in diameter or spacing of reinforcement. However, the Concessionaire shall modify the bar bending schedule, when a particular type and size of reinforcement would not be available, with the approval of the Project Engineer and Executing Agency.

3.3.3 Materials

All steel for reinforced concrete works shall be in accordance with Technical Specification for Properties, Storage and Handling of common Building Materials, (vide module C2) which shall be deemed to form the part of this Specification.
All bars shall be thoroughly cleaned before being fabricated. Pitted and defective bars shall not be used.

3.3.4 Bending and placing

- **Bending**

a) Reinforcing bars supplied bent or in coils, shall be straightened before these are cut to size. Straightening of bars shall be done in cold and without damaging the bars. This is to be considered as a part of reinforcement bending and fabrication work.

b) Unless otherwise specified, reinforcing steel shall be bent in accordance with procedure specified in IS:2502 and/or as approved by the Project Engineer and Executing Agency. Bends and shapes shall comply strictly with the dimensions shown on the approved bar bending schedules and they shall be rechecked by the Concessionaire before bending and he shall be entirely responsible for their correctness. Bars correctly bent, shall only be used. Unless specified otherwise or directed by the Project Engineer and Executing Agency, the detailing of reinforcement shall be in accordance with IS:5525 and SP:34.

c) No reinforcement shall be bent, when in position in the work without approval of the Project Engineer and Executing Agency, whether or not it is partially embedded in concrete. Where the reinforcement bars are bent aside, at construction taken to ensure that, at no time, the radius of the bend is less than 4 times the bar diameters for plain mild steel or 6 times the bar diameters for deformed bars. Care shall also be taken while bending back bars, to ensure that the concrete around the bar is not damaged.

d) Welding of bars to obtain continually shall not be allowed, particularly for cold twisted bars, unless specifically approved by the Project Engineer and Executing Agency. If welding is approved, the work shall be carried out as per IS:2751 and IS:9417, according to the best practice and as directed by the Project Engineer and Executing Agency.

- **Placing in position**

a) All reinforcement shall be accurately fixed and maintained in position as shown on the drawings by such approved means as steel chairs, and/or concrete spacer blocks as per IS:2502. Bars intended to be in contact at crossing points by two numbers annealed steel wire of 0.9 mm to 1.6 mm size conforming to IS:280 in such a manner that they do not slip over each at the time of fixing & concreting. The tying of bars shall be in crisscross manner.

b) Binders shall tightly embrace the bars with which these are intended to be in contact and shall be securely held. The vertical distance between successive layers of bars shall be

maintained by provision of spacer bars. These shall be so spaced that the main bars do not sag perceptively between adjacent spacers.

Bundled bars shall be provided wherever shown on the drawing to facilitate concreting. Location of laps and development lengths, shall be as indicated on the drawings.

c) The placing of reinforcement shall be completed well in advance of concrete pouring. Just prior to concrete pouring, the reinforcement shall be checked by the Project Engineer and Executing Agency, for accuracy of placement and cleanliness. Necessary corrections, as directed by the Project Engineer and Executing Agency shall be carried out. Care shall be taken to ensure that projecting ends of ties and other embedded metal do not encroach into the concrete cover. Where concrete blocks are used for ensuring the cover and positioning of reinforcement, these shall be made of mortar 1:2 (1 cement : 2 sand) by volume and cured for at least seven days. The sizes and locations of the concrete blocks shall be approved by the Project Engineer and Executing Agency. The 28 days crushing strength of cover blocks shall be atleast equal to the specified strength of concrete in which the blocks will be embedded.

d) Laps and anchorage length of reinforcing bars shall be in accordance with IS:456, unless otherwise specified. If the bars in a lap are not of the same diameter, the smaller diameter will guide the lap length. Laps shall be staggered as far as practicable and as directed by the Project Engineer and Executing Agency and not more than 50% of bars shall be lapped at a particular section. Mechanical connections, for splicing reinforcement bars in congested locations may be used by the Concessionaire, only if approved by the Project Engineer and Executing Agency. Reinforcement bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site.

3.3.5 Cover to reinforcement

a) Unless shown otherwise on the drawings, minimum clear concrete cover for reinforcement (exclusive of plaster or other finishes) shall be as follows:

- At each end of a reinforcing bar, not less than 25 mm, nor less than twice the bar diameter.
- For a longitudinal reinforcing bar in a column, 40 mm or bar diameter whichever is more. 25 mm cover may be adopted for columns of minimum dimension 200 mm or under and with longitudinal reinforcement diameter not exceeding 12 mm.
- For longitudinal reinforcing bars in a beam, not less than 25 mm or less than the bar diameter.
- For reinforcement in slabs and walls; not exposed to weather or ground not less than 15 mm nor less than the bar diameter.

- For bottom reinforcement in footings: 75 mm, if concrete is laid against the ground or 40 mm if laid on a layer of lean concrete.
- For retaining walls, grade beams, top and sides of footings and similar surfaces exposed to weather or ground; 50 mm for bars larger than 16 mm and 40 mm for bars upto 16 mm.
- For concrete members exposed to the action of harmful chemicals, acids, alkalis, atmosphere, sulphurous smoke, seawater etc., the cover shall be as shown on the drawings.
- For liquid retaining structures; 40 mm or diameter of main bars, whichever is larger. This shall be increased to 50 mm in case of seawater or corrosive environment.

b) Clean distance between reinforcing bars shall be in accordance with IS:456 or as shown on drawings.

3.3.6 Sampling, testing and quality assurance

➢ **General**

Sample bent bars shall be checked to ensure that they conform to the bar bending schedules. Reinforcement in position shall be checked for proper positioning, and rigidity, cover, spacing of bars, placement of chairs and spacers, etc. Also it shall be checked that all bars at crossings are properly tied.

➢ **Tolerance**

Tolerance in construction, unless otherwise specified or as approved by the Project Engineer and Executing Agency shall be as follows:

Description of item / structural element	Permissible deviation in mm (Max.)
Placing of reinforcement	
For effective depth 200 mm or less	+10 -5
For effective depth more than 200 mm	+15 -10
Cover to reinforcement	-5
Cutting of reinforcement	
When minimum length specified	+75 -
When maximum length specified	- -50
When maximum or minimum length not specified	+75 -25

3.4 Formwork and staging

3.4.1 Scope

This section of the specification deals with the requirements for the supply, erection, dismantling of formwork and staging required for cast-in-situ concrete works including for making pockets / block outs.

3.4.2 General conditions

The Concessionaire shall supply, fabricate, erect, and dismantle (after use) all staging that is required for all activities covered under the specifications. He shall prepare the scheme and submit along with the supporting calculations for approval of the Project Engineer and Executing Agency.

3.4.3 Materials

Formwork shall compose of steel, best quality wood or non-absorbent type plywood. Timber shall be free from significant knots and shall be of medium grain as far as possible and hard woods shall be used as caps and wedges under or over posts. Timber shall be well seasoned, free from sap, shakes, worm holes, warps or other surface defects and shall have smooth finish.

Staging, unless specified otherwise, shall generally be of mild steel tubes, steel beams and channels etc. or strong sal ballies 150 mm in diameter or above. Bamboos, small diameter ballies etc., shall not be used unless approved by the Project Engineer and Executing Agency in specific cases.

3.4.4 Classification of formwork

a) **Ordinary**

This shall be used in places where ordinary surface finish is required and shall compose of steel and/or approved good quality seasoned wood. Plywood shuttering can also be used by the Concessionaire.

b) **Plywood**

This shall be used in exposed surfaces as shown on drawings or as directed by the Project Engineer and Executing Agency where a specially good finish is required. Such surfaces shall be formed using approved brand of heavy quality water resistant plywood to produce a perfectly leveled, uniform and smooth surface. Reuse of such forms may be permitted only after inspection and approval by the Project Engineer and Executing Agency, for each such reuse.

c) **Formwork for shell roofs**

For this item, the detailed design of formwork shall be submitted by the Concessionaire to the Project Engineer and Executing Agency, well in advance, for his approval. Units of shell forms may be used repeatedly but prior approval shall be required for each repetition. Extra care shall be taken to keep correct levels and profiles.

3.4.5 Quality of formwork and staging

Formwork shall consist of all materials required for forming the boxing to pour concrete, including steel / wood / plywood forms, ties, anchors, hangers, inserts, etc. Formwork shall be so constructed that vertical and horizontal adjustments can be made as required. The design and engineering of formwork including staging as well as its erection and dismantling shall be the responsibility of the Concessionaire.

The staging shall be true and rigid and thoroughly braced in both directions as well as cross braced, strutted and propped such that it will not deform unduly under weight of concrete and other loads due to men, equipment, etc. Vertical member or props should not be supported on an unpropped lower suspended floor or beam unless it is ensured by the Concessionaire that the lower floor or beam can safely carry the loads. No propping shall take place until the Project Engineer and Executing Agency's approval has been given to the Concessionaire's scheme submitted along with supporting calculations.

The forms and staging shall be sufficiently strong to carry without under deformation, the dead weight of the concrete as liquid as well as anticipated working loads. Where the concrete is vibrated, the formwork shall be strong enough to withstand the effects of vibration, without appreciable deflection, bulging, distortion or loosening of its components. The joints in the formwork shall be sufficiently tight to prevent any leakage of mortar. The formwork shall be such as to ensure a smooth uniform surface free from honeycombs, air bubbles, bulges, fins and other blemishes. Any blemish or defect found on the surface of the concrete, must be brought to the notice of the Project Engineer and Executing Agency immediately and rectified as directed.

To achieve the desired rigidity, ample studs, braces, bolts, spacer blocks, wires, clamps, ties, straps, shores, etc. Shall be used to hold the form in proper position without undue distortion. These shall be approved by the Project Engineer and Executing Agency but they must in no way impair the strength of concrete or leave stains or marks on the finished surface. Where there are chances of these fixtures being embedded, only mild steel or concrete of adequate strength shall be used. Bolts passing completely through liquid and or earth retaining walls / slabs, basement walls etc. For the purpose of securing and aligning the formwork, shall not be permitted.

For exposed interior and exterior concrete surfaces of beams and columns, plywood or other approved forms thoroughly cleaned and tied together with approved corrosion resistant devices shall be used. Rigid care shall be exercised ensuring that all column forms are plumb and true and thoroughly cross-braced to keep them so.

Beveled strips 25x25 mm shall be provided to form angles and in corners of columns and beam boxes for chamfering of corners if shown on drawings or directed by the Project Engineer and Executing Agency. Temporary openings for cleaning, inspection and for pouring concrete shall be provided at the base of vertical forms and at other places, where these are necessary and as may be directed by the Project Engineer and Executing Agency. The temporary openings shall be so formed that they can be conveniently closed rigidly when required and must not leave any mark on the concrete.

If it is so desired by the Project Engineer and Executing Agency, the Concessionaire shall prepare, before commencement of the actual work, designs and drawings for formwork and staging and get them approved by the Project Engineer and Executing Agency. Formwork shall be so designed and positioned that it can be removed without damage to concrete.

The Concessionaire shall maintain necessary camber in centering for all floor slabs and beams in all spanning directions, so as to offset the deflection and assume correct shape. The camber shall have the crown of not less than 8 mm for every 5 metres span unless otherwise shown on the drawings. For cantilever, camber at free end shall be 1 in 100.

The Concessionaire shall provide the shuttering for complete stretch of work upto expansion joints for the structures like shell, folded plate etc. and/or as directed by the Project Engineer and Executing Agency.

3.4.6 Cleaning and treatment of forms

All forms shall be thoroughly cleaned of old concrete, wood shavings, saw dust, dirt and dust sticking to them before these are fixed in position. All rubbish, loose concrete, chippings, shavings, saw dust etc. shall be scrupulously removed from the interior of the forms before concrete is poured. Wire brushes, brooms, compressed air jet and/or water jet etc. shall be kept handy for cleaning, if directed by the Project Engineer and Executing Agency.

Before formwork is placed in position, the form surfaces that will be in contact with concrete shall be treated with approved non-staining oil or composition, which is insoluble in water and not injurious to concrete. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or stain the concrete surfaces. Burnt oil shall not be allowed to be used specially where the concrete surface will require finishing and/or plaster.

3.4.7 Removal of forms

The Concessionaire shall begin the removal of formwork only after the approval of the Project Engineer and Executing Agency. He shall place on record the dates on which the concrete is placed in different parts of the work and the dates of the removal of formwork therefrom. This record shall be checked and countersigned by the Project Engineer and Executing Agency. The Concessionaire shall be responsible for the safe removal of formwork but the Project Engineer and Executing Agency may delay the time of removal if he considers it necessary. Any work showing signs of damage through premature removal of formwork, shall be entirely removed and reconstructed by the Concessionaire at no extra cost to the Executing Agency.

The formwork shall be so designed and erected that the forms for slabs and the sides of beams, columns and walls may be removed first, leaving the beam bottoms and their supports in position. Re-propping of beams shall not be done except with the approval of the Project Engineer and Executing Agency. Formwork for columns and walls at each stage of concreting shall be erected only upto the particular lift of construction. Wedges, spacer bolts, clamps or other suitable means shall be provided to allow accurate adjustment of the formwork and to allow it to be removed gradually without jerking the concrete.

Forms of various types of structural components shall, under normal circumstances, not be removed before the minimum periods specified in Cl. 10.3 of IS:456-1978, which shall also be subject to the approval of the Project Engineer and Executing Agency. However, in any case formwork shall not be struck until the concrete has reached strength, atleast twice that of the stress to which the concrete may be subjected to at the time of removal of forms.

In normal circumstances and where ordinary Portland cement is used, forms may generally be removed after the expiry of the following periods, according to clause no. 10.3 of IS:456-1978.

i.	Walls, columns and vertical faces of all structural members as directed by the Project Engineer and Executing Agency.	1 to 2 days
ii.	Slabs (Props left under)	3 days
iii.	Beam soffits (props left under)	7 days
iv.	**Removal of props under slabs**	
	Spanning up to 4.5 m	7 days
	Spanning up to 4.5 m	14 days
v.	**Removal of props under beams**	
	Spanning up to 6 m	14 days
	Spanning over 6 m	21 days
vi.	Cantilever slabs	14 days

The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

Where the shape of the element is such that the formwork has reentrant angles, the formwork shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.

In case of cantilever slabs, the removal of forms shall begin from the outer edge and proceed towards the support, where as in the case of slabs supported on two/four sides, the removal of forms shall begin from centre to supports.

The formwork shall be so made as to produce a finished concrete, true to shape, lines, plumb and to dimensions as shown on the drawings. The Project Engineer and Executing Agency may call for finished work at any time to set standards of workmanship. Once approved, these will become the accepted Sample.

In case PPC/PSC is used instead of OPC, the removal of shuttering/support shall be after 50% more time from that being applied for OPC, unless otherwise permitted by the Project Engineer and Executing Agency. For concrete temperature above 40 °C, stripping time shall be increased. In case of special structures, such as shells, folded plates, etc., the sequence of removal of forms shall be as per drawings or as directed by the Project Engineer and Executing Agency.

3.4.8 Reuse of forms

Before reuse, all forms shall be thoroughly scraped, cleaned, all nails and adhering substances removed, holes and leaks satisfactorily plugged, joints examined and where necessary repaired and inside surfaces treated as specified herein before. Formwork shall not be used/re-used, if declared unfit or unserviceable by the Project Engineer and Executing Agency.

3.4.9 Testing and quality assurance (including dimension tolerance)

- **General**

Staging shall be checked for its soundness as a whole and for adequacy of the joints and its foundations. All joints shall be either vertical or horizontal and shall be such as to avoid loss of liquid through the formwork.

- **Dimensional tolerance for formwork**

Levels and heights ± 6 mm

Plumb	3 mm for every metre subject to a maximum of 10mm.
Unevenness of any surfaces	± 3 mm
Length or breadth	± 12 mm
Diagonals	± 15 mm

In case of inclined surfaces like track hopper wall, folded plates etc., the deviation in the alignment of inclined surfaces, shall not exceed 3 mm with reference to the theoretical alignment, for a length of 1000 mm measured vertically, subject to a maximum of 10 mm.

In addition to above, requirement of clause no. 10.3 shall be complied with, which shall be the final acceptance criteria of concrete work.

3.5 Embedded parts

3.5.1 Scope

This section of specification deals with the supply, fabrication (where called for) and/or erection of embedded steel parts and PVC pipes

3.5.2 General requirements

Embedded steel parts shall be furnished by the Executing Agency for transportation & erection by the Concessionaire or supplied, fabricated and erected by the Concessionaire as stipulated. If supplied by the Executing Agency, these parts shall be furnished anywhere within the project area and the Concessionaire shall transport the same to the work site.

a) Embedded steel parts supplied, fabricated and erected by the Concessionaire shall include items such as, but not limited to, foundation grillages, anchor bolts, pipe sleeves, equipment mounting plates, steel pieces properly welded with necessary lugs as shown on the drawings, auxiliary framing for equipment supports, pesty plugs for door and window frames, dowel bars for concrete work, miscellaneous frames, etc.
b) Embedded steel parts supplied, fabricated/erected by the Concessionaire shall also include items such as, but not limited to plate inserts, edge protection angles, rolled sections with or without properly welded lugs.
c) Cold work deformed steel bars shall not be used for lugs.

3.5.3 Materials

The materials shall be in accordance with the relevant clauses of Technical Specification for ‘Properties, Storage and Handling of Common Building Materials (vide module C2), which shall be deemed to form a part of this specification. Mild steel pipes shall conform to IS:1161. Unless

otherwise specified, medium class pipes shall be provided/ PVC pipes shall conform to IS:4985. Minimum pressure rating shall be 2 Kgf/cm^2.

3.5.4 Fabrication, erection etc.

The Concessionaire shall fabricate, transport to site and erect accurately in position all embedded steel parts either by welding, bolting or any other means as approved by the Project Engineer and Executing Agency. Exposed surfaces of embedded parts other than holding down bolts, unless otherwise stated, are to be painted with two coats of approved anticorrosive paint (as per IS:2074) and/or bituminous paint as directed. The threads of holding down bolts shall be greased and protected with waterproof tape.

During erection, the Concessionaire shall provide necessary strong temporary bracings and supports to ensure proper installation of the embedded parts which shall be erected at the true locations as shown on the drawings and these shall be in plumb and level (unless otherwise shown on drawings). The Concessionaire shall furnish the Project Engineer and Executing Agency with fabrication and assembly drawings prepared for embedded steel parts showing the erection procedure, for major items, wherever necessary.

Fabrication & erection shall be carried out as per IS:800. Welding rods & site / field welding shall conform to IS:816 and IS:9595. IS:7634 (Part - III) shall be followed for PVC pipe works.

3.6 Foundation bolt assembly

3.6.1 Scope

This section of the specification deals with the requirements of supply, fabrication and erection of foundation bolt assembly etc.

3.6.2 General requirements

Supply, fabrication, erection and installation of Foundation bolt assembly shall comprise of foundations bolts, stiffener plates, washers, nuts, lock nuts, pipe sleeves etc.

3.6.3 Materials

Foundation bolts shall generally conform to IS:5624. Mild steel bars used for the fabrication of bolt assembly shall conform to grade-I of IS:432, IS:226, IS:2062 or any other material including high carbon/high tensile steel as specified.
Hexagonal nuts and lock nuts shall conform to IS:1363 & IS:1364 upto M 36 dia and IS:3138 and M 42 to M 150 dia.

Flat plain washers shall be of mild steel and punched/machined type conforming to IS:5369.

Steel pipe sleeves shall conform, to Medium class of IS:1161.

3.6.4 Fabrication, erection, etc

The fabrication and erection of bolt assemblies shall include threading, cutting, grinding, drilling, welding, etc., complete. All bolts, bolts assemblies, etc. shall be fabricated by the Concessionaire to the correct dimensions and shapes as shown on drawings, supplied by the Engineer. The bolts shall have coarse pitch screw thread in the diameter range, 8 to 64 and 6 mm pitch screw for diameter > 64 mm as per IS: 4218.

For fabrication of any particular size of bolt indicated on the drawing, the diameter of the threaded portion of the bolt shall be considered as the diameter of the bolt.

Every bolt shall be provided with steel washer, under the nut. The washer shall be flat and min. outside circle have a diameter 2.50 times that of the bolt and of suitable thickness. All nuts shall be of steel with well formed hexagonal heads unless specified otherwise, forged from solid metal and shall be dipped in hot boiled linseed oil as soon as these are made. The nuts shall fit good on the bolts.
During erection, the Concessionaire shall provide necessary template, temporary bracings, supports, etc. to ensure proper positioning of the assemblies and holding them firmly until they are cast / grouted and the grouted has set. All materials shall be erected in plump and in level (unless otherwise specified) and at true locations as shown on the drawings. Threads shall be protected by using PVC taps.

Fabrication & erection shall be carried out as per IS:800. Welding shall conform to IS:816 and 9595.

3.7 Shotcreting

3.7.1 Scope

This section of the specification deals with the requirements of furnishing and placement of shotcreting.

3.7.2 General requirements

Generally, shotcreting shall be done in accordance with IS:9012.

Reinforcement for shotcreting shall be as detailed below, unless specified otherwise.

a) Reinforcement in one direction consisting of 6 mm M.S. bars at 750 mm c/c shall be connected to the lugs of fastening of the wire fabric. This shall be used in case of 50 mm or above thick shotcreting.

b) Wire fabric conforming to IS:1566 shall be used as reinforcement and shall consist of wire, 3 mm diameter, spaced 50 mm both ways and shall be electrically cross welded. Wire fabric shall be securely tied to 6 mm bars for 50 mm (min) thickness. Adjacent sheet of wire fabric shall be lapped at least 100 mm tied.

c) Clear cover to reinforcement mesh shall not be less than 15 mm.

This work shall be executed only by experienced operators, approved by the Project Engineer and Executing Agency.

Minimum thickness shotcreting shall be 50 mm. for abrasion resistant and 25 mm for ordinary surface protection work.

3.7.3 Materials

Generally, the materials shall be in accordance with the relevant clauses of Technical Specification for properties. Storage and Handling of common Building Material, which shall be deemed to form a part of this Specification.

a) Fine aggregates shall consist of natural sand or crushed stone from a known source and shall be strong, hard, coarse, sharp chemically inert, clean and free from any coating. It shall be free from clay, coal or coal residue, organic or any other impurities that may impair the strength or durability of the concrete and shall conform to IS:383.

b) Fine aggregate (sand) shall be well graded and particles shall range in size within the following limits. The Project Engineer and Executing Agency, may approve the use of any other grading as per the requirements of IS:9012.

IS sieve designation	Percentage passing by weight
10 mm	100
4.75 mm	90 – 100
2.36 mm	60 – 95
1.18 mm	45 – 80
600 microns	35 – 60
300 microns	8 – 30

IS sieve designation	Percentage passing by weight
150 microns	0 – 10

c) The fineness modules shall be preferably between 2.5 & 3.3. Any other value can be used, with prior approval of the Project Engineer and Executing Agency.

Water shall be clean & free deleterious matter and shall have same properties, stipulated for use in concrete work.

Set accelerating and water-proofing shotcreting admixtures of approved make shall be used wherever required.

3.7.4 Application

After the placement of reinforcement and/or welded mesh and not more than six hours prior to the application of shotcrete, the surface shall be thoroughly cleaned of all loose material and dirt. The Concessionaire shall properly prepare the surfaces, reinforcement and/or welded mesh to receive the shotcrete. Cleaned surfaces shall be wetted not more than one hour prior to shotcreting.

The mix as placed on surface shall one part cement to three parts approved sand by volume. Cement and sand shall be dry mixed; no water shall be added after mixing and before using in the gun. The quantity of water when added, shall be only that which is sufficient to hydrate the cement. For average atmospheric conditions, the water cement ratio for shotcrete in place shall be between 0.35 and 0.5. Suitable admixture shall be used wherever required.

A uniform pressure of not less than 2.5 Kgf/cm^2 at the nozzle shall be maintained. Necessary adjustments shall be made to ensure this pressure, taking into account the length of hose and height of the place to be shotcreted.

The application shall proceed in an upward direction. Beams, stiffener and intermediate walls, if any, shall be wrapped with wire fabric and completely covered with shotcreting. All rebound shall be removed from the area of application as the work progresses and such rebound material shall not be reused.

3.7.5 Curing

As soon as the freshly shotcreted surface shows the first dry patches, a fine spray of water shall be applied to keep it moist. After the surface has hardened, it shall be kept continuously moist for minimum seven days. If there is extreme heat, especially when accompanied by hot winds, the shotcreted surface, immediately upon completion, shall be covered with burlap of similar covering, which must be kept continuously moist for 14 days after shotcreting. The temperature of the lining shall not be permitted to exceed 38 Degrees Centigrade during placing and curing.

3.8 Grouting

3.8.1 Scope

This section of the specification deals with the requirements of furnishing and placement of grout in block outs and foundation bolt holes and underpinning of base plates In case special type of grouting is required for the machine base plate, the Concessionaire shall submit the details of the same and get it approved from the Project Engineer and Executing Agency.

3.8.2 General requirements

The space between the top surface of the foundation and the underside of the base plate shall be filled with appropriate grout.
Crushing strength of grout shall be one grade higher than the foundation concrete. Minimum crushing strength shall be 25N/sq.mm. Unless otherwise specified.

The contact area between the grout and base plate shall not be less than 80%.

3.8.3 Materials

Cement shall be Ordinary Portland Cement slag cement or Pozzolana Portland Cement conforming to IS:269, 455 and 1489 respectively.

Sand shall be clean and well graded conforming to IS 383. For flow able grout, sand conforming to Zone - 4 grade shall be used. Coarse aggregate wherever used shall also conform to IS:383.

Clean potable water as recommended for concrete mix shall be used.

- **Admixtures**

a) Non-shrink admixtures of approved make shall be used.
b) Plasticizer conforming to IS:9103 shall be used to increase the workability, wherever required.

3.8.4 Mixing and placing

- **Type of mix**

There shall generally be following three types grout mix::

i) Ready mixed non-shrink cementations grout

ii) Cement-Sand Grout: The proportion of cement to sand shall generally be 1:2, unless otherwise specified.

iii) Cement Aggregate Grout: The approximate proportions of cement, sand and coarse aggregate shall be 1:1:25:2, with a maximum size of aggregate as 10 mm. This mix shall generally be used for grout thickness above 40 mm for dry pack application.

- **Mixing**

Depending upon the case of placement and method of application, there shall be following three grout consistencies.

a) **Fluid Mix:** Water cement ratio shall be 0.6 (max.) may be added to increase workability, wherever required. This grout mix shall be suitable for application with low pressure grouting equipment or self flowing and suitable for grouting of pockets/block outs, etc.

b) **Plastic Mix:** Water-Cement ratio shall be about 0.5. This grout mix shall be suitable for application with trowel or rod.

c) **Stiff Mix:** Water-cement ratio shall generally be 0.4. This grout mix shall be suitable for dry-pack application. The consistency should allow pressurizing into firm hardball without cracking.

- **Placing**

The block outs, bolts holes etc. Which have to be grouted, shall be cleaned thoroughly by use of compressed air just prior to taking up the grouting operations.

Cement, sand, aggregate, and non-shrink admixture of approved quality and proven make shall be first blended thoroughly in the required proportion as per manufacturer's specifications. Grout shall then be prepared by mixing this admixture with water. Any grout which has been mixed for a period longer than half an hour shall not be used on the work.

Immediately after preparation, a grout of suitable mix shall be poured into the block outs, pockets and bolt holes either from the sides or through the holes provided for this purpose in the base plate, by using special equipment for pressure grouting. It shall be ensured by Roding and by tapping of bolts that the block out is completely filled without leaving any voids. The pouring shall cease as soon as each hole is filled and any excess grout found on the surface of the concrete foundation shall be completely removed and the surface dried.

The space between the top surface of the foundation concrete and the underside of the base plate shall be filled with appropriate grout type. Grouting, once commenced, shall be done

continuously. Grout shall be worked from one end to the other (to prevent air entrapment) and until the grout oozes out through the grout holes provided in the base plates.

In case of stiff mix, the space between the top surface of foundation concrete and the underside of the base plate shall be dry packed by firmly pressing or ramming into place against fixed supports.

When it is clear that the centre of base has been properly filled, the grout outside the base plate shall be briefly rammed to ensure compaction below the edges. Shims provided for the alignment of plant bases shall be positioned at the edges of the base to permit subsequent removal, which shall take place not less than 7 days after the grouting has been executed. The resulting cavities shall be made good with the same grade of grout as has been used for grouting under the rest of the base plate.

- **Curing**

The work shall be cured for a period of atleast 7 days commencing 24 hours after the completion of the grouting. The curing shall be done by covering the surfaces with wet gunny bags and flooding.

3.9 Encasement of steel structures / elements

3.9.1 Scope

This section of specification deals with the requirement for encasement of steel work in concrete with necessary formwork, placing, finishing and curing, complete as per drawings and specifications.

3.9.2 General requirements

All concrete work, reinforcement, formwork & staging work shall be done as per stipulations of section 2, 3 and 4 of this specification.

The reinforcement to be provided for encasement of steel elements shall be mild steel bars or in the form of wire netting. Such reinforcement shall be kept 20 mm away from the steel member and held securely to it.

The minimum grade of concrete to be used for encasing shall be M-20 unless specified. The aggregate to be used in concrete shall be 12.5 mm maximum size unless specified otherwise. In

case of box type steel sections, encasement shall be done with cement, sand mortar (1:4) with thickness of 50mm over 0.9 mm size wire netting conforming to IS:3150, or as shown on the drawings.

In the case of encasement of beams with concrete, if the gap between the edge of the shuttering and flange is hardly sufficient for placing the concrete, the workability of the concrete shall be increased suitably by increasing the water-cement ratio.
Minimum cover for concrete encasement shall be 50 mm

3.9.3 Materials

The materials shall be in accordance with the relevant clauses of Technical Specification for Properties, Storage and handling of common Building Materials which shall be deemed to form the part of this specification.

3.9.4 Wire netting

Hexagonal wire netting shall be 0.9 mm dia and 19 mm aperture size, conforming to IS:3150.

3.10 Joints in concrete

3.10.1 Scope

This section of the specification deals with the requirement of furnishing and installing of joints including joint filler materials, water bars, resilient pads type vibration damping material in an around the side of concrete works etc.

3.10.2 General requirements

Details of joints shall be as approved by Project Engineer and Executing Agency or as per approved drawings. Where necessary or / and specified, joints shall be made water tight by use of water stops.

3.10.3 Classification of joints

From the point of view of utility, the joints as provided may be classified as below:

a) **Construction joints**

Construction joints are produced by placing fresh concrete against surface of hardened concrete. Construction joints are generally, but not necessarily, vertical or horizontal. Requirements of construction joints shall be as per clause specified elsewhere.

b) **Contraction joints**

These are provided to eliminate tensile stresses due to shrinkage and are commonly used where temperature variations are small and where there is no likelihood of expansion, such as spaces below water and earth levels and unexposed to atmosphere. At contraction joints, the reinforcement is discontinued and bond is not allowed to develop between the joint faces, thereby introducing a structural discontinuity. A contraction joint also serves as a construction joint so far as break in the pouring of concrete is concerned.

c) **Expansion joints**

These are provided either to completely eliminate or to significantly reduce comprehensive stresses in concrete that would otherwise result from thermal expansion and might crush, buckle or crack part of the structure. Expansion joints serve the purpose of contraction and also construction joints.

d) **Control joints**

At places where cracking is inevitable, places of weakness are introduced by the provision of control joints so that the cracking takes place along these joints instead of allowing it to develop in a haphazard manner.

e) **Separation joints**

The places where the expansion of the structure is not expected but they are required to be kept structurally separate so that stresses, vibrations, etc. are not transferred, a separation joint should be provided. Like expansion joint, a gap is provided in separation joint also, but this is not expected to be used by the expansion of members. In case, no gap is required, the separation joint can be obtained by using an approved alkathene sheet stuck on the surface against which concrete shall be placed.

f) **Settlement joints**

Structures, which are likely to settle with respect to the adjacent structures, shall be separated by a settlement joint so that the adverse effects of differential settlement are obviated. It is like an expansion joint but with a different sealing arrangement.

3.10.4 Materials

- **Joint filler**

a) Bitumen board:

The bitumen impregnated fiber board; a preformed material shall be used as joint filler which shall fill space between the concrete surfaces at the joints. The minimum thickness of board shall be 12 mm and the material shall conform to IS:1838.

b) Expanded polystyrene :

The expanded polystyrene slab shall be of fire retarding grade (type-2) conforming to IS:4671 Density of material shall not be less than 25 kg/cum.

- **Water stops**

a) Water stops shall be provided at the joints as a continuous diaphragm to contain the filler material and/or to exclude passage of water or any other material into or out of the structure.

b) The water stops shall be either metallic like Copper, or non-metallic like P.V.C. the material is to be procured from reputed manufacturers having proven records of satisfactory supply of Water Stops of similar make and shape of other jobs. Only PVC water stop shall be used, unless, otherwise, specifically approved by the Project Engineer and Executing Agency.

c) **Non-metallic Water Stop :**
These will be normally in PVC and can be of shape having any combination of the following features:

i) Plain
ii) Central Bulb
iii) Dumb-bell or flattened ends
iv) Ribbed and Corrugated Wings
v) V-shaped
vi) Kicker type (Externally placed)

Water bars shall generally meet the stipulations of IS:12200. The minimum thickness of PVC Water Stops shall be 5 mm and the minimum width 225 mm, unless otherwise specified in the schedule of items. However, for some non-critical areas 150 mm wide and 5 mm thick water stop can be used. The actual size and the shape will be as shown on drawings and/or as directed by the Project Engineer and Executing Agency. The material should be of good quality Polyvinyl Chloride, highly resistant to tearing, abrasion and

corrosion as well as to chemicals likely to come in contact with during use. The performance requirements shall generally be as follows:

Sp. Gr	:	1.3 to 1.4
Shore hardness	:	60A to 80A
Tensile strength	:	116kgf / cm^2 min.
Max. Safe continuous temp.	:	70 degree C.
Ultimate elongation	:	Not less than 300%
Tear resistance	:	45kgf / cm^2 min.
Stiffness in flexure	:	25kgf / cm^2 min.
Accelerated extraction		
i) Tensile strength	:	110kgf / cm2
ii) Ultimate elongation	:	250%
iii) Water absorption in 7 days	:	5% (max.)
Effect of Alkali	**:**	7 days
1. Weight increase	**:**	0.25% max.
2. Weight decrease	**:**	0.10% max.
3. Hardness change	**:**	$\pm$ 5 %
Effect of Alkali	**:**	28 days
a) Weight increase	**:**	0.40% max.
b) Weight decrease	**:**	0.30% max.
c) Dimension change	**:**	$\pm$1%

- **Sealing compound**

a) Bitumen sealing compound:

The bitumen sealing compound shall be from approved manufacturer and shall conform to the requirements of IS:1834. For joints in concrete lining on canals/reservoirs, sealing compound conforming to IS:5256 shall be used.

b) Polysulphide sealing compound:

This shall be two-part polysulphide sealant and shall be from approved manufacturer, conforming to IS:12118. Materials shall consist of polysulphide polymer and a curing agent. Gun grade material shall be used unless otherwise specified. The application of the sealant shall be strictly followed as per manufacturer's guidelines.

- **Metal cover strips**

Metal cover strips shall be made from aluminium or mild steel sections as shown on drawings. The min. thickness of aluminium strips shall be 3 mm and that of mild steel 6 mm. Aluminium alloy strip shall be corrosion resistant grade 31000 as per IS:737. Mild Steel shall conform to IS:226 or IS:2062.

- **Resilient pads**

i) The vibration damping material shall be resilient rubber pads made up of natural or synthetic rubber and shall have the following physical properties

a) Shore 'A' durometer hardness : 50 (+) / (-) 5
b) Min. elongation : 450%
c) Ultimate min. tensile strength : 145 kg/sq.cm

d) Rubber pads shall not absorb more than 10% of weight of water in a 7 days test.

ii) The minimum thickness of the resilient pads shall be 12 mm.

3.10.5 Installation

- **Bitumen board / Expand polystyrene**

The bitumen impregnated fiber board may be secured to vertical concrete by nails in the first placed concrete. The joint filler shall be coated on both faces with coal-tar pitch conforming to IS:216 or bitumen grade conforming to IS:73 or IS:702.

i) Water stops shall not have any longitudinal joints and shall be procured and installed in largest practicable lengths having a minimum number of transverse joints. The jointing procedure shall be as per the manufacturer's recommendations and shall be reviewed and approved by the Project Engineer and Executing Agency. Suitable field splicing kit including heater shall be used for this purpose. The edges shall be neatly crimped and bent to ensure proper bond with the concrete.

ii) As Non-metallic Water Stops can be easily handled in very large lengths unlike metal strips, transverse joints will be allowed only under unavoidable circumstances and with the specific approval of the Project Engineer and Executing Agency. The method of forming these joints, laps etc. shall be as specified by the Manufacturer and/or approved by the Project Engineer and Executing Agency, taking particular care to match the centre and the edges accurately.

iii) Particular care shall be taken for the correct positioning of the water stops to prevent any faulty installation, which may result in joint leakage.

Adequate provisions shall be made to support the water stops during the progress of work and to ensure their proper embedment in the concrete. The symmetrical halves of the water stops shall be equally divided between the concrete pours adjacent to the joints.

Max. Density and imperviousness of the concrete shall be ensured by thoroughly working in the vicinity of joints. However, particular care should be exercised in use of vibrators in the proximity of joints to avoid dislodging of the water stops.

iv) **Splices**

Splices in the continuity of intersections of runs of water stops shall be jointed as per manufacturer's stipulations depending on the type of water stops used. In case of a cross section, overlapping must not be done but, instead factory made cross joint should be used. It is essential that the material is not damaged during the splicing operation and that the continuity of the entire water stops across the section be maintained.

v) **Inspection**

All water stops installations shall be subject to inspection and approval by the Project Engineer and Executing Agency, before concreting operations, encasing water stops, are performed**.**

- **Sealing compound**

When directed, the gap in joints shall be thoroughly cleaned and sealing compound laid as per manufacturer's specification and approved drawings. Primer shall be applied wherever required. For reservoir/canal lining, procedure as stipulated under clause 9.0 of IS:5256-1969 shall be followed.

- **Metal cover strips**

The metal cover strips shall be pinned (using stainless steel) at one end and slotted at the other end. Exposed surface of mild steel shall be painted with two coats of approved anti-corrosive paint (as per IS:2074) and/or bituminous paint. Welding of aluminium shall be in accordance with IS:2812.

3.10.6 Resilient pads:

The resilientpads shall be installed around the foundation or at other locations as shown on the drawings. The pads shall be installed in position by sticking the same to the foundations by using approved glue.

3.11 Waterproofing / damp proofing of underground concrete structures

3.11.1 Scope

This section of specification deals with the retirements of all works for completing water proofing / damp proofing of underground concrete structure. This shall include water retaining and basement type structures.

3.11.2 General requirements

As a general guidance, the provisions of IS: 6494 shall be followed unless otherwise mentioned.

The Concessionaire shall do the proper concreting so that concrete is water tight in itself without any waterproofing treatment. The waterproofing treatment shall be provided in exceptional cases, as additional precaution, as shown on the drawings or directed by the Project Engineer and Executing Agency.

The work of waterproofing / damp proofing of underground concrete structures by course of bitumen felt, blown bitumen or any other operations shall be entrusted by the Concessionaire to one of the well known expert agencies approved by the Project Engineer and Executing Agency. Actual type of waterproofing treatment to be provided for particular structure, shall be as shown on the drawings or directed by the Project Engineer and Executing Agency.

3.11.3 Bitumen felt treatment

- **Materials**

a) The materials shall be in accordance with the relevant clauses of Technical specification for properties, Storage and Handling of Common building materials

b) The bitumen felt shall conform to IS: 1322 and the workmanship to IS:1609 and IS: 3067. The bitumen felt shall be hessian based. Bitumen primer shall conform to IS: 3384. The bonding materials shall consist of blown type bitumen conforming to IS: 702 or residual bitumen conforming to IS:73 or a mixture of the two, to withstand local conditions of prevailing temperature gradient of surface. The Concessionaire shall satisfy the Project

Engineer and Executing Agency that the bonding materials proposed to be used are suitable for the particular job.

- **Installation**

a) Waterproofing / Damp proofing for horizontal surfaces, unless specified otherwise with two layers of felt on which subsequently concrete shall be placed, shall be provided with the following treatments :

i) A minimum of 12mm thick plaster 1:4 (1 cement : 4 sand) with waterproofing admixture / additives over PCC
ii) One coat of bitumen primer @ 0.4 kg/Sqm min.
iii) One layer of hot applied bitumen @ 1.5kg/sq.m. min.
iv) One layer of self-finished felt (type - 3, grade II as per IS: 1322).
v) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
vi) One layer of self-finished felt (type - 3, grade - II as per IS: 1322).
vii) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
viii) A minimum of 12mm thick plaster 1:4 (1 cement: 4 sand).

b) Water proofing / Damp proofing for other surfaces (including vertical) unless specified otherwise, with two layers of felt shall be provided with following treatments:

i) One coat of bitumen primer @ 0.4 kg/Sqm min.
ii) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
iii) One layer of self-finished felt (type - 3, grade - II as per IS: 1322).
iv) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
v) One layer of self-finished felt (type - 3, grade II as per IS: 1322).
vi) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
vii) A minimum 25mm thick plaster 1:4 (1cement: 4 stand).
viii) Half brick masonry work in cement mortar 1:4 (1 cement: 4 sand) using bricks of class designation 75, unless otherwise specified.

3.11.4 Miscellaneous treatment

- **Plastering treatment**

After the side walls are constructed and allowed to undergo the specified curing, the surface of the walls and the flooring should be made rough with a hacking tool, washed clean with water and wire brushed so as to remove all the loose material, and a waterproof cement plaster 1:3 mix, with suitable proportion of an integral waterproofing compound shall be applied in two coats, the first coat being 12mm thick and the next 10mm thick. The second coat shall be applied after

allowing a time interval of at least 24 hrs for the first coat to harden. Hexagonal galvanized netting of 0.90mm dia, 19 mm aperture size shall be used in the plastering. The netting shall be fixed with the help of MS Screws, fixed with the help of fibrous plugs provided before application of first layer of plaster.

- **Hot applied bitumen treatment**

The external concrete of plastered surface shall be carefully cleaned, cured and allowed to dry for some time before the application of a coat of hot bitumen of the industrial grade 85/25 conforming to IS : 702 against ground water seepage. Rate of application of bitumen shall not be less than 1.7 kg/Sqm and it should be heated to about 120 C before application. Anti-stripping compound shall be added. Anti-stripping and adhesion improving agent shall be 100% mixable in bitumen. The stripping and adhesion improving agent shall be 100% mixable in bitumen. The stripping value tested as per IS: 6241 should be nil when recommended quantity of anti-stripping compound is mixed. Nominal mix proportion of the compound shall be 1 percent by weight of bitumen. However, actual mix proportion shall be as per manufacturer's recommendation.

- **Polymer modified cementitious coating treatment**

a) Materials

i) Modified liquid polymer blend shall be a dispersion containing 100% acrylic based polymer solids.
ii) Portland cement based dry powder
iii) Clean, fine specially prepared quartz sand approximately 0.6 mm size.

b) Mixing

The liquid polymer shall be stirred well and cement base powder shall then be added slowly to make a slurry mix. For preparation of brush topping mix, quartz sand shall be added slowly and mixed well till a homogenous mixture is obtained. The mix shall be used within half an hour of the preparation. Addition of quartz sand may not be necessary, in case dry power contains the same.

c) Properties of the coating

i) It must adhere to the wet surface
ii) It should develop adequate bond strength with the concrete surface, not less than 2 N / Sqm
iii) Co-efficient of permeability shall be about 5 x 10 Cms
iv) Water absorption after continuous soaking shall not be more than 1%.

v) The materials shall be permeable under water vapor.
vi) The material shall be resistant to acids and alkalis' present in the soil and underground water with normal pH value between 4 and 14.
vii) The co-efficient of thermal expansion of the material shall be close to that of concrete.

d) Application

The concrete surface shall be cleaned and made free from grease, oils or loosely adhered particles. The surface shall be damp without any free water.

i) For slurry mix: a minimum of 2 coats shall be applied on the surface. The first coat being applied when the surface is still damp and left to harden for 4 to 6 hours. After 4 to 6 hours of the application of second coat, it shall be finished by rubbing down with a soft dry sponge. The coverage shall not be less than 1.1kg/sq.m in the 2 coats. A lap of 75mm shall be provided at the joints.

The coating shall be air dried for 4 to 6 hours and, thereafter, cured for 7 days after the application of last coat.

ii) For brush toping mix: This shall be applied in two coats. A primary coat of slurry mix can also be first applied on the surface as first coat. After the coating has dried up, a coat of brush toping mix shall be applied over it with a push broom or any other similar brush. It shall be left in broom finished condition. The nominal thickness shall be 1.5mm and minimum thickness shall be 1.0mm. A lap of 75mm shall be provided at the joints. It shall be ensured that no pinhole exists and re-brushing shall be done to cover the pinholes if any.

The coating shall be air dried for 4 to 6 hours and thereafter cured for 7 days after application of last coat.

3.11.5 Chemical injection treatment

Wherever shown on the drawing or directed by the Project Engineer and Executing Agency, min 12mm dia (N.B.) threaded nozzle of suitable length, shall be provided over the surface ad along the construction joint line in a grid pattern at a spacing not exceeding 1.5m c/c before concreting operation. Adequate precaution shall be taken to keep the nozzles plugged at both ends to prevent them from getting closed by concrete.

For fixing of any nozzle in set concrete suitable size hole shall be drilled, preferably by using repercussive hammer drill electrically operated, in grid pattern and grouting nozzle shall be fixed in these holes.

After the nozzles are fully set, neat cement slurry admixed with water-soluble non-shrink polymer/monomer based chemical shall be injected through the network of nozzles with low pressure grout pumps at a pressure of about 2.0 kg/sq.cm. Water cement ratio of the slurry shall not be more than 1:2. The resultant solution shall not have viscosity greater than 1:2 centipoises. Plasticizing agent shall be added wherever required. The grouting shall be started at very low pressure and increased gradually to a required pressure. The grouting shall continue till the hole refuses to take any further grout, even at an increased pressure. Applied pressure shall not be more than the designed strength of the concrete. After completion of grouting operation, the nozzles shall be sealed properly to the satisfaction of the Project Engineer and Executing Agency.

3.12 Dismantling / demolishing work - RCC and PCC

3.12.1 Scope

This section of specification deals with the requirements of dismantling / demolishing RCC and / or PCC work.

3.12.2 General requirements

The dismantling implies, carefully taking up or down and removing without damage, this shall consist of dismantling one or more parts of a structure. This includes chipping work, making holes/ opening etc in concrete members according to the required shape, size and profile at all elevations.

The term demolition implies, taking up or down or breaking up of a structure / member in part or full as specified or shown on drawings or as directed by the Project Engineer and Executing Agency.

In a structure / member, both dismantling and demolishing work may be involved. In such case, the portion of work treated as demolishing shall be as shown on the drawing or as decided by the Project Engineer and Executing Agency.

All materials obtained from the demolition/dismantling work shall be the property of the Executing Agency, unless otherwise specified.

All serviceable materials obtained, shall be separated out and stacked properly upto a lead of 500 metres and all unserviceable materials, rubbish etc shall be disposed off as directed by the Project Engineer and Executing Agency..

The dismantling / demolishing operations shall be carried out in proper sequence so that the serviceable material can be salvaged, without being damaged during the process of work.

Necessary propping, shoring and under pinning shall be provided for the safety of the adjoining work or property which is to be left intact, before dismantling / demolishing work

3.12.3 Safety

All demolition work shall be carried out in conformity with the local safety regulations, extreme caution being exercised to avoid damage to the work and the equipment, which are to be left intact. Necessary precautions shall be taken to keep the dust nuisance down. Safety requirements in IS: 4130 shall also be followed.

As and where necessary, the dismantled / demolished materials shall be lowered to the ground and not thrown and then properly stacked as directed by the Project Engineer and Executing Agency. Wherever required, temporary enclosures shall be erected to minimize the dust or moisture infiltration.

3.13 Cement additives / admixtures in concrete

3.13.1 Scope

This section of specification deals with the requirements of furnishing, placing and mixing cement additives / admixtures, in all kinds of cement concrete, (plain or reinforced) for all kinds of structures at all levels.

3.13.2 General requirements

The Concessionaire shall furnish all labour and equipment to place and mix waterproofing cement additive and cement plasticizer in concrete of any grade and cement mortar. Thereafter he shall carry out the work as specified earlier in relevant clauses of this specification for concrete and hence complete the work as indicated on the drawing and as per the specification listed hereunder.

Waterproofing additive and other types of admixtures shall be as far as possible, free from aggressive chemical like chloride, sulphide etc., which can cause corrosion of steel reinforcement in RCC.

The Concessionaire shall have the services of the manufacturer's supervisor, at no extra cost to the Executing Agency, to supervise the work, if directed by the Project Engineer and Executing Agency.

Admixtures in concrete for promoting workability, improving strength, entraining air or for similar purposes may be used only after the written permission from the Project Engineer and Executing Agency, is obtained. Addition to admixtures shall not reduce the specified strength or durability of concrete in any case. The admixtures shall conform to IS: 9103 and shall be of proven make and from a reputed manufacturer. Calcium chloride shall not be permitted to be used other than in mass (plain) concrete works.

3.13.3 Materials

Waterproof cement additive shall conform to IS: 2645 and shall be of proven make and from a reputed manufacturer.

Admixtures in concrete shall conform to IS: 9103 and shall be of proven make and from a reputed manufacturer. In addition, for plasticizer cum waterproofing compound materials shall meet the permeability requirements as per IS: 2645. Similarly, for plasticizer cum retarder admixture material shall satisfy the setting time requirements of retarder and other properties of plasticizer as per IS: 9103.

3.13.4 Mixing

Admixtures / waterproofing additive shall be used at the rate specified by the manufacturer or as indicated on the drawings and shall be mixed with water, as required by the Project Engineer and Executing Agency. Samples of concrete in which admixture and / or waterproofing cement additive is added shall be tested for water proofness, workability, compressive strength, water absorption, density, setting time, etc., the results shall conform to relevant IS specifications.

Table - 4: Frequency of sampling and testing

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
1.	**Coarse aggregates**			
a)	Particle size & shape	IS:2386(Pt.1)	One per 100 cum. or part thereof or change of source whichever is earliest	Result to be as per the requirement of design mix, subject to variations within the limits specified in relevantIndian Standards.
b)	Moisture content	IS:2386(Pt.3)	Once for each stack of 100 cum. or part	Accordingly water content of the concrete shall be

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
			thereof except during monsoon when this has to be done every day before starting of the work.	adjusted.
c)	Specific gravity, density, voids, absorption.	IS:2386(Pt.3)	Once in 12 weeks or change of source whichever is earlier	These tests shall be carried out while establishing design mix and results to be intimated.
d)	Mechanical properties, crushing value, abrasion value and impact value.	IS:2386(Pt.4)	Once per source	Acceptance norms shall be as per IS:383
e)	Soundness	IS:2386 (Pt.5)	Once per source	Acceptance norms shall be as per IS:383.
f)	Reaction with alkali.	IS:2386 (Pt.7)	Once per source	These tests shall be carried out while establishing design mix and result to be intimated. Acceptance shall be as per IS:2386 (Pt.7).
g)	Flakiness and petro-graphic examinations	IS:2386	This is to be done once and should be repeated in case the source is changed.	These tests shall be carried out while establishing design mix and results to be intimated.
h)	Deleterious materials	IS:2386 (Pt.2)	Once per source	Results should be within the limit as specified in relevant Indian Standards and in this Specification.
2.	**Fine aggregates / sand**			
a)	Particle size and shape.	IS:2386 (Pt.1)	One per 100 cum. or part thereof or change of source, whichever is earlier.	Should be as per the requirement of design mix, subject to variation within the limit as specified in relevant IS Codes.
b)	Specific gravity, density, voids, adsorption and	IS:2386 (Pt.3)	Once in 12 weeks or change of source whichever is earlier	These tests will be carried out while establishing design mix and results to be

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
	bulking.			intimated.
c)	Bulk age, moisture content (Routine test)	IS:2386 (Pt.3)	To be done every day before start of work.	Volume of sand and weight of water shall be adjusted as per bulk age and moisture content.
d)	Silt, clay deleterious materials, organic impurities.	IS:2386 (Pt.2)	Once per source and to be repeated, if source is changed.	Volume of sand and weight of water shall be adjusted as per bulk age & moisture content.
e)	Soundness and Petrographic examination.	IS:2386 (Pt. 5 & 8)	Once per source.	Acceptance norms shall be as per IS:383.
f)	Mortar making properties.	IS:2386 (Pt.6)	-do-	Acceptance norms shall be as per IS:383.
g)	Reaction with alkali.	IS:2386(Pt.7)	Once per source	Acceptance norms shall be as per IS:383 and IS:2386 (Pt.7).
3.	**Cement**			
a)	Setting time	IS:4031	One sample of each received from stores.	Acceptance norms shall be as per relevant Indian Standard
b)	Compressive Strength	IS:4031	-do-	-do-
4.	**Water**			
	Harmful substances, pH value, initial setting time, compressive strength.	IS:3025, IS:4031 & IS:516	Once a month for each source	Acceptance norms shall be as per Cl.4.3 of IS:456-1978.
5.	**Concrete**			
a)	Workability (Slump and compaction factor)	IS:1199	One sample every two hours from every mixing plant.	Acceptance value shall be as per Cl. 6.1 of IS:456-1978.
b)	Crushing Strength	IS:516	i) As per Cl.14.2.2 of IS:456-1978 for initial period ii) One sample of six cubes per 150 cum or part thereof for mass concrete for	Acceptance criteria shall be as per Cl.15 of IS:456-1978. A minimum of 3 (Part-7) specimens shall be tested for 28 days strength.

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
			subsequent period.	
c)	Water-cement ratio	IS:119	At random at the time of batching	According to mix design
d)	Cement Content	IS:1199	-do-	-do-
e)	Finished dimensions	Physical measurement	All structures	Acceptance as per Specification
6.	**Form work** a) Staging (Durability strength & soundness of staging, joints, adequacy of its foundation and specific level)	Visual	Each member	Any staging intended for use shall be approved by the Project Engineer and Executing Agency for its durability and strength
				After erection of staging, nominated representatives of Project Engineer and Executing Agency shall check the soundness of the staging as a whole, its joints, adequacy of its foundation and the specific levels.
	b) Shuttering			
	i) Materials	Visual	Random	Formwork materials shall be strictly as per specifications and approved of the Project Engineer and Executing Agency. Materials for formwork shall be unwrapped, thoroughly clean and without broken or damaged edges either due to repetitive use or otherwise. Oiling of for m work before concreting shall be resorted to.

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
	ii) Joints	Visual	Random	Joints shall be leak proof to avoid loss of liquid
	iii) Dimensions and plumb	Physical measurement	Each member and before every lift.	Tolerance as per Specification
7	**Reinforcement**			
	a) Placement	Visual	each	The bar bending schedule with the necessary hooks, laps, covers, spacers and chairs shall be 100% checked for all concreting works before start of the work.
	b) Cutting tolerance	Physical measurement	Random	Tolerance shall be as per specification.

3.14 Slab on grade

3.14.1 Scope

This section of specification deals with carrying out the work of "slab on grade". In all medium duty industrial floors

3.14.2 General requirements

The Concessionaire shall furnish all material/ labour and equipment. The specifications covered under section C-3, sub section 1 to 13 for cast in situ concrete and allied works shall generally be applicable unless otherwise specified here under.

The work includes right from preparation of sub grade to completing and curing slab on grade in all respects to the satisfaction of the Project Engineer and Executing Agency.

3.14.3 Materials

(a) Materials for filling shall be crushed stone dust, sand or other inorganic materials and they shall be clean and free from shingle, salts, organic matters, roots and excessive amount of sod, concrete or any other foreign substances which could harm or impair the strength of the substructure in any manner.

(b) Stones for Granular sub base shall be broken stones to gauge not exceeding 63 mm and shall be free from dust, organic matters etc.
(c) Maximum size of 40 mm stone aggregate shall be used for concrete.
(d) Cement shall be ordinary Portland cement conforming to IS:269,Grade 43
(e) Admixtures in concrete for improving workability, strength etc may be used only after the written permission from the Project Engineer and Executing Agency.
(f) Water shall be clean, free from injurious matters. Potable water is generally considered satisfactory.
(g) Reinforcing steel bars shall conform to grade 1 of IS:432 (part 1)
(h) Polysulphide sealant shall conform to IS 12118 Gun Grade.
(i) Concrete curing compound shall be CONCURE WB of M/s. Fosroc Chemicals (India) Ltd., or equivalent.

3.14.4 Laying of slab on grade

i) Uneven (but fairly level) sub grade shall be dressed, leveled by necessary Excavation / Scraping / Filling, watered, rolled by 10T roller and consolidated to desired level.
ii) On consolidated sub grade, two layers of granular sub base each of 75 mm thickness shall be laid Total consolidated thickness of sub base shall be 150 mm. Refer specification No.C-1.6.0 - Granular Sub Base (Hard core)
iii) On consolidated sub base water proof paper shall be placed with minimum 150mm overlaps on all sides.
iv) Concrete grade M20, 150 mm thick shall be poured in strips as per drawing and as directed by the Project Engineer and Executing Agency.

The strips shall be prepared by placing formwork in straight line and level. Each strip may be of size 4 metre wide x 20 metre long alternate strips shall be cast by leaving 24 hours interval in between.

Form work shall be strong enough to hold the screed vibrator.

The concrete shall be vibrated by screed vibrator / surface vibrator and when it becomes touch dry it shall be machine trowel led to smooth uniform level surface. Ramp surfaces shall then be "**Broom Finished**".

Under no circumstances dry cement or cement slurry shall be separately spread on concrete at any time.

Special care shall be taken to pour and vibrate the concrete along the form work to avoid any segregation of aggregate and honey combing.

v) 24 hours after concreting, the form work shall be removed and immediately the grooves of size 10mm x 50mm as shown on the drawing shall be cut in concrete at an interval of about 4.0 metres or as shown on the drawing.

The grooves shall be cleaned and concrete surface shall then be sprayed by water based concrete curing compound as specified. The grooves shall be filled up by poly sulphide sealant after fourteen days.

vi) Dowels shall be provided along transverse and longitudinal construction joints as shown on the drawing.

vii) Any expansion / contraction joints in slab on grade shall be provided at locations and as per the details indicated on the drawing.

3.14.5 Acceptance criteria

All finished surface shall be smooth, uniform and at desired line and level within a tolerance of $\pm$ 3.0 mm. It shall be free from cracks and warping.

Sub-section - C4
Technical specification for masonry and allied works

Sub-Section - C4

Technical specification for masonry and allied works

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Section - C4: Technical specifications for masonry and allied works

4.1 Scope

This section of the specification covers furnishing, installation including handling, transportation, batching, mixing, laying, scaffolding, centering, shuttering, finishing, curing, protection and repairing till handing over of brick masonry and allied works including DPC, plinth protection and dismantling.

4.2 General requirements

The Concessionaire shall furnish all skilled and unskilled labour, plant, equipment, scaffolding, materials, etc. required for complete execution of the work in accordance with the drawings and as described herein and/or as directed by the Project Engineer and Executing Agency.

All workmanship shall be in accordance with the latest standards and best possible practice. Masonry work shall be true to line & level as shown on drawings. All such masonry shall be tightly built against structural members and bonded with dowels, anchors, inserts, etc, as shown on the drawings.

The Concessionaire shall carry out all works for settling out the building lines, locating the co-ordinates and establishing the reduced levels (RL's) on the basis of reference grid lines and bench mark, which shall be furnished by the Executing Agency, at one or more locations.

Any approval, instructions, permission, checking, review, etc. whatsoever by the Project Engineer and Executing Agency shall not relieve the Concessionaire of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, quality, workmanship, etc.

4.3 Codes and standards

All applicable standards, acts and codes of practice referred to shall be the latest editions including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the Concessionaire.

In case of conflict between this specification and those (IS Standards, Codes etc.) more stingent shall prevail.

Some of the applicable Indian Standards, Codes, etc. are referred to here below:

IS:1127	Recommendations for Dimensions and Workmanship of Natural Building

	Stones for Masonry Work.
IS:1597	Code of practice for construction of Stone Masonry.
IS:1905	Code of Practice for Structural Safety of Buildings - Masonry walls.
IS:2116	Specification for sand for masonry mortars.
IS:2185	Specification for Hollow cement concrete blocks
IS:2212	Code of Practice for Brickwork.
IS:2250	Code of Practice for preparation and use of masonry mortar.
IS:2572	Code of Practice for construction of Hollow concrete block masonry
IS:3414	Design and installation of joints in buildings.
IS:3696	Safety code for scaffolds and ladders.
IS:4130	Safety code during demolition of buildings.
IS:4326	Code of practice for earthquake resistant design and construction of buildings
IS:12894	Fly ash lime bricks specifications.
SP:20	Explanatory hand book on masonry code.

4.4 Brick masonry

4.4.1 Materials

Properties of common building materials for the construction of brick masonry, viz. burnt clay bricks, sand lime and cement shall be in accordance with the technical specification for 'Properties, Storage and Handling of Common Building Materials' (vide Mode C2). Besides clay bricks, other type of bricks like, fly ash-lime bricks cured by autoclave process shall also be used, whenever specified, or shown on the drawing.

4.5 Fly ash brick masonry

4.5.1 Materials

Properties of common building materials for the construction of brick masonry, viz. fly ash bricks, sand lime and cement shall be in accordance with the technical specification for 'Properties, Storage and Handling of Common Building Materials' (vide Mode C2). Besides fly ash bricks, other type of bricks like, fly ash-lime bricks cured by autoclave process shall also be used, whenever specified, or shown on the drawing.

4.5.2 Mortar

IS: 2250 shall be followed as general guidance for preparation and use of mortar. Only cement & Fly ash-sand mortar shall be used. Lime shall be added for composite mortar with specific approval of the Project Engineer and Executing Agency.

Unless otherwise specified, mortar for brickwork having one or more brick thickness shall be 1 part cement & fly ash (20% replacement ratio of cement with fly ash): and 6 parts sand by volume. Mortar for half-brick thick walls shall be 1 part cement & fly ash (20% replacement ratio of cement with fly ash): and 4 parts sand by volume. Richer mix proportion shall be used, whenever specified or as per design requirement. Mortar shall meet the compressive strength requirement as per IS: 2250 and IS: 1905.

Sand shall conform to IS: 2116. Grading of sand when tested as per IS: 2386 shall be as specified in Table -1.

Table 1: Grading of sand for use in masonry mortars

IS sieve designation IS:460 (Part – I)	Percentage passing by mass	Method of test
4.75mm	100	IS:2386
2.36mm	90 to 100	(Part-I)
1.18mm	70 to 100	
600 micron	40 to 100	
300 micron	5 to 70	
150 micron	0 to 15	

Sand, whose grading falls outside the specified limits due to excess or deficiency of coarse or fine particles, may be processed to comply with the standard by screening through a suitably sized sieve and/or blending with required quantities of suitable sizes of sand particles. Based on test results and in the light of practical experience with the use of local materials, deviation in grading of sand given in Table-1 may be considered by the Project Engineer and Executing Agency. The various sizes of particles of which the sand is composed, shall be uniformly distributed throughout the mass. The required grading may often be obtained by screening and/or by blending together either natural sands or crushed stone screenings, which are by themselves of unsuitable grading.

Cement, fly ash (20% replacement ratio of cement with fly ash): and sand shall be thoroughly mixed dry in a mechanical mixer and water shall then be added to obtain a mortar of the consistency of a stiff paste, care being taken to add just sufficient water for the purpose. Water shall be clean and free from injurious amount of deleterious matter such as oil, acid alkali, salt and vegetable growth. Hand mixing may be allowed by the Project Engineer and Executing Agency on clean approved platform in special cases only. Mortar shall be used as soon as possible after mixing, before it begins to set and preferably within 30 minutes after water is added to the dry mixture. Mortar unused for more than 30 minutes shall generally be rejected and removed from site of work. However, the Project Engineer and Executing Agency may allow the use of mortar upto 2 hours.

Surplus mortar droppings while laying masonry, if received on a surface from dirt, may be mixed with fresh mortar if permitted by the Project Engineer and Executing Agency, where direct for addition of extra cement and this shall be implemented.

4.5.3 Laying

IS:2212 shall be followed as general guidance for construction of brick masonry Vat/tank of suitable size shall be provided by the Concessionaire for soaking of bricks. Bricks shall be soaked in water before use for a period generally not less than 6 hours so that the water just penetrates the whole depth of the bricks. Bricks shall be laid in by hand and not thrown inside the tank. Bricks shall be taken out sufficiently in advance so that these are skin dray at the time of laying.

Bricks shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except where necessary to complete the bond. Closers in such cases shall be cut to the required size and used near the ends of the walls, next to quoin headers.

Bricks shall be laid generally with frogs upwards. A layer of mortar shall be spread on the full width and over a suitable length of the lower course. Each brick shall be properly bedded and set home (in position) by gently tapping with the trowel handle or with a wooden mallet. It's inside face shall be buttered with mortar before the next brick is laid and pressed against it. On completion of a course, all vertical joints shall be fully filled from the top with mortar. The thickness of joints shall be kept uniform and shall not exceed 10 mm. Bricks shall be so laid that all joints are full of mortar.

All face joints shall be raked to a minimum depth of 15 mm by raking tools during the progress of brickwork, when the mortar is still green, so as to provide proper key for the plaster or pointing to be done. When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying.

Brickwork in walls shall be taken up truly plumb. All courses shall normally be laid truly horizontal unless indicated to be laid on slope and all vertical joints shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. Brick wall shall be construed with atleast one plain face with proper alignment.

All connected brickwork shall be carried up simultaneously and no portion of work shall be left more than one metre below the rest of the work. Where this is not possible, in the opinion of the Project Engineer and Executing Agency, the work shall be raked back according to bond (and not toothed) at an angle not steeper than 45 deg. The work done per day should not be more than one metre height

All iron fixtures, pipes, water outlets, holdfasts for doors and windows, etc. which are required to be built into the brickwork shall be embedded in their correct position in mortar or cement concrete as the work proceeds as per directions of the Project Engineer and Executing Agency.

All brickwork shall be built tightly against columns, floor slabs or other structural parts and around door and window frames with proper distance to permit caulked joint. Where drawings indicate that structural steel columns and spandrel beams are to be partly or wholly covered with brickwork, the bricks shall be laid closely against all flanges and webs with all spaces between the steel and brickwork filled solid with mortar not less than 10mm in thickness.

The top courses of all plinth, parapet, steps and top wall below CRC shall be laid with brick on edge (other than modular size bricks) unless otherwise specified. Care shall be taken that the bricks forming the top courses and ends of walls are properly radiated and keyed into position as shown on the drawings.

Scaffolding shall be strong enough to withstand all the dead, live and impact loads which are likely to come upon it. It shall also be so designed as to ensure the safety of the workmen using them.

For all brick masonry except for exposed brickwork, single scaffolding shall be permitted. In such cases, the inner end of the horizontal scaffolding pole shall rest in a hole provided only in header course for the purpose. Only one header for each pose shall be left out. Such holes for scaffolding shall, however, not be allowed in pillars/columns less than one metre in width. The holes left in masonry works for scaffolding purposes shall be filled and made good before plastering.

In case of joining old brickwork with new brick work, the old work shall be toothed to the full width of the new wall and to the dept of quarter of a brick in alternate courses. It shall be cleaned of all dust, loose mortar, etc., and thoroughly wetted before starting new brick work. Thickness of each course of new work shall be made equal to the thickness of the corresponding course of the old work by adjusting thickness of horizontal mortar joints.

The face of the brickwork shall be cleaned on the same day on which brickwork is laid and all mortar dropping removed promptly.

Template (bed-block) of plain or reinforced cement concrete shall generally be provided to support ends of RCC beams. Top surface of the wall shall be suitably treated as per direction of the Project Engineer and Executing Agency so as to minimise the friction to movement of the concrete slab over the bearing.

Brickwork shall be protected from rain by suitable covering when the mortar is green. Masonry work shall be cured by keeping it constantly moist on all faces for a minimum period of seven

days. Brickwork carried out during the day shall be suitably marked indicating the date on which the work is done so as to keep a watch on the curing period.

4.5.4 Half brick masonry

The work shall be done in the same manner, as mentioned in 4.03 except that all course shall be laid with stretchers. In cases where reinforcement is considered necessary from structural consideration, 2 nos. 8 mm dia bars shall be provided generally at every 4th layer of bricks or as specified on the drawings. Before laying reinforcement, it shall be cleaned of rust and loose flakes with a wire brush. They shall be securely anchored at their ends where the partitions bond. Half the mortar thickness for the bedding joint shall be laid first and then 8mm dia bars laid straight out near each face of the brickwork maintaining a side cover of 12mm mortar. Subsequently the other half of the mortar thickness shall be laid covering the reinforcement fully.

4.5.5 Exposed brickwork

Exposed brickwork i.e. brickwork is superstructure which is not covered by plaster shall be as shown on the drawings and shall be done by specially skilled masons. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. Thickness of brick courses shall be kept uniform and for this purpose wooden straight edge with graduations indicating thickness of each course including joint shall be used. The height of window sills, bottom of lintels and other such important points in the height of the wall shall be marked on the graduated straight edge. Masons must check workmanship frequently with plumb, spirit level, rule and string.

For all exposed brick work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

If face bricks are specified on the drawings, the brickwork shall be in composite work with face bricks on the exposed face and balance in standard bricks, but maintaining the bond fully. Where face bricks are not specified, bricks for the exposed face shall be specially selected from available stack of bricks. All exposed brickwork on completion of work shall be rubbed down, washed clean and pointed as specified. Where face bricks are used, carborundum stone shall be used for rubbing down.

4.5.6 Reinforcing anchorage

For external walls, the anchorage in the form of flats or rods from spandrel beams and columns and any other anchoring and reinforcement as shown on the drawing shall be adequately embedded in the masonry.

4.6 Stone masonry

Rubble stone masonry which is commonly used in stone work has been covered under this specification. Details of construction for Random Stone Masonry (uncoursed) and Coursed Rubble Masonry (first and second sorts) are given in the following clauses. IS: 1597 shall be followed as general guidance for construction of stone masonry

4.6.1 Stone masonry

The stone shall be of the type specified, such as granite, sand stone, quartzite and /or best locally available stone which shall be subject to approval of the Project Engineer and Executing Agency. It shall be obtained only from an approved quarry. Colour of the stone shall be as shown on the drawings or approved by the Project Engineer and Executing Agency. It shall be hard, sound, durable and free from decay, weathering. It shall also be free from defects like cavities, cracks, sand holdes, flaws, veins, patches of soft and loose materials, etc. Stones with round surface shall not be more than 5 percent when tested in accordance with IS: 1124. The minimum crushing strength of stone shall be 200 kg/sq cm unless otherwise specified.

4.6.2 Size of stone

Normally, stones used should be small enough to be lifted and placed by hand. The length of stone, shall not exceed three times the height and the breadth on base shall not be greater than three fourth of the thickness of wall not more than 15 cm. The height of stone may be upto 30 cm.

4.6.3 Mortar

Unless otherwise specified, mortar for stone masonry shall be 1 part of cement & fly ash (20% replacement ratio of cement with fly ash): and 6 parts sand by volume. Properties, preparation and use of mortar shall be same as specified for brick masonry work.

4.6.4 Dressing of stone

The dressing of stone shall be as specified below for individual types of masonry work and it shall also conform to the general requirements for stone covered in IS:1129.

a) For Random Rubble Stone Masonry, stone shall be hammered –--- the face, the sides and the beds to enable it to come into close with the neighbouring stone. the bushing on the face shall be than 4 cm on an exposed face, and 1 cm on a face, to
b) For coursed Rubble Masonry (First sort) Face stones, shall dressed on all beds, and joints, so as to give them approx. angular shape.

4.6.5 Laying

a) Random rubble masonry

All stones shall be wetted before use. The wall shall be carried up truly plumb or to the specified batter. Every stone shall be carefully fitted to the adjacent stones, so as to form neat and close joints. Stones may be brought to level courses at plinth, window sills and roof level. Levelling up shall be done with concrete comprising of one part of mortar (used for the masonry) and two parts of graded stone aggregate of 20 mm nominal size. The bond shall be obtained by fitting in closely, the adjacent stones and by using bond stones.

Face stones shall extend and bond well into the backing. These shall be arranged to break joints as much as possible, and to avoid long vertical lines of joints, the hearting or interior filling of the wall shall consist of rubble stones which may be of any shape but shall not pass through a circular ring of 15 cm inner diameter. Thickness of these stones in any direction shall not be less than 10 cm. These shall be carefully laid, hammered down with a wooden mallet into the position and solidly bedded in mortar. Clips and spells of stone shall be used where necessary to avoid thick mortar beds or joints and at the same time ensuring that no hollow spaces are left any where in the masonry. The hearting shall be laid nearly level with facing and backing except that at about one metre intervals, vertical 'plumb' projecting about 15 cm to 20 cm shall be firmly embedded to form a bond between successive courses. The chips shall not be used below the hearting stone to bring these upto the level of face-stones. The use of chips shall be restricted to the fillings of interstices between the adjacent stones in hearting and these shall not exceed 20% of the quantity of stone masonry. The masonry in a structure shall be carried regularly. Where the masonry of one part has to be delayed, the work shall be raked back at an angle not steeper than 45 deg. Toothing in masonry shall not be permitted.

Bond or through stones running right through the thickness of walls shall be provided in walls upto 60 cm thick and in case of walls above 60 cm thickness, a set of two or more bond stones overlapping each other by atleast 15 cm shall be provided in a line from back to back.

In case of highly absorbent type of stones (porous lime stone and sand stone etc.) the bond stone shall extend about two third into the wall. Through stones in such cases may give rise to damp penetration and therefore, for all thickness of such walls, a set of two or more bond stones overlapping each other by atleast 15 cm shall be provided.

Where bond stones of suitable length are not available, cement concrete block of mix 1:3:6 (with 20mm nominal size graded stone aggregate) shall be used. Atleast one bond stone or

a set of bond stones shall be provided for every 0.5 sq m of the wall surface. All bond stones in stone masonry shall be marked suitably as directed by the Project Engineer and Executing Agency.

The quoins shall be selected stones, neatly dressed with the hammer or chisel to form the required angle, and laid header and stretcher in the alternate layers. Volume of these stones shall not be less than 0.03 cu m.

Stones shall be so laid that all joints are fully packed with mortar and chips. Face joints shall not be more that 20mm think. When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. Otherwise the joints shall be raked to a minimum depth of 20 mm by raking tool during the progress of work, when the mortar is still green.

Single scaffolding having one set of vertical support shall be allowed. Masonry work shall be kept constantly moist on all faces for a minimum period of seven days. Green work shall be protected from damage, mortar dropping and rain during construction.

b) Coursed rubble masonry (First Sort)

All stones shall be wetted before use. The walls shall be built up truly plumb or to specified batter. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. The height of each course shall not be less than 150 mm nor more than 300 mm. Every stone shall be carefully fitted to the adjacent stones, so as to form neat and close joints. Face stones shall be laid in alternate header and stretcher fashion. No face stone shall be less in breadth than its height and at least one third of the stones shall tail into the work for length not less than twice their height. These shall be so arranged as to break joints by 7 atleast 75 mm. Each face stone shall be of the same height in any given course. The bond shall be obtained by fitting in closely the adjacent stones and by using bond stones.

Stones shall be laid with grains horizontal so that the load is transmitted along the direction of the maximum crushing strength.

The hearting or the interior filling of the wall shall consist of stones carefully laid on their proper beds in mortar; chips and spalls of stone being used where necessary to avoid thick beds or joints of mortar and at the same time ensuring that no hollow spaces are left anywhere in the masonry. The chips shall not be used below the hearting stone to bring these upto the level of face stones. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearting and these shall not exceed 10% of the total volume of stone masonry. All bed joints shall be horizontal and all side joints vertical. All joints shall be fully packed with mortar. Face joints shall not be more than 10 mm thick.

When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. Otherwise, the joints shall be raked to a minimum depth of 20mm by raking took during the progress of work, when the mortar is still green.

Stone may be brought to level courses at plinth, window sills and roof level. Levelling up at plinth level, window sills and roof level shall be done with concrete comprising of one part of the mortar (use for the masonry) and two parts of graded stone aggregate of 20mm nominal size.

The masonry in a structure shall be raised up uniformly and regularly but where breaks are unavoidable, the work shall be raked back at angle not steeper than 45 deg. Too things shall not be allowed. Masonry on any day should not be raised by more than 1 metre in height.

Bond or through stones running right through the thickness of walls shall be provided in walls upto 600 mm thick and in case of walls above 600 mm thickness, a set of two or more bond stones overlapping each other by atleast 150mm shall be provided in a line from face to back.

In case of highly absorbent types of stones (porous limestone and sand stone etc.) the bond stone shall extend about two-third into the wall. Through stones in such cases may give rise to damp penetration. Therefore, for all the thickness of such walls, a set of two or more bond stones overlapping each other by atleast 150mm shall be provided.

Where bond stones of suitable lengths are not available, cement concrete blocks of 1;3:6 mix (1cement : 3 sand : 6 graded stone aggregate 20mm nominal size) shall be used.

A bond stone or a set of bond stones shall be inserted 1.5 to 1.8 metres apart, in every course. All bond stones shall be suitably marked during construction for subsequent verification and shall be staggered in subsequent layers. The quoins shall be of selected stones, neatly dressed with the hammer or chisel to form the required angle. These shall be of the same height in which these occur. These shall be atleast 450 mm long and shall be laid stretchers and headers alternately. These shall be laid square on the beds, which shall be rough chisel dressed to a depth of atleast 100 mm. In case of exposed work, these stones shall have a minimum 25mm wide chisel drafts at four edges, all the edges being in the same plane. Single scaffolding having one set of vertical support shall be allowed. The supports shall be sound and strong, tied together by horizontal scaffolding member may rest in a hole provided in the masonry. Such holes, however, shall not be allowed in pillars less than one metre in width. The holes left in masonry work for supporting scaffolding shall be filled and made good with cement concrete 1:3:6 (1 cement : 3 sand : 6 stone aggregate 20 mm nominal size)

Masonry work shall be kept constantly moist on all faces for a minimum period of seven days. Green work shall be protected from rain by suitable covering. The work shall also be suitably protected from damage, mortar dropping and rain during construction.

c) Coursed rubble masonry (second sort)

Laying of this type of masonry shall be in the same manner as First Sort masonry described above except for the following:

The use of chips for filling of interstices of adjacent stones in hearting shall not exceed 15% of the total volume of stone masonry, and stone in each course need not be of the same height, but more than two stones shall not be used in the height of a course. Face joints shall not be more than 20mm thick.

4.7 Mouldings and cornices

The bricks or stones shall be cut and dressed to the required shape as shown on architectural drawings. If no subsequent finish is envisaged, these shall be rubbed to correct profile with carborundum stone.

4.8 Plinth protection

Plinth of buildings shall be protected with brick on edge paving of minimum 750mm width unless otherwise shown on the drawings. The treatment shall consist of laying bricks conforming to class 50 (min.) of IS:1077 in cement mortar 1:6 (1 cement & fly ash (20% replacement ratio of cement with fly ash): : 6 sand) over a 75 mm thick bed of dry graded brick aggregate, 40mm nominal size, grouted with sand. the top shall be finished with 1:3 cement mortar pointing (1 cement & fly ash (20% replacement ratio of cement with fly ash):: 3 sand). Plinth protection shall be laid with a minimum outward slope of 1 in 50. The brick aggregate shall be well graded, broken from well burnt or slightly over burnt and dense brick bats. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt or any other foreign matter.

The ground shall first be prepared to the required, slope around and building. The high portions of the ground should be cut down, hollows and depressions filled upto the required level from the excavated earth and rammed so as to give uniform outward slope. The bed shall be watered and rammed and heavy iron square rammers. Surplus earth, if any, shall be disposed off beyond a lead of 50 m or as directed by the Project Engineer and Executing Agency.
Over this, 75mm thick bed of dry brick aggregate of 40mm nominal size shall be laid with a minimum outward slope of 1 in 50. Aggregates shall be carefully laid and packed, bigger sized being placed at the bottom. The brick aggregates shall be consolidated dry with heavy iron rammers.

The aggregates shall then be grouted evenly with sand at the rate of 0.06 cubic metre per square metre area, adequately watered to ensure filling of voids by sand and again rammed with heavy iron rammers. The finished surface shall give uniform appearance. After the sub grade has been compacted thoroughly, brick flooring with bricks of specified strength in cement mortar 1:6 (1 cement & fly ash (20% replacement ratio of cement with fly ash): 6 sand) shall be laid. The soaking of bricks shall be done as per the relevant standard. The bricks shall be laid on edge in Diagonal / herring Bone Bond or other pattern as specified or as directed by the Project Engineer and Executing Agency. Bricks shall be laid on 12mm thick mortar bed and each brick shall be properly bedded and set home by gentle tapping with handle of trowel or wooden mallet. It's inside face shall be buttered with mortar before the next brick is laid and pressed against it. On completion of the portion of flooring, the vertical joints shall be fully filled from the top with mortar. The surface shall present a true plain surface with the required slope.

The point shall be done in cement mortar 1:3 (1cement & fly ash (20% replacement ratio of cement with fly ash): 3 sand). The mortar shall be pressed into the joints and shall be finished off flush and level with the edges of the bricks so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and a straight edge the mortar shall not spread over surface of the masonry.

Brick flooring and pointing shall be kept wet for a minimum period of seven days. These shall be protected from rain by suitable covering when the mortar is green.

4.9 Damp Proof Course (DPC)

All walls in a building shall be provided with a damp proof course generally immediately below the underside of the ground floor or as shown on the drawings. This shall run without break throughout the length of the wall, even under door or other openings.

Damp proof course shall be 50 mm thick (unless, otherwise specified) consisting of cement concrete in proportion 1:1.5:3 (1 cement: 1.5 sand: 3 graded stone aggregate 10mm nominal size) mixed with water proofing cement additive as approved by the Project Engineer and Executing Agency. The additive shall be used in proportion recommended by the manufacturer.

The surface of masonry work shall be levelled and prepared before laying the cement concrete. Edges of DPC shall be straight and even. The side shuttering shall consist of wooden forms and shall be strong and properly fixed so that it does not get disturbed during compaction and mortar does not leak through. The concrete mix shall be of workable consistency and shall be tamped thoroughly to make a dense mass. When the side shuttering are removed the surface should be smooth without any honeycombing. The top surface shall be double chequered and cured by pounding for atleast 7 days. The cement concrete shall be allowed to dry for atleast 24 hours after

curing and hot bitumen of grade 85/25 conforming to IS:702 at the rate of 1.7 kg/sq metre shall be applied over the dried up surface of cement concrete after being properly cleaned with brushes and finally with a cloth soaked in kerosene oil. The bitumen shall be applied uniformly so that no blank spaces are left anywhere.

4.10 Dismantling and demolition

The term 'Dismantling' implies carefully removing without damage (up or down). This shall consist of dismantling one or more part of the building as specified or shown on the drawings.

The term 'Demolition' implies breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown on the drawings.

4.10.1 General requirements

(a) All materials obtained from dismantling or demolition shall be the property of the Executing Agency, unless otherwise specified and shall be kept in safe custody until handed over at Executing Agency's stores. Demolition shall be carried out in the shape and profile shown on the drawings or as directed by the Project Engineer and Executing Agency.

(b) The dismantling or demolition shall always be planned before hand and shall be done in reverse order of the one in which the structure was constructed. The scheme shall be got approved from the Project Engineer and Executing Agency before starting the work.

4.10.2 Precautions

(a) Necessary propping, shoring and under pinning shall be provided for the safety of the adjoining work or property before dismantling or demolition is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions shall also be provided.

(b) All demolition work shall be carried out in conformance with the local safety regulations, ensuring the safety of men and materials.

(c) Necessary precautions shall be taken to keep down the dust nuisance.

(d) All materials which are likely to be damaged during the operation shall be carefully removed first.

(e) Dismantling shall be done in a systematic manner. The dismantled articles shall be passed by hand, where necessary, lowered to the ground (and not thrown) and then properly stacked as directed by the Project Engineer and Executing Agency.

(f) Where fixing is done by nails, screws, bolts, rivets, etc. dismantling shall be done by taking out the fixing with proper tools and not be tearing or ripping off.

(g) All serviceable materials obtained shall be separated out and stacked properly as directed by the Project Engineer and Executing Agency, upto a lead of 500m or handed over at Executing Agency's stores. All unserviceable materials, rubbish etc. shall be disposed off, as directed by the Project Engineer and Executing Agency.

4.11 Sampling testing and quality control

4.11.1 General

(a) The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International Standards and shall conduct such tests as are called for by the Project Engineer and Executing Agency. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Project Engineer and Executing Agency. Tests shall be done in the field and at a laboratory approved by the Project Engineer and Executing Agency and the Concessionaire shall submit to the Project Engineer and Executing Agency, the test results in triplicate within three days after completion of a test. The Project Engineer and Executing Agency may at his discretion, waive off some of the stipulations given below, for small and unimportant operations.

(b) Material / work found unsuitable for acceptance shall be removed and replaced by the Concessionaire. The works shall be redone as per specification requirements and to the satisfaction of the Project Engineer and Executing Agency.

4.11.2 Quality assurance programme

The Concessionaire shall submit and finalise a detailed field Quality Assurance Programme according to the requirements of the specification. This shall include setting up of a testing laboratory, arrangement of testing apparatus / equipment, deployment of qualified / experienced manpower, preparation of format for record, field quality plan etc. On finalised field quality plan, the Executing Agency shall identify, customer hold points beyond which work shall not proceed without written approval from the Project Engineer and Executing Agency.

Frequency of sampling and testing including the methods for conducting the tests are given in Table - 2. The testing shall be done at site. The testing frequencies set forth are the desirable

minimum and the Project Engineer and Executing Agency shall have the full authority to carry out or all for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications. Some of the type tests and performance tests which are not included in the table shall be carried out at the manufacturer's premises or at an independent Government approved laboratory.

All masonry shall be built true and plumb within the tolerances prescribed as below. Care shall be taken to keep the pretends properly aligned.

a) Deviation in vertically in total height of any wall of a building more than one storey in height shall not exceed +/- 12.5 mm.

b) Deviation from vertical within a storey shall not exceed +/- 6mm per 3 m height.

c) Deviation from the position shown on the plan of any brickwork more than one storey in height shall not exceed 12.5 mm.

d) Relative displacement between load bearing walls in adjacent storeys intended to be in a vertical alignment shall not exceed 6 mm.

e) Deviation of bed joint from horizontal in any length upto 12 m shall not exceed 6 mm, and in any length over 12m it shall not exceed 12.5mm total.

f) Deviation from the specified thickness of bed-joints, cross joints or pretends shall not exceed +/- 3 mm.

Table 2: Frequency of sampling and testing

Sl. No.	Type of material/ work	Nature of test / characteristics of test	Method of test	No. of samples and frequency	Remarks/ acceptance norms
1	2	3	4	5	6
1.	Burnt clay bricks/Fly ash bricks	(a) Dimensions	Clause No.5.2.1 of IS:1077		Max. 8% deviation for non-modular bricks. For modular bricks as per Clause no.5.2 of IS: 1077. For face bricks as per IS: 2691.
		(b) Compressive strength	IS:3495 (Part-1)		As specified

Sl. No.	Type of material/ work	Nature of test / characteristics of test	Method of test	No. of samples and frequency	Remarks/ acceptance norms
1	2	3	4	5	6
		(c) Water absorption	IS:3495 (Part-2)	A set of 20 bricks (min.) for each lot of 50,000 or part thereof for all tests (a to c)	Max. 20%. However, 15% for face bricks only.
		(d) Efflorescence	IS:3495 (Part-3)		Moderate. However for face brick nil.
		(e) War page	IS:3495		For face brick 2.5 mm (max.)
II.	Stone	a) Type of stone by petro graphic examination	IS:1123	One set of stones of each type and from each source.	As specified.
		b) Shape & size	Physical measurement	Random	As specified
		c) Crushing strength	IS:1121 (Part-I)	One set of stones of each type and from each source.	As specified
		d) Water absorption	IS:1124	One set of stones of each type and from each source.	As specified
		e) Durability	IS:1126	One set of stones of each type and from each source.	As specified
III.	Sand	a) General quality	Visual	One set of samples from each source of material per 100	As specified

Sl. No.	Type of material/ work	Nature of test / characteristics of test	Method of test	No. of samples and frequency	Remarks/ acceptance norms
1	2	3	4	5	6
				Cum. or part thereof.	
		b) Deleterious material	IS:2386 (Parts-I & 2)	One set of samples from each source of material per 100 cum. or part thereof.	Clause 3.3 of IS:2116
		c) Grading	Sieve analysis as per IS:2386 (Part-I)	One set of samples from each source of material per 100 cum. or part thereof.	Table-1 of IS:2116
IV.	Cement	a) Setting time	IS:4031	One set of sample for each lot of material received	No separate testing is required in case cement is tested for preparation of concrete mix
		b) Compressive strength	IS:4031	One set of sample for each lot of material received	No separate testing is required in case cement is tested for preparation of concrete mix
V.	Water	a) Harmful substances, pH value	IS:3025	Once a month for each source	No separate testing is required in case water is tested for concrete mix
		b) Initial setting time	IS:4031	Once a month for each source	No separate testing is required in case water is tested for concrete mix

Sl. No.	Type of material/ work	Nature of test / characteristics of test	Method of test	No. of samples and frequency	Remarks/ acceptance norms
1	2	3	4	5	6
		c) Compressive strength	IS:516	Once a month for each source	No separate testing is required in case water is tested for concrete mix
VI.	Mortar	a) Compressive strength	Appendix-A of IS:2250	One sample (consisting of min 3 specimens)	Table-1 of IS:2250
		b) Consistency	Appendix-B of IS:2250	One sample for each type of mix	Clause 7.2 of IS:2250
		c) Water retentively	Appendix-C of IS:2250	One sample for each type of mix	Clause 7.3 of IS:2250
VII.	Masonry construction	a) Workmanship	Visual & Physical measurement	All work	As per specification and Cl. No.11.0 of IS:2212 for brickwork
		b) Verticality and alignment	Physical measurement	All work	As per specification and Cl.No.6.3.4 of IS:1905

Section - C5

Technical specification for plastering and allied works

Section - C5

Technical specification for plastering and allied works

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Section - C5: Technical specification for plastering and allied works

5.1 Scope

This part of the specification covers the requirements for plastering and allied works for all types of masonry and concrete surfaces.

5.2 General requirements

The Concessionaire shall furnish all skilled and unskilled labour, plant, equipment, scaffolding, materials, etc. required for complete execution ofthe work in accordance with the drawings and as described herein and/or as directed by the Project Engineer and Executing Agency.

The Concessionaire shall follow all safety requirements/rules during execution of the work.

I.S:1661 shall be followed as a general guidance for plastering work.

5.3 Codes and standards

All applicable standards, acts and codes of practice referred to shall be the latest editions including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at Site with the Concessionaire.

In case of any conflict between this specification and those (IS Standards, Codes etc.) more stringent shall prevail.

Some of the applicable Indian Standards, Codes, etc. are referred to here below:

IS:383	-	Coarse and fine aggregates from natural sources for concrete.
IS:712	-	Building limes.
IS:1542	-	Specification for sand for plaster
IS:1635	-	Code of practice for field slaking of Building lime and preparation of putty
IS:2250	-	Code of practice for preparation and use of masonry mortar.
IS:2333	-	Plaster-of-paris
IS:2402	-	Code of practice for external rendered finishes
IS:2547	-	Gypsum building plaster
IS:3150	-	Hexagonal wire netting for general purpose

5.4 Materials

Materials namely, cement, sand, water, Coarse aggregate, shall be in accordance with Technical Specifications for properties, storage and handling of common building materials.

Lime for preparation of putty or neeru for punning work shall be according to class B& C of IS: 712.

For rough cast plaster, coarse aggregate of size 6 to 12 mm shall be used in the finishing coat. Coarse aggregate shall be as per IS: 383.

Gypsum, for use in plaster-of-paris punning work shall be according to IS:2333.

For lath plastering, galvanised hexagonal wire netting with wire 0.9mm dia and 12.5 mm mesh conforming to IS:3150 shall be used.

5.5 Mortar

Unless otherwise specified cement & Fly ash (20% replacement ratio of cement with fly ash): - sand mortar shall be used. Cement mortar shall be prepared by mixing cement & fly ash (20% replacement ratio of cement with fly ash): and sand in specified proportions by volume. Sand shall be measured on the basis of its dry volume using gauge boxes. Suitable allowance in quantity shall be made to cater for the bulkage. Cement and fly ash shall preferably be measured by weight. For the purpose of determining the corresponding volume, one cubic metre of cement shall be taken to weigh 1440 Kg and one cubic metre of fly ash shall be taken to weigh 641 Kg (i.e. coal ash)

The mixing of mortars shall be done in mechanical mixer. However, depending on nature, magnitude and location of the work, the Project Engineer and Executing Agency may relax the condition of use of mechanical mixer and allow hand mixing.

Cement, fly ash and sand in the specified proportions shall be fed into the mixer and mixed dry thoroughly in the mixer. Water shall then be added gradually and the wet mixing continued for at least 3 minutes. Hand mixing shall be carried out on a clean, water tight platform. Only that quantity of mortar, which can be used within 30 minutes of its mixing, shall generally be prepared at a time. Care shall be taken, not to add more water than that which shall bring the mortar to the consistency of a stiff paste. IS: 2250 and IS:1661 shall be referred for ascertaining the quantity of water.

In case of cement mortar, the mortar that has stiffened because of evaporation of water from the mortar may be retempered under special circumstances, with the approval of the Project

Engineerand Executing Agency, by adding water as frequently as needed to restore the requirements of consistency but this retempering shall be permitted only upto one hour from the time of addition of cement.

Cement mortar shall be used as soon as possible after mixing and before it begins to set, preferably within half an hour from the time water is added to cement during mixing and in any case within one hour thereof.

Sweep mortar shall not be used.

5.6 Plastering

5.6.1 Mix proportion and plaster thickness

The mix proportion and thickness of plaster for various surfaces shall be as specified or shown in the drawings. Unless otherwise specified the following shall be adopted.

i.	Ceiling plaster	minimum 6mm thick cement mortar (1:4)
ii.	Plaster on external / rough face of masonry work or concrete surface	18mm thick, cement mortar* (1:6)
iii.	Plaster on plain face of masonry work or concrete surface.	12mm thick, cement mortar*(1:6)

*In case of special application like water proofing surface, base course of decorative finish etc., richer mix proportion not leaner than 1:4 shall be used.

5.6.2 Preparation of surface

The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surfaces shall be roughened by wire brushing, if it is not hard and by hecking when it is hard. In case of concrete surface, if a chemical retarder has been applied to the framework, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface.

Trimming of projections, wherever necessary shall be done to achieve an even surface. Ranking of joints in case of brickwork where necessary shall be done. The masonry shall be allowed to dry out for sufficient period before plastering.

For ceiling plaster, the concrete surface shall be pock marked with a pointed tool to ensure a proper key for the plaster.

The wall shall be dampened evenly and not soaked before application of plaster. If the surface becomes dry in spots, such areas shall be moistened again.

5.6.3 Sequence of plastering operations

For external plaster, the plastering operations shall be started from the top and carried downwards. To ensure even thickness and a true surface, plaster about 15 x 15 cm shall be first applied horizontally and vertically, at not more than 2m intervals over the entire surface to serve as gauges. The surfaces of those gauged areas shall be truly in the plane of the finished plastered surface. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready; the temporary supports of the ceiling resting on the wall have been removed.

The first undercoat shall then be applied to ceilings. After the ceiling plaster is completed and scaffolding for the same removed, the first undercoat on walls shall then be applied.

After a suitable time interval as detailed under application of plaster, the second coat (finishing coat) shall be applied, first to the ceiling and then to the walls.

Where corners and edges have to be rounded off, such rounding off shall be completed alongwith the finishing coat to prevent any joint marks.

5.6.4 Application of plaster

- **Wall / vertical surface plaster**

Unless otherwise stated, the plastering above 12mm thick shall be carried out in two coats only.

i) The backing or first coat

The backing coat shall be 10 to 12 mm thick and carried to the full length of the all or to natural breaking points like doors and windows. Before the rendering coat hardens, it shall be roughened to provide mechanical key for the second coat.

Masonry walls on which plaster is to be applied directly, shall be properly set and cured with the joints raked to a depth of at least 10 mm. The rendering coat shall be troweled hard and tight, forcing it into surface depressions to obtain a permanent bond.

On smooth concrete walls, the surface shall be roughened and the rendering coat shall be dashed on to ensure adequate bond. The dashing of the rendering coat shall be done using a strong whipping motion at right angles to the face of the wall, or it may be applied with a plaster machine or cement gun.

ii) Finishing coat

Before starting to apply the finishing coat, the surface of the backing coat shall be dampened evenly. The final plastered surface shall be cured and kept continuously damp for minimum 7 days.

- **Ceiling plaster**

Stage scaffolding shall be provided for ceiling plaster. This shall be independent of the walls. Projecting burrs of mortar formed due to gaps at the joints is shuttering shall be removed. The surface shall be scrubbed clean with wire brushes. In addition, the concrete surfaces shall be pock marked with a pointed tool at a spacing of not more than 50 mm centres, the pocks being made not less than 3 mm deep, to ensure a proper key for the plaster. The mortar shall be washed off and all surface cleaned of all oil, grease, etc. and well wetted before the plaster is applied.

Ceiling plaster shall not be commenced until the slab above has been furnished and centering has been removed. The average thickness of plaster shall not be less than 6 mm. The minimum thickness over any portion of the surface shall not be less than 5 mm.

The Surface shall be cured atleast twice a day for a minimum period of seven days.

- **Grooves in plaster**

Where specified in drawings, rectangular grooves 12 to 20 mm wide and 8 to 10 mm deep shall be provided in external plaster by means of timber battens or metal strips, fixed on plaster when plaster is still green. Battens or strips shall be carefully removed after initial set of plaster and broken edges and corners made good. All grooves shall be uniform in width and depth and shall be truly plumb and correctly aligned.

- **Drip course**

Drip course wherever indicated in the drawings shall be provided at the time of plastering to prevent travelling of water drops from the projections. Unless otherwise, specified, projected strip form drip course shall be provided.

- **Metal lathing**

The lathing shall be tightly stretched with the long way of the mesh across the supports before nailing. This shall be secured with 25 mm galvanised steel staples or nails at 200 mm centres, if the studding is of wood and with 0.90 mm iron tying wire, if the studding is of steel. Edges of lathing shall be lapped not less than 25 mm at the sides and ends and wired together with galvanised wire of diameter not less than 1.25 mm, every 100 mm between supports.

Before plastering, the surface of metal lathing shall be brushed over with thin cement slurry or given a protective coat of bitumen oil paint.

Plastering to lathing

It shall be carried out in two coats. Mortars for the first coat shall be of stiff consistency and applied as evenly as possible to give a uniform good cover to the lathing. It shall be allowed to dry until all shrinkage movement has ceased before the second coat is applied. Too much pressure shall not be used in applying plaster to lathing to guard against its deflection.

- **Rough cast finish**

The plaster base over which the rough cast finish is to be applied shall be done in general as per Clause no. 5.6.2 under sub head "Application of Plaster".

It shall be ensured that the base surface which is to receive rough cast mixture is in plastic state. Coarse aggregate of size 6 to 12 mm shall be used in the finishing coat. The grading and size shall vary according to the texture required.

The rough cast mix shall be wetted and shall be dashed on the plaster base in plastic state by hand scoop so that the mix gets well pitched into the plaster base. The mix shall again be dashed over the vacant spaces, if any, so that the finished surface represents a homogeneous surface of sand mixed with grovel. The surface shall be cured for a minimum period of 7 days.

5.6.5 Punning work

- **Lime punning or Neeru finish**

Materials

Lime putty: It shall be obtained by slaking lime with fresh water and sifting it. The slaking shall be done in accordance with IS: 1635.

Neeru: It shall be obtained by mixing lime putty and sand in equal proportion and chopped jute @ 4 Kg. per cu.m. of mortar. The mixture shall be properly ground to a fine paste between two stones.

Application of punning

Lime punning consists in finishing the interior with a thin coat (3 mm) of fat lime putty mixed with an equal amount of sand. Before actual use, putty shall be matured for 2 to 3 days.

The mortar for punning shall be applied in 3 mm thick layer just after the undercoat has hardened. It shall be finished to a smooth surface by means of a plaster's trowel.

The curing shall be started as soon as the punning has hardened but in any case not earlier than 24 hours after the punning has been completed. The punning shall be kept wet for a period of seven days.

- **Plaster of paris punning**

The plaster of paris (gypsum Anhydrous) conforming to IS: 2547 shall be used for plaster of paris punning. The plaster of paris shall be mixed with water to a workable consistency and shall be applied on the plastered surface and finished to a smooth surface by steel float. The finished surface shall be smooth and true to plane, slopes or curves as required. The nominal thickness of the punning shall be 2 mm.

- **Neat cement punning**

The plastered surface over which neat cement punning is to be done, shall be uniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that the whole surface is covered with neat cement coating. The quantity of cement applied shall be 1 kg. per sq. metre. Smooth finishing shall be completed with a float immediately and in no case later than half an hour of adding water to the cement.

5.6.6 Trueness of plastering system

The finished plastered surface shall not show any deviation more than 4 mm when checked with a straight edge of 2 metre length placed against the surface.

5.6.7 Thickness of plaster

The thickness of the plaster shall be measured exclusive of the thickness of key i.e. grooves or open joints in brickwork. The average thickness of plaster shall not be less than the specified thickness. The minimum thickness over any portion of the surface shall not be less than the specified thickness by more than 3 mm for plaster thickness above 12 mm and 1 mm for ceiling plaster. Extra thickness required in dubbing behind rounding of the corners at junctions of wall or in plastering of masonry cornices etc. shall be ignored.

5.6.8 Inspection and testing

a) The plastered surface shall be checked for following defects and the remedial measures for the same shall be adopted as per IS: 1661.

i) Blistering
ii) Bound failure or loss of adhesion
iii) Cracking
iv) Crazing
v) Efflorescence
vi) Grinning
vii) Irregularity of surface texture
viii) Popping or blowing
ix) Recurrent surface dampness
x) Softness or chalkiness

b) Trueness of the plaster shall be checked as per Clause no. 5.6.6
c) Thickness of the plaster shall be checked as per Clause no. 5.6.7

5.7 Pointing

The materials, preparation of mortar etc. shall be same as specified for cement plaster works. The mix proportion shall not be leaner than 1:3, unless otherwise specified. For all exposed brickwork or stone masonry work, self supporting double scaffolding, having two sets of vertical supports shall be provided so as to avoid openings in the wall.

5.7.1 Preparation of surface

The joints shall be raked out properly to such a depth that the minimum depth of the new mortar measured from either the sunken surfaces of the finished pointing or from the edge of the brick shall not be less than 10 mm. Dust and loose mortar shall be brushed out. Efflorescence, if any shall be removed by brushing and scraping. The surface shall then be thoroughly washed with water, cleaned and kept wet before commencement of pointing.

5.7.2 Application of mortar and finishing

The mortar shall be pressed into the raked out joints, with a pointing trowel, either flush, sunk or raked, according to the type of pointing required. The mortar shall not spread over the corner, edges or surface of the masonry. The pointing shall then be finished with the proper tool according to the type of pointing required.

5.7.3 Type of pointing

- **Ruled pointing**

Unless otherwise specified ruled pointing shall be adopted for all exposed brick/block masonry work However, for rubble masonry works, recessed pointing shall be adopted.

The mortar shall be pressed into the raked out joints and shall be finished off flush and then while the mortar is still green, a groove of shape and size as shown in drawings shall be formed by running a forming tool straight along the centre line of joints. This operation shall be continued till a smooth and hard surface is obtained. The vertical joints shall also be finished in a similar way. The vertical joints shall make true right angles at their junctions with the horizontal lines and shall not project beyond the same. For recessed pointing in rubble masonry recess shall be provided along the centre line of the joint profile.

- **Flush pointing**

The mortar shall be pressed into the joints and shall be finished off flush and level with the edges of the brick, tiles or stones so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and straight edge. Unless otherwise specified, flush pointing shall be adopted for drains and brick on edge paving.

- **Raised and cut pointing**

Raised and cut pointing shall project from the wall facing with its edges cut parallel so as to have a uniformly raised band about 6 mm raised and width 10 mm or more as directed. The superfluous mortar shall be cut off from the edges of the lines and the surface of the masonry shall also be cleaned off all mortar. Unless otherwise specified, raised and cut pointing shall be adopted for stone masonry pointing, and shall be provided along the Centre line of the joint profile.

5.7.4 Curing

The pointing shall be kept wet for 7 days.

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Sub section - C6: Technical specification for flooring and other allied works

6.1 Scope

This specification cover the supplying, installation, finishing, curing, testing, protecting, maintaining until handling over of various types of floor finishes and allied items of works as listed below :

6.1.1 In situ finishes

Integral finishes to concrete base.

Terrazzo finish.

Metallic hardener like “Ironite” finish.

6.1.2 Tile finishes

Terrazzo tile

Glazed tile

Rubber based vinyl tiles

6.1.3 Base

The base to receive the finish is covered under other relevant specifications.

6.1.4 Sequence

The commencement, scheduling and sequence of the finishing works shall be planned in details and must be specifically approved by the Project Engineer and Executing Agency, keeping in view the activities of other agencies working in the area. However, the Concessionaire shall remain fully responsible for all normal precautions and vigilance to prevent and damage whatsoever till handling over to the Executing Agency.

6.2 Installation

6.2.1 Special materials

Materials required for individual finishing items are specified under respective items. In general, all such materials shall be in accordance with the relevant IS Codes (Latest edition) where applicable. In all cases these materials shall be of the best indigenous quality unless specified otherwise.

The materials for finishing items must be procured from well-reputed specialized manufactures and on the basis of approval of samples by the Project Engineer and Executing Agency.The materials shall be ordered, procured and stored well in advance to avoid possible delays to the construction programme.

6.2.2 Workmanship

Workers specially experienced in particular items of finishing work shall carry out the work.Where such workers are not readily available, experienced supervisors recommended by the manufacturer shall be engaged with the prior permission of the Project Engineer and Executing Agency. In particular cases, Project Engineer and Executing Agency may desire the installation of finishing items by the manufacturer. This arrangement shall be made by the Concessionaire.

6.2.3 Preparation of the base surface

The surface to be treated shall be thoroughly examined by the Concessionaire.Any rectification necessary shall be brought to the notice of the Project Engineer and Executing Agency and his approval shall be obtained regarding the method and extent of such rectification required. For all types of flooring, skirting, dado and similar locations, the base to receive the finish shall be adequately roughened by chipping, raking of joints and thoroughly cleaning of all dirts, grease etc., using water hard brushes and detergent as required, unless otherwise directed by the manufacturer of any special finishing materials, or specifically indicated in this specification under the individual item. To prevent absorption of water from any wet finishing treatment, the base shall be thoroughly soaked with water and all excess water mopped up. However, the surface shall be dry where adhesive are used for fixing the finishes. The actual finishing work shall not commence until the Project Engineer and Executing Agency has approved the surface.

6.2.4 In-situ-finishes

- **Integral finishing to concrete base**

While the surface of the concrete laid in accordance with the specification for ''Cement Concrete'' has been fully compacted and levelled but the concrete is still green, a thick slurry made with neat cement shall be applied evenly and worked in with iron floats. When the slurry starts to set, it shall be pressed with iron floats, to achieve a firm, compact and smooth surface without any trowel marks or undulations. The finish shall be as thin as possible by using 2.2 kg. of cement per sq.m. of area. The surface shall not be subjected to any loads or abrasion for at least 21 days after laying.

When desired by the Project Engineer and Executing Agency, the surface while still 'green' shall be intended by pressing strings. The markings shall be of even depth, in straight lines and the panels shall be of uniform and symmetrical patterns.

- **Terrazzo finish: In-situ**

It shall consist of an underbed and a topping laid over an already laid and matured concrete base.

(a) Thickness

Unless otherwise specified, the total thickness of the finish shall be a minimum of 40 mm for horizontal surfaces and 25 mm for vertical surfaces of which the topping shall be not less than 10 mm. The topping shall be of uniform thickness but the underbed shall vary in thickness as necessary to provide any slopes. The finished vertical surface shall project 6 mm from the adjacent plaster or other finishes. The surface receiving the finish shall be cut back as necessary to accommodate the specified thickness. All junctions between vertical and horizontal surfaces shall be rounded neatly to a uniform radius of 25 mm.

(b) Mix

i) Underbed

The underbed for floors and similar horizontal surfaces shall consist of a mix of 1 part cement, 1 part sand and 3 parts sand by volume. The sand shall be coarse. The stone chips shall be 10 mm down well graded. Only sufficient water shall be added to provide a mortar of workable consistency.

ii) Topping

The mix for the topping shall be composed of cement, colour pigment, marble dust and marble chips. The proportions of the ingredients shall be such as to produce the terrazzo of the colour, texture and pattern approved by the Project Engineer and Executing Agency. The cement shall be white or grey or a mixture of the two in which

the pigment shall be added to achieve the desired colour. To 3 parts of these mixture, 1 part marble powder by volume shall be added and thoroughly mixed dry to 1 part of this mix, 1 to 1.5 parts of marble chips by volume shall be added and thoroughly mixed dry again.

The pigment must be stable and non-fading. It must be very finely ground. The marble powder shall l be from white marble and shall be finer than I.S. Sieve No. 30. The size of marble chips may be between 1 mm to 20 mm but at least 5 mm smaller than the topping thickness.

Sufficient quantity to cover each visible area shall be prepared in on lot to ensure uniform colour. Water to make it just workable shall be added to a batch immediately before it is laid. The size of batch shall be such that it can be laid before it starts setting.

(c) Laying

The underbed shall be laid in panels. The panels shall not the more than 5 sq.m. in area of which no side shall be more than 2.5 m long. For locations exposed to the sun, the maximum ate of a panel shall be 2.0 sq.m. The panels shall be laid in alternate bays or chequered board pattern. No panel shall be in contact with any other already laid until the later has contracted to the full extent.

Dividing strips made of aluminium 40 mm wide and 2 mm thick (min) shall be used for forming the panels. The strips shall exactly match the total depth of underbed plus topping.

After laying, the underbed shall be levelled, compacted and brought to proper grade with a screed or float. The topping shall be laid after about 24 hours while the underbed is still 'green' but firm enough to receive the topping. Slurry of the mixture of cement and pigment already made shall be spread evenly and brushed in just before laying and topping. The topping shall be rolled for horizontal areas and thrown and pressed for vertical areas of extract all superfluous cement and water and to achieve a compact dense mass fully bonded with the underbed. The surface of the topping shall be trowelled over, pressed and brought to a smooth dense surface showing at least 75% exposure of marble chips in an even pattern of distribution over the area covered.

(d) Curing

The surface shall be left for curing for 12 to 18 hours and then cured by allowing water to stand on the surface or by covering with wet sack for four days.

(e) Grinding and polishing

When the surface has sufficiently hardened it shall be watered and ground evenly with rapid cutting coarse grade (No. 60) grit blocks till the marble chips are exposed and the surface is smooth. Then the surface shall be thoroughly washed and cleaned. A grout already prepared from a mixture of cement and pigment shall be applied to fill up all pinholes. This surface shall be cured for 7 days by keeping it moist and then ground with fine grit block (No. 120). It shall again be cleaned with water, the grout reapplied to fill up any more pinholes that might have appeared and allowed be cured again for 5 days. Finally the surface shall be ground a third time with very fine grid blocks (No. 320) to achieve a smooth surface free from pinholes. Where a grinding machine cannot be used, hand grinding may be allowed where the first rubbing shall be with carborundum stone of coarse grade No. 60, the second rubbing with medium grade NO. 80 and the final rubbing and polishing with fine grade (No. 120). The surface shall be cleaned with water, dried and covered with oil free clean saw dust if directed by the Project Engineer and Executing Agency.

Just before handing over to the Executing Agency, the surface shall be dusted with oxalic acid at the rate of 0.33 gm per sq.m., water sprinkled on to it and finished by buffing with felt or hessian mops. The floor shall be cleaned with soft moist rag and dried, if desired by the Project Engineer and Executing Agency, wax polish shall be applied. However, all excess wax polish has to be wiped off and the surface left glossy but not slippery.

- **Metallic hardener like ''ironite'' finish**

It shall consist of an underbed and a topping (incorporating iron particles) laid over an already laid and matured concrete base.

(a) Thickness

Unless otherwise specified the total thickness of the finish shall be minimum of 52 mm for horizontal surfaces of which topping shall not be less than 12 mm. The topping shall be of uniform thickness, but the underbed shall vary in thickness to provide and slopes. Vertical surfaces shall project 6 mm from adjacent plaster or other finishes. The surface receiving the finish shall be cut back as necessary to accommodate the specified thickness.

(b) Material

The hardening compound shall be uniformly graded iron particles, free from non-ferrous metal impurities, oil, grease, sand, soluble alkaline compounds or other injurious materials. When desired by the Project Engineer and Executing Agency, actual samples shall be tested for impurities.

(c) Mix

i) The underbed for floors and similar horizontal surfaces and for vertical surfaces shall be prepared in accordance with Clause 6.2.4(b).

ii) The Proportion of the metallic hardener shall be as specified or as indicated by the manufacturer. However, in absence of any such direction 1 part metallic hardener shall be mixed dry with 4 parts cement, by weight. To this mixture 6 mm nominal size stone chips shall be added in proportion of 1 part cement (mixed with hardener) to 2 parts of stone chips by volume and uniformly mixed. A minimum quantity of water shall be added to make it workable.

(d) Laying

The concrete floor shall be laid in panels of 1m x 1m or as directed by the Project Engineer and Executing Agency. Alternate panels shall be laid on the same day followed by the other group of alternate panels the next day. The edges of the panels shall be supported either by wooden strips or flat angle iron pieces fixed securely in position. The underbed shall be laid to the required grade. The forms, if any, shall remain sufficiently projecting to take the topping. The surface of the underbed shall be roughened by wire brush as soon as possible.

The junction of floor and walls, floors and dado or skirting shall be rounded off as directed.

The Wooden strips or flat iron pieces shall be removed from their places before the succeeding alternate layers are laid.

The topping shall be laid while the concrete underbed is still 'very green' about 3 hours after laying of the later. The topping shall be of uniform thickness and even dense surface without trowel marks, pinholes, etc. The topping layer shall be pressed firmly, worked vigorously and quickly to secure full bond with the underbed. Immediately after the initial setting starts, the surface shall be finished smooth with a steel trowel.

The finished floor shall be cured for 7 days by keeping it wet.

6.2.5 Tile finishes

These shall included tiles, stone slabs and similar manufactured or natural items over an already, laid and matured base of concrete or masonry by means of an underbed or an adhesive layer.

- **Terrazzo tiles**

This tiles finish shall consist of precast terrazzo tiles laid over an underbed.

(a) Thickness

The total thickness including the underbed shall be a minimum of 40 mm for floors and 30 mm for walls unless otherwise specified.
The skirting, dado and similar vertical surfaces shall project 6 mm uniformly from the adjacent plaster or other wall finishes. The surface receiving the finish shall be cut back as necessary to accommodate the specified thickness.

(b) Tiles

The tiles shall be composed of an underbed and topping. The topping shall be of uniform thickness not less than 10 mm. The total thickness including the topping shall be as specified but not less than 20 mm. The underbed shall be composed of 1 part ordinary grey cement and 3 parts of stone ships by weight, mixed with water.

(c) Topping

The tiles for the topping shall be as specified under Clause 6.2.4 (b).

The tiles shall be cured at the shop for at least 14 days before delivery to the site. First grinding shall be given to the tiles in the shop before delivery. Tiles shall be packed properly to prevent damage during transit and storage. The tiles must be stored carefully to prevent staining by damp, rust, oil, grease or other chemicals.

Tiles made in each batch shall be kept and used separately so that the colour of each area of the floor shall be uniform. The manufacturer of the tiles shall also supply the grout mix containing cement and pigment in the exact proportions as used in finishing the tiles. The containers for the grout mix shall be suitably marked to ensure that they can be related to the particular type and batch of tiles.

(d) Mix-underbed

The underbed for floors and similar horizontal surfaces shall be 1 part lime putty; 1 part surkhi; 2 parts coarse sand by weight mixed with sufficient water to form a stiff workable mass. For skirting and dados and all vertical surfaces it shall be about 10 mm thick and composed of 1 part cement and 3 parts sand by weight.

(e) Laying

The underbed mortar shall be evenly spread and brought to the appropriate grade and consolidated to a smooth surface. The surface shall be roughened for better bond with the tiles. While the underbed is still fairly moist but firm, cement shall be hand dusted over it or cement slurry applied. The tiles shall immediately be placed in position and firmly pressed by wooden mallet on to the underbed so that the tile surface achieves the desired level. The tiles shall be soaked in water for about 10 minutes just before laying. The joints between tiles shall be as narrow as possible and not more than 1.5 mm wide.

Special care shall be taken to check the level, the surface and the lines of the joints frequently so that these are perfect.

When tiles are required to be cut to match the dimensions, they shall be sawn and edges rubbed smooth. The location of cut tiles shall be planned in advance and approved by the Project Engineer and Executing Agency.

At the junction of horizontal surface with vertical surfaces the tiles on the former shall enter at least 12 mm under the later.

After fixing, the floor shall be kept moist sand allowed to mature undisturbed for 7 days. Heavy traffic shall not be allowed.

If desired, diving strips as specified under Clause 6.2.4 (c) may be used for dividing the work into suitable panels.

(f) Grinding and polishing

The procedure shall be the same as specified in Clause 6.2.4 (e) but grinding shall not commence until 14 days have elapsed after laying of tiles.

- **Glazed tiles**

This finish shall be composed of glazed, earthen, coarse tiles with an underbed laid over a concrete or masonry base.

(a) Thickness

The total thickness shall be between 20 mm and 25 mm including the underbed.

The tile finish on vertical surface shall project 6 mm uniformly from the adjacent plaster or other wall finishes. The surfaces receiving the finish shall be cut as necessity to accommodate the specified thickness.

(b) Tiles glazed

The tiles shall be earthenware, covered with glazed, white or coloured, plain or with designs, of this size approved by the Project Engineer and Executing Agency and 6 mm thick. The tolerance shall be +/-1.5 mm for length and breadth and +/-0.5 mm for thickness. Specials like internal and external angles, beads, covers, cornices, corner pieces etc., shall match. The top surface of the tiles shall be glazed with an unfading stable gloss finish as desired by the Project Engineer and Executing Agency. The tiles shall be flat and to shape. The colour shall be uniform and a fractured section shall be fine grained in texture, dense and homogenous. The tiles shall be strong and free from flaws like cracks, chips craze, spacks, crawlings etc., and other imperfections. The edges and the underside of the tiles shall be completely free from glaze and the underside shall have ribs or indentations for better anchorage with the fixing mortar.

The coloured tiles, when supplied, shall preferably come from one batch to avoid difference in colour.

(c) Mix-underbed

This mix for the underbed shall consist of 1 part cement and 3 parts coarse sand by weight mixed with sufficient water or any other mix if specified.

(d) Laying

The under and tiling shall be laid as specified in Clause 6.2.4 (e).

(e) Finishing

The joints shall be cleaned and flush pointed with white cement and cured for 7 days by keeping it wet. The surface shall be cleaned with soap or suitable detergent, washed fully and wiped with soft cloth to prevent scratching immediately before handing over to the Executing Agency.

- **PVC tiles and rolls as per IS-3462-1986**

This covers PVC based vinyl Tiles and Rolls set with adhesive on to a concrete or masonry base. An underbed may be required to secure a desirable surface and grade.

Tiles

Unless otherwise mentioned the tiles shall be squares of approved dimensions. The tolerance of dimensions shall be +/-1.5 mm.

The tiles should be clandered laminated solid resilient unbreakable and flexible PVC Vinyl tiles in sizes of 305 mm x 305 mm x 3 mm thick. This shall have properties of a high wear resistance and resilience, designed to withstand high traffic and abrasion. All edges shall be cut true and square. The colour shall be non-fading and uniform in appearance, insoluble in water and resistant to alkalies cleaning agents and usual floor polishes.

Rubber based adhesive to be used for fixing tiles shall be Dunlop S-758 or Fevicol SR-998 or equivalent or a recommended by the manufacture. The adhesive shall have a short drying time and long life. Each container shall show the shelf life, date of manufacture and over age container shall be immediately removed from the site.

Rolls

It should be clandered laminated solid resilient unbreakable and flexible PVC Vinyl Flooring of size 1.5 mtrs. (Width) x 20 mtrs (Length) x 3 mm thick with inherent characteristics of wear resistance, dimensional stability, elegance etc.

Each packet of tile or roll shall be legibly and indelibly marked with the manufacturer's trade mark, thickness, size batch number and date of manufacture.

Tiles shall be delivered securely packed and store in clean, dry, well ventilated places.

Joint welding

This can be provided where ever the PVC Rolls are installed in order to avoid dust accumulation leakage of water and prevention from wear and tear in joints. In this, a PVC cord is put into the joint after making groves with machine and is welded with hot thermo welding machine.

(a) Mix Underbed

The underbed, where required to make up the specified thickness or to achieve the required grade of the right type of surface shall be composed of 1 part cement, 2 parts sand and 4 parts stone chips mixed with just sufficient water to make the mix workable.

(b) Laying

The tiles shall be stored in the room to be tied for atleast 24 hours to bring them to the same temperature as the room. In air conditioning spaces, the air conditioned space, the tiles shall be stored in the room to be tiled for at least 24 air conditioning shall be fully operational before the tiling is laid.

The surface to receive this finish shall be firm, even textured but not too smooth, without undulations and other deficiencies. If an underbed is laid, the same shall be cured for at least 7 days by keeping it moist and then is shall be fully dried.

The surface shall be thoroughly cleaned. All loose dust particles shall be removed. Oil and grease, if any shall be removed completely by the use of detergent.

The adhesive shall be applied uniformly to the fully dry surface in the desired thickness. The adhesive shall also be applied to the backs and edges of the tiles and surface shall be allowed to dry. The tiles shall then be placed neatly on the surface exactly to the approved pattern and set with a suitable tool. If the edges tend to curl up, weights are to be applied to keep the edges down. Special care shall be taken to avoid the formation of air pockets under the tiles. The joints shall be very fine. Any adhesive squeezed out through the joints shall be removed immediately.

(c) Finishing

Any adhesive marks on the surface shall be removed by wiping with a soft cloth soaked in solvent. The surface shall be cleaned with soft soap dried and then polished with approved type of polish just before handling over to the Executing Agency.

6.2.6 Ground floor with earth subgrade

For ground floors having an earthen subgrade, the floor finish shall consist of the following:

- **Compacted Earth**

i) 150 mm thick dry rubble soling on rammed earth. Rubble shall be hand packed as directed by the Project Engineer and Executing Agency. This shall be laid closely in position on the subgrade. All interstices between the stones shall be wedged in with smaller stones of suitable size well driven to ensure tight packing and complete filling of the interstices. The filling shall be carried out simultaneously with the placing in position of the rubble stone and shall not lag behind. The small interstices shall be filled with hard clean sand well watered and rammed.
ii) 100 mm thick sand cushion.
iii) PVC sub-base 75 mm thick, 1:4:8 mix.
iv) Floor finish with underbed as specified elsewhere.

- **Acceptance criteria**

The finish shall be checked specially for:

(a) Level, slope, plumb as the case may be (The surface of the finish shall be smooth and within +/-5 mm of the specified level or position. Local irregularities shall be within +/-3 mm when measured against a 3 metre straight edge. Abrupt changes of alignment shall not exceed 2 mm).
(b) Pattern and symmetry
(c) Alignment of joints, dividing strips, etc.
(d) Color, texture
(e) Surface finish
(f) Thickness of joints
(g) Details of edges, junctions, etc.
(h) Performance
(i) Precautions specified for durability

- **External wall treatment**

Madrasi danna, vineratex, granotex, etc.

Madrasi Danna, Vineratex, or Granotex finishes, where indicated shall be applied with materials as manufactured by the approved agencies. Stone finish, unless otherwise specifically mentioned, shall be used.

Samples of materials shall be submitted to the Project Engineer and Executing Agency to approval before the bulk purchase is made. The Concessionaire shall prepare test panels 1m x 1m in size and obtain approval from the Project Engineer and Executing Agency before commencing actual application of each type of finish.

The thickness of the finish shall not be less than 3 mm.

All surfaces to be finished shall be smooth and level and shall be thoroughly cleaned to remove any grease, dirt or loose particles and shall be free from surface water.

Extremely porous surfaces shall be pre-sealed with a thin coat of suitable primer. Previously painted surfaces shall be prepared by scrapping off all loose paints, washing with a suitable detergent and rinsing thoroughly with clean water. The finish shall be applied strictly in accordance with the manufacturer's instructions.

After application, the Concessionaire shall protect the surfaces against rain & sun until complete hardness of the finish is achieved without any extra cost to the Executing Agency. This type of work shall be carried out by specialized agencies only.

- **I.S. codes**

Some of the important applicable Indian Codes for this section are listed below. Latest editions of these codes shall be follows:

IS : 777 - Glazed earthenware tiles
IS : 1237 - Cement concrete flooring tiles
IS : 1433 - Code of practice for laying and finishing of cement concrete flooring tiles.
IS : 2114 - Code of practice for laying in situ terrazzo floor and finishes.

Sub section - C7
Technical specification for roof waterproofing insulation and allied works

Sub section - C7

Technical specification for roof waterproofing insulation and allied works

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Sub section - C7: Technical specification for roof waterproofing insulation and allied works

7.1 Scope

This specification covers furnishing, installing, finishing, curing, testing, protecting, maintaining till handing over of roof waterproofing, thermal insulation and allied works for buildings.

7.2 General requirements

The Concessionaire shall furnish all skilled and unskilled labour, plant, equipment, scaffolding, materials etc., required for complete execution of the work in accordance with the drawings and as described herein and / or as directed by the Project Engineer and Executing Agency.

The Concessionaire shall follow all safety requirements / rules during execution of the work.

The Concessionaire should have adequate experience in execution of such works. Alternatively, he should engage specialized agency for executing the work after obtaining approval from the Project Engineer and Executing Agency.

7.3 Codes and standards

All applicable standards, acts and codes of practice referred to shall be the latest editions including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the Concessionaire.

In case of any conflict between this specification and those (IS Standards, Codes etc.) more stringent shall prevail.

Some of the applicable Indian Standards, Codes, etc are referred to here below:

IS : 702	-	Specification for industrial bitumen
IS : 1203	-	Methods of testing tar and bitumen
IS : 1237	-	Specification for cement concrete flooring tiles
IS : 1322	-	Specification for bitumen felts for water proofing and damp proofing
IS : 1346	-	Code of practice for water proofing of roofs with bitumen felts
IS : 1580	-	Specification for bituminous compound for waterproofing and caulking purposes
IS : 3067	-	Code of practice for general design details and preparatory

		work for damp- proofing and water proofing of buildings
IS : 3384	-	Specification for bitumen primer for use in water proofing and damp- proofing
IS : 5916	-	Safety code for construction involving use of hot bituminous materials
IS : 6598	-	Specification for cellular concrete for thermal insulation

7.4 Materials

Bitumen felt for waterproofing treatment shall be Hessian base self - finished felts of specified type and grade conforming to IS: 1322

Bitumen primer shall conform to IS: 3384

The bonding material between the felt and the roof surface and between the successive felts shall be industrial blown type bitumen of specified grade (s) conforming to IS: 702

Cellular concrete (foam concrete) for insulation of roof shall be cast - in - situ of specified type conforming to IS: 6598

Materials for cement mortar under bedding and cement sand plaster over cellular concrete shall be as specified for plastering and allied works

Materials for cement concrete under bedding work shall be as specified for concrete and allied works

7.5 Layers of treatments

Various layers of treatment required for roof waterproofing and insulation work shall be as given below

However different layers which are to be actually provided for various areas shall be as shown in the drawings and directed by the Project Engineer and Executing Agency.

a) Grading underbed
b) Insulation (Cellular concrete)
c) Cement plaster and
d) Waterproofing treatment

7.6 Grading underbed

The underbed shall be laid to provide an ultimate run-off gradient not less than 1 in 100 or as specified in the drawing and as directed by the Project Engineer and Executing Agency. Upto an average thickness of 25mm the underbed shall usually be composed of cement and sand plaster. For higher thickness the underbed shall be made with cement concrete. However actual thickness and other details shall be as per approved drawings well defined cracks other than hair cracks in the roof structure shall be cut to 'V' section, cleaned and filled up flush with cement - sand slurry or with cold applied bituminous caulking compound conforming to IS: 1580. The roof surface shall be cured prior to the application of underbed.

The surface of roof and that part of the parapet, gutters, drain mouths etc., over which the underbed is to be applied shall be roughened and thoroughly cleaned of all foreign matter namely fungus, moss and dust, with wire brushing and dusting. Oil patches if any shall be removed with detergent. The surface shall be soaked with water and all excess water removed just before laying of the underbed.

The underbed shall not be laid under direct sunlight and shall be kept in shade immediately after laying, so as to avoid quick loss of water from the mix and separation from the roof surface. The underbed shall be cured under water twice a day for at least 7 days.

The underbed shall be finished to receive the waterproofing treatment directly or insulation as the case may be.

7.6.1 Cement mortar underbed

The grading plaster shall have an average thickness of 25mm. It shall consist of cement and sand in the ration of 1:4 by volume. The sand and cement shall be thoroughly mixed dry before water is added. Each batch of mix shall be consumed before the initial set starts.

The plaster shall be laid to proper grade in continuous operation and fully compacted. The surface shall be even and reasonably smooth. For detailed specification of plastering work Section -C5 shall be followed.

7.6.2 Cement concrete underbed

The concrete shall be used where the underbed is more than 25mm (average) thick. It shall consist of cement concrete 1:2:4 mix by volume (1 cement: 2 sand: 4 graded stone aggregate. 12.5 mm down stone nominal size). The aggregate shall be thoroughly mixed dry and minimum quantity of water shall be added to make the mix workable.

The mix shall be laid to proper grade in continuous operation and full consolidated. The surface shall be even and smooth. For detailed specification of concrete work Section C3 shall be followed.

7.7 Insulation

Insulation shall consist of cast-in-situ cellular concrete conforming to IS: 6598.

The cellular concrete of thickness 40 mm (minimum) shall be laid over the grading underbed over precast/cast-in-situ RCC roofs. The cellular concrete shall be laid directly over the surface of the roof without separate under bedding and the slope be provided by cellular concrete, wherever shown in the drawings and / or as directed by the Project Engineer and Executing Agency.

7.8 Cellular concrete

It shall consist of cast - in - situ light weight concrete formed by producing gas or air bubbles in cement slurry or a cement - sand slurry. The cement slurry or cement - sand slurry. The material shall be cured under natural conditions i.e., under ambient pressure and temperature by water. The material shall have a density of 320 kg/cu.m. crushing strength of minimum 2.5 kg/sq.m. value of thermal conductivity of maximum 0.7 mW/cm deg at 50 degree Centigrade mean temperature i.e., Type A.

Before start of the laying of the cellular concrete, samples shall be prepared at site got tested. The approval of the Project Engineer and Executing Agency shall necessarily be obtained.

Cellular concrete laid shall be sufficiently strong to take the usual workloads and standard loads expected on the roof. Any damaged portion shall be removed and replaced forthwith.

While laying the cellular concrete, samples from each batch of the mix shall be kept for test, if so desired by the Project Engineer and Executing Agency.

The approval of the Project Engineer and Executing Agency shall be taken before laying the layer of cement plaster over the cellular concrete.

7.9 Cement plaster

After laying the insulation (cellular concrete), the surface shall be regarded with cement plaster and made ready as required to receive the waterproofing treatment.

The top surface of insulation shall be finished, with 12mm (minimum) thick, or as specified in the item 1:4 cement - sand plaster by volume to get an even and smooth surface. The sand and cement shall be thoroughly mixed dry before water is added to it. Each batch of the mix shall be consumed before the initial set starts. It shall be cured twice a day for at least seven days before laying the waterproofing course. For detailed specification of plastering work MODULE / shall be followed.

7.10 Waterproofing treatment

7.11.1 Preparatory work

IS: 3067 shall be followed as a general guidance for preparatory work.

Waterproofing treatment shall be carried out into the drain pipe or outlets by at least 100mm. The waterproofing treatment laid on the surface shall overlap the upper age of the waterproofing treatment in the drain outlets by at least 100 mm.
Drain outlets shall be suitably placed with respect to the roof gradient to ensure rapid drainage and prevent local accumulation of water on the roof surface. Masonry drain mouths shall be widened two and a half times the diameter of the drain and rounded with cement mortar.

Forecast iron outlets a groove shall be cut all round to tuck the treatment.

When a pipe passes through a roof on which waterproofing treatment is to be laid, a cement concrete angle - fillet shall be built round it and the waterproofing treatment taken over the fillet.

In case of parapet walls above 450mm in height, for tucking in the waterproofing treatment a horizontal groove at a minimum height of 150mm above roof level shall be left in the vertical face at the time of construction. This groove shall be 75mm wide and 65mm deep. The horizontal face of the groove shall be shaped with cement mortar 1:4.

In case of low parapets, where the height does not exceed 450mm, no groove shall be provided and the waterproofing treatment shall be carried right over the top.

In the case of existing RCC and stone walls, cutting the chase for tucking in the waterproofing treatment is not recommended.

At the junction between the roof and the vertical face of the parapet wall, a fillet 75mm (min) in radius shall be constructed.

At the drain mouths, the fillet shall be suitably cut back and rounded off for easy application of the waterproofing treatment and easy flow of water.

Outlets at every low dividing wall, about less than 300mm in height, shall be cut open to full depth and the bottom and sides shall be rendered smooth and corners rounded off for easy application of waterproofing treatment.

The surface to be coated with bitumen primer shall be cleaned with wire brushes and cotton or gunny cloth. All loose materials shall be removed and surface shall be further cleaned with a piece of cloth lightly soaked in kerosene oil. The surface shall be painted when it is completely dry.

Bitumen primer (priming coat) shall be used prior to the application of the first mopping coat of hot molten bitumen to promote the bonding of the bitumen with the surface. The bitumen primer shall be liquid bitumen of low viscosity which shall penetrate into the prepared surface upon application. It shall be free from water and it shall conform to IS: 3384. It shall preferably be made from the same grade of bitumen as used in bonding.

The bitumen primer shall be brushed over the surfaces and allowed to dry. Generally, a quantity of 0.27 litres per sq.m. (Minimum) is recommended.

The bonding material between the felt and the roof surface and between the successive felts shall be industrial blown type bitumen of Grade 85/25 or 90/15 conforming to IS: 702 to withstand local conditions of prevailing temperature and gradient of roof surface. For top dressing bitumen used shall be industrial blown type of allowable penetration not more than 40 when tested in accordance with IS : 1203.

For vertical surface upto 1 meter height blown type bitumen of grade 85/25 or 90/15 and above 1 metre height grade 115/25 shall be used.

Bitumen tar felt of type 3, grade 1 conforming to IS: 1322 shall be used for roof waterproofing and the treatment shall be done as per IS: 1346.

The Concessionaire shall state the source from where he proposes to procure the materials. The Concessionaire shall satisfy the Project Engineer and Executing Agency that the bonding material proposed to be used is suitable for the particular job. Test certificates for the bonding material shall also be submitted and samples, if desired by the Project Engineer and Executing Agency shall be provided for confirmatory tests. Sample of the self - finished felt shall be submitted in advance to the Project Engineer and Executing Agency along with test certificates for his review. Samples of stone grit shall be submitted if instructed by the Project Engineer and Executing Agency. The stone grit shall be 6mm and down size and shall be devoid of fine sand. Test certificates shall be furnished with each batch of bulk supply for Project Engineer and Executing Agency's approval.

7.11.2 Course of treatment

The waterproofing treatment shall consist of a seven course treatment. Each layer of bonding materials, self - finished bitumen felt or stone grit is counted as one course.

Brief description of various courses of treatment shall be as follows:
Heavy treatment - seven courses for severe conditions:

1 Primer conforming to IS : 3384 at the rate of 0.27 litre / sq.m minimum
2 Hot applied bitumen at the rate of 1.2 kg/sq.m minimum
3 Hessian - base self finished felt, Type - 3, Grade 1
4 Hot applied bitumen at the rate of 1.2 kg/sq.m minimum
5 Hessian - base self finished felt, Type 3, Grade 1
6 Hot applied bitumen at the rate of 1.2 kg/sq.m, minimum and
7 Grit, devoid of fine sand, at the rate of 0.006 cu.m/sq.m

7.11.3 Surface finish

When the roof surface is subjected to foot traffic or used as a working area, a cement mortar (1:4) shall be applied over the top most layer of roofing treatment. Over this, a layer of cement concrete flooring tiles conforming to IS: 1237 shall be provided in place of stone grit and cement painted. The tiles shall be laid as per IS: 1443. Alternatively, a screening of proportion of 1:4 of cement and sand 45mm thick can be laid over the roof treatment wherever shown in the drawing and marked off into square of 600mm made with expansion joints provided at a distance of 3

metre which shall be properly caulked with bituminous sealing compound conforming to grade A of IS: 1834.

Waterproofing treatment shall be carefully carried out from the time the surface is prepared to receive the felt to the finishing of the treated surface. Special attention and strict supervision shall be necessarily paid to overlapping of joints in felts, treatment around drainage openings in the roof and treatment of the parapet walls. The sticking of the felt to the roof by means of hot bitumen also requires skill. In order to achieve this, the waterproofing treatment shall be laid by a specialist firm with long experience in this particular line. The surface to receive the waterproofing treatment must be cleaned of all foreign matter, namely fungus, moss, dust etc by wire brushing and dusting and dried satisfactorily and the approval of the Project Engineer and Executing Agency taken before starting the work. If any existing top course shall be completely removed and all damaged felts or other defects repaired. The Project Engineer and Executing Agency may instruct the Concessionaire to lay part of the stipulated course at the first instant to be followed later on with the balance courses. This interim finish shall be done with a course of hot applied bitumen. While doing the balance, hot bitumen shall be applied again to start with after repair of all damages to the already laid courses.

The bitumen bonding material of specified grade shall be prepared by heating to the correct working temperature specified by the manufacturer and maintained at that temperature. It shall then be conveyed to the point of work in a bucket or pouring can, poured and spread on the surface in a uniform continuous coating at the specified rate. For very large roofs, use of a spray machine is recommended to secure even spreading. The surface shall be carefully examined for gaps or pin holes, which on location shall be carefully filled up with the bitumen. Bitumen shall be applied carefully so that the exposed faces are not disfigured by splashing or spattering the bitumen all over.

The coat of bitumen shall be continued at least 15cm along the vertical surfaces joining the roof. In case of parapet walls, it shall be continued upto the drip course.

The self finished felt shall be cut to the required lengths, brushed clean of dusting material and laid out flat on the roof and allowed to soften, to eliminate curls and subsequent stretching. The felt shall normally be laid in lengths at right angles to the direction of run-off gradient, commencing at the lowest level and working upto the crest so that the over-laps of the adjacent layers of felt shall offer minimum obstruction to the flow off of water. The felt shall not be laid in single piece of very long lengths as they are likely to shrink. Six to eight metres are suitable lengths. Each length of felt prepared for laying as described above shall be laid in position and rolled up for a distance of half its length. The hot bonding material heated to correct working temperature as specified by the manufacturer, shall be poured on to the roof across the full width of the rolled felt as the latter is steadily unrolled and pressed down. The excess bonding material which squeezes out at the ends shall be removed as the laying proceeds. The pouring shall be so

regulated that the correct weight of bonding, material per unit area is spread uniformly over. When the first half of the strip of felt has been bonded to the roof, the other half shall be rolled up and then unrolled on to the hot bonding material in the same way. Subsequently strips shall also be laid in the same manner. Each strip shall overlap the preceeding one by at least 75mm at the sides of strip of felt and at least 100mm at the ends. All overlaps shall be firmly bonded with hot bitumen. Streaks and trailings of bitumen near edges of laps shall be levelled by heating the overlaps with a blow lamp and leveling down unevenness.

In a seven course treatment the fourth and sixth layers of bonding material and the fifth layer of self-finished felt shall be laid in the manner already described, taking care that the joints are staggered with those in the layer beneath it i.e., third layer. The sixth layer shall be carried out after the flashing is done.
Immediately after application of top layer of bitumen stone grit shall be evenly spread and levelled over the surface when the bitumen is still hot.

After completion, the surface shall be cleaned taking care that loose gravels, felt cuttings, etc. do not find their way into rain down corners.

The surface level shall be such as to allow quick draining of rains without leaving any pool anywhere. The finishing course shall be fully secured and shall have an even density. There shall not be any bubble formation or crushed or squeezed insulation or underbed.

For heat reflecting surface or for aesthetic reasons bitumen based aluminium paints or coloured bituminous emulsions may be used as directed by the Project Engineer and Executing Agency.

7.11.4 Flashing

Felt shall be laid as flashings in widths wherever junctions of vertical and horizontal structures (i.e., roof surface and parapet wall or any other vertical structure) occur with minimum overlap of 100mm. The lower layer of flashing felt in seven course treatment shall overlap the roof waterproofing by not less than 200mm while upper layer shall overlap the roofing felt by 100mm. On the vertical and sloping faces last course of flashing should not be of stone grit or pea-sized gravel, but it shall be replaced by providing two coats of bituminous paint at the minimum rate of 0.1 litres/sq.m per coat or a single coat of bituminous emulsion at the rate of 0.5 litre/sq.m may be applied.

The lower edge of flashing shall overlap the felt laid on flat portion of the roof and the upper edge of the flashing shall be tucked into the horizontal groove 75mm thick wide 65mm deep, provided at a minimum height of 150mm from top of the roof surface. The flashing treatment shall be firmly held in place in the grooves with wooden wedges at intervals and the grooves shall be

filled with cement mortar 1:4 (1 cement: 4 coarse sand) or cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 6 mm nominal size) and surface of flashing.

After the top flashing felt layer has been laid, the penultimate layer of bonding material shall be applied over the roofing felt and horizontal overlaps and vertical and sloping surfaces of flashing at the specified rate. Then grit or gravel shall be spread uniformly over the hot bonding material on the horizontal surface and pressed into it with a wooden roller.

Where waterproofing treatment is required to be isolated from the roof structure, bitumen saturated felt shall be spread over the roof surface and tucked into the flashing grooves. To keep these felts free from the structure, no bonding material shall be used below these felts.

7.11.5 Fillets

All along the junction of the roof surfaces and vertical walls cement mortar (1:4) fillet shall be provided. The fillets shall be 150mm x 150mm in size unless otherwise shown on drawing or instructed by the Project Engineer and Executing Agency. The shape of the fillet shall slightly be concave.

Cast-in-situ cement concrete (1:2:4 with 12.5mm down aggregate) or cement mortar 1:4 shall be used to provide fillet.

7.11.6 Expansion joints

Expansion joints shall be designed to suit the requirements of each roof. Expansion joint coverings shall be of bitumen felt. In this case, a minimum of two layers of bitumen felt, Type 2, Grade 2 as specified in IS: 1322 shall be used with top dressing gravel or other suitable finish.

7.11 Acceptance criteria

The surface level shall be such as to allow quick draining of rains without leaving any pool anywhere. The finishing course shall be fully secured and shall have an even density. There shall not be any bubble formation or crushed or squeezed insulation or underbed.

Sub section - C8
Technical specification for painting, white washing, etc.

Sub section - C8

Technical specification for painting, white washing, etc.

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Sub section - C8: Technical specification for painting, white washing, etc.

8.1 Scope

This specification covers painting, white washing, etc. of both interior and exterior surfaces of masonry, concrete, plastering, plaster of Paris, rain water down comers, floor and roof drains, waste and service water pipes and other items, as directed by the Project Engineer and Executing Agency.

If the surface to be finished cannot be put in a suitable condition for painting by customary preparatory method, the Concessionaire shall notify the Project Engineer and Executing Agency in writing and assume responsibility for any rectification and unsatisfactory finishing that might result.

Before commencing painting, the Concessionaire shall obtain the approval of the Project Engineer and Executing Agency in writing regarding the scheduling of work to minimise damage, disfiguration or staining by other trades. He shall also undertake necessary precautions to prevent damage, disfiguration or staining of other trades or other installations.

8.2 Materials

Materials shall be the highest grade products of well known approved manufacturers and shall be delivered to the site in original sealed containers, bearing brand name, manufacturer's name and colour shade, with labels intact and seals unbroken. All materials shall be subject to inspection and approval by the Project Engineer and Executing Agency. It is desired that materials of one manufacturer only shall be used as far as possible and paint of one shade be obtained from the same manufacturing batch. All paints shall be subjected to analysis from random samples taken at site from the painter's bucket, if so desired by the Project Engineer and Executing Agency.

All primer coats shall be compatible to the material of the surface to be finished as well as to the finishing coats to be applied.

All unspecified materials shall be of the highest quality available and shall conform to the latest IS standards. All such materials shall be made by reputable recognised manufacturers and shall be approved by the Project Engineer and Executing Agency.

All colours shall be as per the painting schedule and tinting and matching shall be done to the satisfaction of the Project Engineer and Executing Agency. In such cases, where samples are required, they shall be executed in advance with the specified materials for the approval of the Project Engineer and Executing Agency.

8.2.1 Synthetic enamel paint

Shall be made from synthetic resins and drying oil with rutile titanium dioxide and other selected pigments to give a smooth, hard, durable and glossy finish to all exterior and interior surfaces. White and pastel shades shall resist yellowing and darkening with ageing, The paint shall conform to IS:2932 and IS:2933.

8.2.2 Waterproof cement paint

Shall be made from best quality white cement and lime resistant colours with accelerators, waterproofing agents and fungicides. The paint shall conform to IS:5410.

8.2.3 Dry distemper

Dry distemper of required colour conforming to IS: 427 of approved brand and manufacturer shall be used. The primer where used shall be cement primer or distemper primer. These shall be of same manufacturer as that of distemper.

8.2.4 White washing

White washing shall be done from pure shell lime or fat lime, or a mixture of both as instructed by the Project Engineer and Executing Agency and shall conform to IS:712 (latest edition) Samples of lime shall be submitted to the Project Engineer and Executing Agency for approval and lime as per the approved samples shall be brought to site in an unslaked condition. After slaking, it shall be allowed to remain in a tank of water for two days and then stirred up with a pole, until it attains the consistency of thin cream. 100 grams of gum to 6 litres of white wash water and a little quantity of indigo or synthetic ultramarine blue shall be added to the lime.

8.2.5 Colour wash

Shall be done with mineral colours not affected by lime added to white wash. No colour wash shall be done until a sample of the colour wash to the required tint or shade has been approved by the Project Engineer and Executing Agency. The colour shall be of even tint or shade over the whole surface. If it is blotchy or otherwise badly applied, it shall be redone by the Concessionaire at his own cost.

8.2.6 Acrylic emulsion paint

Shall be water based acrylic copolymer emulsion with rutile titanium dioxide and other selected pigment and fungicide. It shall exhibit excellent adhesion to plaster and cement surface and shall resist deterioration by alkali salts. The paint film shall allow the moisture in wall to escape

without pelling or blistering the paint. After it is dried, the paint should be able to withstand washing with mild soap and water without any deterioration in colour or without showing flaking, blistering or peeling.

8.2.7 Oil bound distemper

Oil bound distemper (IS:428-1969) of approved brand and manufacture shall be used. The primer where used be cement primer or distemper primer. These shall be of same manufacturer as that of distemper. The distemper shall be diluted with prescribed thinner in a manner recommended by the manufacturer. Only sufficient quality of distemper required for a day's work shall be prepared.

8.2.8 Chemical resistant paint

Chemical resistant paint as per IS:157 of approved brand and manufacture shall be used. Primer coat to be used shall be as per manufacturer's specifications.

8.2.9 Fire resistant paint

Fire resisting paint (silicate type) shall be as per IS:162 and of approved brand and manufacture. Primer to be used shall be as per manufacturer's specifications.

8.2.10 Oil resistant paint

Oil resistant paint shall be as per IS:161 and of approved brand and manufacturer. Primer coat shall be as per manufacturer's specifications.

8.3 Storage

The Concessionaire shall arrange for safe and proper storage of all materials and tools. Paints shall be kept covered at all times and mixing shall be done in suitable containers. All necessary precautions shall be taken by the Concessionaire to prevent fire.

8.4 Preparation of surface

Before starting the work, the Concessionaire shall obtain the approval of the Project Engineer and Executing Agency regarding the soundness and readiness of the surface to be painted on.

8.4.1 Masonry, concrete and plastered surface

The surface shall be free from all oil, grease, efflorescence, mildew, loose paint or other foreign and loose materials. Masonry cracks shall be cleaned out and patch filled with mortar similar to

the original surface and uniformly textured. Where this type of resurfacing may lead to the finishing paint being different in shade from the original surfaces, the resurfaced area shall be treated with a minimum of one coat of cement primer and should be continued to the surrounding area for a distance of atleast 100mm.

Surfaces with mildew or efflorescence shall be treated as below:

a. Mildew

All mildewed surfaces shall be treated with an approved fungicide such as ammonical wash consisting of 7 gm. of copper carbonate dissolved in 80 ml liquor and diluted to 1 liter with water or 2.5 percent magnesium silica fluoride solution and allowed to dry thoroughly before paint is applied.

b. Efflorescence:

All efflorescence shall be removed by scrubbing the affected surface with a solution of mariatic acid and in water (1:6 to 1:8) and then washed fully with clear water and allowed to dry thoroughly.

8.4.2 Metal

All metal surfaces shall be absolutely clean, dry and free from wax, grease and soap films. All steel and iron surfaces in addition shall be free from rust. All galvanised iron surfaces shall be pretreated with a compatible primer according to the manufacturer's direction. Any abrasion in shop coat shall be touched up with the same quality of paint as the original coat.

8.5 Application

8.5.1 General

The method of application shall be as recommended by the manufacturer. In case of selection of a special shade and colour (not available in standard shades) the Concessionaire shall prepare test panels in different shades of minimum size 1 metre square as instructed by the Project Engineer and Executing Agency and obtain his approval prior to applications of the finishing paints.

Proper tools and implements shall be used. Scaffolding if used shall be independent of the surface to be painted to avoid shade differences of the freshly repaired anchor holes. Painting shall be done by skilled labour in a workman like manner. All materials shall be evenly applied, so as to be free of sags, runs, crawls or other defects. All coats shall be of proper consistency. In case of

application by brush, no brush marks shall be visible. The brushes shall be clean and in good condition before application of the paint.

All priming undercoats for painting shall be applied by brush only. Roller and spray equipment, etc., shall not be used.

No work shall be done under conditions that are unsuitable for the production of good results. No painting shall be done when plastering is in progress or is drying. Paint which seals the surfaces to moisture shall be applied only after the moisture on and below the surface has dried out.

All coats shall be thoroughly dry before being sand papered or before the succeeding coat is applied. Coats of painting as specified are intended to cover surfaces perfectly. In case the surface is not covered properly by applying the specified number of coats, further coats shall be applied by the Concessionaire when so directed by the Project Engineer and Executing Agency.

All primers and under coats shall be tinted to approximate the colour of the finishing coats. Finished coats shall be of exact colour and shade as approved samples and all finish shall be uniform in colour and texture. All parts of mouldings and ornaments shall be left clean and true to finish.

8.5.2 Synthetic enamel paint

Shall be applied on properly primed surface. Subsequent coat shall not be applied till the previous coat is dry. The previous coat shall be lightly sand papered for better adhesion of subsequent coats.

8.5.3 Waterproof cement paint

Surface to be coated with cement paint shall be washed and brushed down. As soon as the moisture has disappeared, the surface shall be given one coat of paint. Care shall be taken so that the paint does not dry out too rapidly. After 4 to 6 hours, the water shall be sprinkled over the surface to assist curing and prevent cracking. After the first, coat has dried (24 to 48 hours), the second coat shall be applied.

In a similar manner the finished surface shall be kept moist by occasional sprinkling with water for seven days after painting.

8.5.4 Dry distemper

New plastered surface shall be allowed to dry for atleast two months. New lime or lime plastered surface shall be washed with a solution of 1 part of vinegar to 12 parts water or 1:50 sulphuric acid solution and left for 24 hours after which the wall shall be thoroughly washed with clean water. For cement plastered surface, the surface shall be washed with a solution of 100 gms of zinc sulphate to 1 litre of water and then allowed to dry.

Dry distempering shall be done as per manufacturer's instruction. In applying the distempers, the brush should first be applied horizontally and immediately crossed off perpendicularly. Brushing shall not be continued too long as otherwise brush marks may result.

8.5.5 White washing

The surface where white washing is to be applied shall be cleaned of all loose material and dirt. All holes and irregularities of the surfaces shall be filled up with lime putty and shall be allowed to dry out before application of the lime solution.

One coat of white wash shall consist of one stroke from top downwards, another from bottom upwards over the first stroke and another from left to right and right to left before the vertical stroke dries out. A second coat shall be applied and similarly a third coat shall be applied whenever the Project Engineer and Executing Agency feels that more than two coats are required and the Concessionaire shall do so without any extra cost to the Executing Agency. No brush marks shall show on the finished surface.

8.5.6 Colour wash

For new work, the priming coat shall be of white wash with lime or with whiting. Two or more coats shall then be applied on the entire surface till it represents a smooth and uniform finish. The finished dry surface shall not be powdery and shall not readily come off on hand when rubbed. Indigo or synthetic ultramarine blue shall, however, not be added.

8.5.7 Acrylic emulsion paint

Lime gauged cement plastered surfaces shall not be painted for at least one month after plastering. All sample patch shall be painted to check alkali reaction if so desired by the Project Engineer and Executing Agency. Painting shall be strictly as per manufacturer's specification.

8.5.8 Oil bound distemper

Any unevenness in surface shall be made good by applying putty. The patched surface shall be allowed to dry thoroughly before the coat of distemper is applied. One coat of distemper properly diluted with thinner as specified by the manufacturer shall be applied by brush in horizontal

strokes followed immediately by vertical ones which together will constitute one coat. Two or more coats of distemper as found necessary shall be applied to obtain even shade.

8.5.9 Chemical resistant, fire resistant and oil resistant paints

In general, method of application of these paints shall be strictly as per manufacturer's specification.

8.6 Painting of iron work

Paint to use for various items of work shall be of best quality and shall be obtained ready mixed in sealed containers from approved manufacturer. The Concessionaire shall obtain the Project Engineer and Executing Agency's approval for the make and colour of the paint he proposes to use.

All surfaces shall be thoroughly cleaned of all dirt, loose particles and rust and approved prior to application of paint. Workmanship shall conform to IS:1477 (Part I & II)

Specified number of coats shall be applied and atleast 24 hours shall elapse between the application of successive coats. No painting shall be carried out on exterior work in wet weather or on surfaces which are not entirely dry.

Painting rate shall include all necessary scaffolding, cradles and plant.

8.7 Protection

Furniture and other movable objects, equipments, fittings and accessories shall be moved, protected and replaced upon completion of the painting work. All stationary items of equipments shall be well covered so that no paint can fall on them. Work finished by other agencies shall be well protected. All protection shall be as per instruction of the Project Engineer and Executing Agency.

8.8 Cleaning up

The Concessionaire shall upon completion of painting etc. remove all marks and make good surfaces, where paint has spilled, splashed or splattered, including all equipments, fixtures, glass furniture, fittings, etc. to the satisfaction of the Project Engineer and Executing Agency.

8.9 Acceptance criteria

All painted surfaces shall be uniform and pleasing the appearance.

The colour, texture etc. shall match exactly with approved samples.

All stains, splashes and splatters of paint shall be removed from surrounding surfaces.

8.10 Painting of structural steel / miscellaneous steel

8.10.1 Scope

The specification covers painting of the structural/ miscellaneous steel supplied and erected either by other agencies or by the Concessionaire for work under the scope of this contract. One shop coat of red oxide zinc chromate primer including necessary touching up has already been completed by the concerned agency. One coat of red oxide zinc chromate primer followed by a coat of undercoating and two or more finishing coats of synthetic enamel paint as described hereunder are only required to be provided under the item for painting structural / miscellaneous steel.

8.10.2 Type of structures to be painted

Painting shall be done on all exposed surfaces (including undersides wherever exposed) of various structural steel members like columns, trusses, beams, roof girders, oil tanks, trestles, bracings, crane girders, chequered plates, gratings, brackets, base plates etc. in the plant as directed by the Project Engineer and Executing Agency. It should be clearly noted that all structures are already erected / placed in position or are under erection, hence the quoted rate by Concessionaire shall account for all aspects involved in painting keeping in view the heights, available access to members etc. It is advised that the Concessionaire should visit the site and get himself acquainted with the nature of work completely including the extent and type of scaffoldings etc, required, before quoting his rate.

8.10.3 Material

Paint shall be synthetic enamel paint conforming to IS:2932 of approved colour and brand.

8.10.4 Painting

In general, painting work shall be in accordance with IS:1477 (Part I & II).

Surface of steel work to be painted shall be thoroughly cleaned of all grease, oil dirt, rust, foreign matter like cement splashings, etc. by suitable solvent and mild rubbing with abrasive paper/ hand

scrapping to the full satisfaction of the Project Engineer and Executing Agency. Clearing with solvents/ scraping shall be limited to the affected areas only.

In cases where the existing primer is removed while cleaning the surface as detailed in 12.4.2, damaged portions shall be provided with a coat of wash or etching primer on suitable chemical pretreatment solutions and another coat of red oxide Zinc chromate primer. The payment for red oxide primer will be made as per relevant item of Schedule of items.

After the surface is prepared in a manner described above, the primer coat shall be dry cut without scratching or in any way damaging the primer coats and clean the surfaces from dust.

Over this dry surface apply an optimum coat of undercoating (synthetic enamel paint) by brush or spray with minimum brush marks. Allow the film to dry hard, wet rub, cutting down to a smooth finish (ensuring that at no place the undercoat is completely removed) Allow the water to evaporate.

The total dry film thickness of each coat shall be not less than 25 microns.

The paint shall be applied by brushing / spraying. Spraying shall be adopted with prior approval of Project Engineer and Executing Agency generally on large surface areas. Paints shall be stirred frequently to keep the pigment in suspension. Paint shall be ready mixed in original sealed containers as packed by the paint manufacturers and no thinners shall be permitted. No painting shall be done in frosty/ foggy / rainy weather or when humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is 5 deg or lower.

Concessionaire shall provide and use sufficient number of drop clothes, covers, tarpaulins and other screens to protect adjacent surfaces and shall remove all splatter and stains from such surfaces. The Concessionaire shall also protect his own work.

Any and all damage to adjacent work or any part of the premises due to painting carelessness or accidental performance of the Concessionaire shall be repaired or made good at the Concessionaire's expense.
Painting shall be discontinued when exposed to rain and dust storm and shall not commence until the surfaces are perfectly dry and clean. Wherever practicable. Surfaces shall be painted when in shade or when temperature is falling.

8.10.5 Cleaning up

The Concessionaire upon completion of painting etc. shall remove all marks and make surfaces good, where paint has been spilled, splashed or splattered, including all equipment, fixtures, glass, furniture, fittings, etc. to the satisfaction of the Project Engineer and Executing Agency.

8.10.6 Acceptance criteria

a. All painted surfaces shall be uniform and pleasing in appearance.
b. The colour, texture, etc. shall match exactly with the approved samples.
c. All stains, splashes and splatters of paints shall be removed from surrounding surfaces.

Sub section - C9

Technical specification for fabrication and erection of structural steel works

Sub section - C9

Technical specification for fabrication and erection of structural steel works

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Sub section - C9: Technical specification for fabrication and erection of structural steel works

9.1 Scope

This section of specification deals with the technical specifications needed for the fabrication and erection of structural steel works coming under the scope of this contract. All connections shall be of welded type unless specifically approved by the Project Engineer and Executing Agency otherwise.

The specification cover providing, fabrication, erection, alignment etc. complete including preparation of fabrication drawings of structural steel work involving rolled sections, pipes and built up sections fabricated out of plates, rolled section and or combination of plates and rolled sections in columns, beams, gantry girders, roof trusses, portals, purlins, space frames, shear connector, monorails, galleries, wall beams, brackets, stub columns bracings, trestles, base plates, chequered plate floorings, gratings with binders, walk way platform, ladders, stairs complete with stringers, treads, landings, hand rails posts, erection bolts and nuts, permanent bolts and nuts, dismantling, modification and re-erection of fabricated/erected steel, etc. including all sampling and testing as given in Annexure-B for the areas of work as specified above.

9.2 General requirements

The Concessionaire shall furnish all structural steel material, labour, plant, equipment, consumables, scaffolding, tools, tackles, materials and everything that is required for complete executions of the work on schedule in accordance with the drawings and as described herein and/or as directed by the Project Engineer and Executing Agency.

9.2.1 Reference points and bench marks

The Concessionaire shall make his own arrangements for locating the coordinates and positions of all work and reduced level (RL) at these locations based on two reference grid lines and one bench mark which shall be furnished by the Executing Agency. The Concessionaire has to provide at site all the required survey instruments to the satisfaction of the Project Engineer and Executing Agency so that the work can be carried out accurately according to the specifications and drawings.

9.2.2 Safe working

The Concessionaire shall strictly follow, at all stages of fabrication, transportation and erection of steel structures, the stipulations contained in the Indian standard safety code for erection of structural steel work IS:7205 and the provisions of the safety rules as specified in the general

conditions of the contract for ensuring safety of men and materials. This shall include proper approach and working platform during erection of the structures.

9.2.3 Drawings

The fabrication drawings are to be prepared and furnished by the Concessionaire. These shall be based on the design drawings. These drawings shall indicate complete details of fabrication and erection including all splicing details, lacing details, weld sizes of lengths, detailing of all joints, and bill of materials in the proforma approved by the Project Engineer and Executing Agency, and all other customary details in accordance with standard structural engineering practice whether or not given by the Executing Agency. He shall furnish along with the fabrication drawings, necessary calculations regarding design of joints viz. Size and length of welds, dia and number of bolts, and calculations justifying other fabrication details as well as design of erection and fabrication splices in accordance with IS:800 and other relevant standards. He shall also furnish scheme of erection.

The fabrication drawings shall indicate identification (erection) marks for purposes of despatch and erection etc.

In addition, the total quantity as well as abstract of quantities is indicated in the fabrication drawings. The Concessionaire shall prepare a consolidated schedule of permanent bolts and nuts, showing the length, size, weight and numbers required for each fabricated member.

Three copies of the detailed fabrication drawings including bolts and nuts schedule shall be submitted by the Concessionaire for approval in the first instance along with Bill of materials showing the description of members, their erection marks, quantity, etc. (Proforma to be approved by the Project Engineer and Executing Agency). In case the approval accorded to the fabrication drawings is subject to any modifications, additions, and alterations, the Concessionaire shall submit two sets of the revised drawings for final approval after incorporating these changes.
In case the drawings are approved as submitted, he shall submit thirteen additional prints of such approved fabrication drawings. In addition, the Concessionaire shall also be required to furnish one reproducible copy of final fabrication drawings (as actually fabricated).

The design drawings may require revision either before or after the preparation and approval of fabrication drawings. Such revision shall be duly incorporated in the fabrication drawings and nothing extra shall be payable on this account for preparation / revision of fabrication drawings. The Concessionaire is expected to make his own assumptions regarding the quantum of such revisions involving preparation/revision of fabrication drawings, while quoting.

The fabrication work shall start only after the approval to the fabrication drawings is accorded by the Project Engineer and Executing Agency.

Such approval shall, however, not relieve the Concessionaire of his responsibility for the safety of the structure, good connections, erectability, etc.

9.2.4 Samples

Samples for checking the quality of materials procured by the Concessionaire and workmanship in the execution of the works may be called for at any time by the Project Engineer and Executing Agency. In case such samples are found to be of sub standard/unacceptable quality, the Concessionaire shall immediately discontinue use of such materials and workmanship and get fresh samples approved by the Project Engineer and Executing Agency. Nothing shall affect the liberty of the Project Engineer and Executing Agency to reject whole or portions of structures where such defective materials and workmanship has already been used before detection.

9.2.5 Test at works

The Concessionaire shall arrange for all materials procured by him to be tested as and when required and in the presence of the representative of Project Engineer and Executing Agency.

For structural steel test samples shall be cut out of the materials from the locations indicated by the Project Engineer and Executing Agency and samples shall be prepared in accordance with the requirements of Indian Standards Specifications for conducting such tests. For each set of tests three samples shall be taken for tensile strength test and bend test. One set of tests will include test of three individual specimens of samples.

9.2.6 Fabrication shop at project site

Fabrication shop of the Concessionaire at project site shall have all facilities required for carrying out the work. The Concessionaire shall get the details of the shop approved by the Project Engineer and Executing Agency.

9.3 Applicable standard and codes

Except where otherwise specified herein or authorized by the Project Engineer and Executing Agency, all items of work shall conform to the requirements of relevant latest Indian standards. Any item of work, for which there is no Indian Standard available, shall conform to the latest British standard (B.S.). The item of work shall be best of its kind and subject to approval of the Project Engineer and Executing Agency. In case of conflict between this specification and those referred to in the standard, the former shall prevail.

List of certain important codes and standards applicable to this work is given below. However the applicable standards and codes shall be as per but not limited to the list given below.

9.3.1 Materials

IS : 808 Rolled steel, beam, channel and angle sections
IS : 2062 Structural steel (fusion welding quality)
IS : 1363 Hexagon head bolts, screws and nuts of production grade C.
IS : 1364 Hexagon head bolts, screws, and nuts of production grade A & B.
IS : 1367 Technical supply conditions for threaded fasteners.
IS : 1161 Specification of steel tubes for structural purposes.
IS : 2016 Specification for plain washers.
IS : 814 Specification for covered electrodes for metal arc welding for weld steel.
IS : 1852 Specification for rolling and cutting tolerances for hot rolled steel products.
IS :2074 Ready mixed paints, red oxide zinc chromate primer.
IS : 3502 Specifications for chequered plate.
IS : 383 Specification for coarse and fine aggregates from natural sources for concrete.
IS : 1566 Specification for hard-drawn steel wire fabric for concrete reinforcement.
IS : 3757 Specification for high strength structural bolts.

9.3.2 Codes of Practice

IS : 800 Code of practice for construction in steel.
IS : 816 Code of practice for use of metal arc welding for general construction.

IS : 9595 Code of procedure of manual metal arc welding of mild steel.
IS : 817 Code of practice for training and testing of metal arc welders
IS : 1811 Qualifying tests for metal arc welders (engaged in welding structures other than pipes).
IS : 1182 Recommended practice for radiographic examination of fusion-welded butt joints in plates.
IS : 1477 Code of practice for painting of ferrous metal in buildings and allied finishes.
IS : 3696 Safety code of scaffolds and ladders.
IS : 7293 Safety code for working with construction machinery.
IS : 7205 Indian Standard safety code for erection of structural steel.
IS : 7215 Tolerances for fabrication steel structures.
IS : 12843 Tolerance for erection of structural steel.

IS : 4353 Recommendation for submerged arc welding of mild steel and low alloy steels.

SP : 6 ISI Hand book for structural engineers. (Part 1 to 7)

9.3.3 Standards for testing

IS: 1608 Method of tensile testing of steel products other than sheets, strip, wire andtube.

IS : 1599 Method of bend tests for steel products other than sheets, strip, wire and tube.

IS : 228Methods of chemical analysis of pig iron, cast iron and plain carbon and alloy steel

IS : 2595 Code of practice for radio graphic testing.

IS : 1182 Recommended practice for radiographic examination of fusion welded buttjoints in steel plates.

IS : 3664 Code of practice for ultrasonic testing by pulse echo method.

IS : 3613 Acceptance tests for wire flux combination for submerged arch welding.

IS : 3658 Code of practice for liquid penetrant flow detection.

IS : 5334 Code of practice for magnetic particle flaw detection of welds.

9.4 Materials

Structural steel rolled sections and plates shall conform to specified grade of IS:2062. However rolled sections and plates upto 20mm conforming to IS:226 may be used in place of grade-A of IS:2062. Pipes used in Handrails, embedments etc. Shall conform to IS:1161. Chequered plate shall conform to IS:3502. High strength steel shall conform to IS:8500 of specified grade. All other materials shall be as per the list of standards codes given above or mentioned elsewhere in the relevant sections.

All steel sections and plates shall be straight, sound, free from twists, cracks, flaws, laminations, rough, jagged and imperfect edges and other defects.

In case any defect like laminations is noticed in the steel sections and plates during fabrication and erection, the same shall be brought to the notice of the Project Engineer and Executing Agency. These sections and plates shall be rejected unless specifically approved for acceptance by the Project Engineer and Executing Agency.

9.5 Fabrication

The fabrication and erection of works shall be carried out generally in accordance with IS:800 as well as the stipulations contained in this specification. All materials shall be completely

fabricated at his own shop or at the shop established by him at project site and finished with proper connection materials for ready assembly in the field. Check list format, inspection certificate for fabrication, erection, alignment and protocol for handling over of structural steel shall be submitted by the Concessionaire in the form as agreed to by the Project Engineer and Executing Agency. Fabrication work shall be taken up based on the approved fabrication drawings.

9.5.1 Cutting plans

Fabrication work shall be taken up based on the fabrication drawings duly approved by the Project Engineer and Executing Agency. The Concessionaire shall prepare necessary cutting plans before commencement of fabrication for all fabrication drawings.

9.5.2 Straightening

All steel material shall be straight and free from bends or twists. If the sections are distorted or twisted during transit, storage, etc. They shall be straightened and/or flattened by straightening machine at ambient temperature, though minor kinks or bends may be corrected by limited heating under careful supervision.

9.5.3 Bending

The bending of plates and sections to specially required shapes shall be done either on appropriate machine or by angle smithy and black smithy processes.

9.5.4 Cutting

Cutting may be effected by shearing, cropping, sawing or by gas cutting by mechanically controlled torch. Gas cutting by hand may only be used when specifically authorized in writing by the Project Engineer and Executing Agency. The edges of all plates shall be perfectly straight and uniform throughout. Shearing, cropping and gas cutting shall be clean, square and free from distortion and burrs, and should the Project Engineer and Executing Agency find it necessary the edges shall be ground afterwards by the Concessionaire.

9.5.5 Grinding

All the edges cut by flame shall be ground before they are welded. Ends of all bearing stiffeners shall be ground to fit tightly at both top and bottom. The maximum permissible gap between the bearing stiffeners and the flanges shall not be more than 0.2 mm locally.

In case of gantry girders, the bottom of the knife-edge support shall be accurately ground to provide effective bearing on the column bracket with a clearance not exceeding 0.2 mm locally at any place. The top surface of the column bracket shall also be ground similarly. The column splices and butt joints of struts and compression members shall be accurately ground and closely butted over the whole section with tolerance not exceeding 0.2 mm locally at any place. Notwithstanding the above, full load shall be transferred through welds.

The ends of shafts together with attached gussests, angles, channels, etc. After welding together shall be accurately ground so that the parts connected, butt over the entire surface of contact. Care shall be taken to see that these connecting angles or channels are fixed with such accuracy that they are not reduced in thickness by grinding by more than 1 mm.

The slab bases shall be similarly ground over the bearing surface and shall have effective contact with the end of the shaft. The bearing face which is to be grouted direct to a foundation need not be ground if such face is true and parallel to the upper face. To facilitate grouting and escape of air, holes shall be provided wherever necessary in column bases.

9.5.6 Clearances

The erection clearance for cleated ends of members connecting steel to steel shall not be greater than 2 mm at each end unless specifically approved by the Project Engineer and Executing Agency.

9.5.7 Holes

Holes through more than one thickness of material for members, such as compound stanchion and girders, flanges, shall where possible, be drilled after the members are assembled and tightly clamped or bolted together. Sub-punching may be permitted before assembly, provided the holes are punched 3 mm less in diameter than the required size and reamed after assembly to the full size. Punching shall not be adopted where the thickness of metal exceeds 16 mm.

When holes are being drilled in one operation through two or more separable parts, those parts, when so specified by the Project Engineer and Executing Agency, shall be separated after drilling and burrs removed.

Holes in connecting angles and plates, other than splices, also in roof members and light framing, may be punched full size through material not over 12 mm thick, except where required for close tolerance.
Matching holes for rivets and blacks bolts shall register with each other so that a gauge of 1.5 mm or 2.0 mm (as the case may be, depending on whether the diameter of the bolt is less than or more than 25 mm) less in diameter than the diameter of the hole will pass freely through the assembled members in a direction at right angles to such members. Finished holes shall not be more than 1.5 or 2.0 mm (as the case may be) larger in diameter than the diameter of the black bolt passing through them unless otherwise specified by the Project Engineer and Executing Agency.

Holes for bolts shall not be formed by a gas cutting process, except in special cases with specific permission of the Project Engineer and Executing Agency. Wherever a horizontal member is likely to collect water, suitable holes for drainage shall be provided.

9.5.8 Notches

The ends of all joints, beams and girders shall be cut truly square unless required otherwise and joist flanges shall be neatly cut away or notched where necessary, the notches being kept as small as possible.

9.5.9 Assembly

The component parts shall be assembled in such a manner that they are neither twisted nor otherwise damaged and shall be so prepared that the specified chamber, if any, is provided. In order to minimize distortion in a member the component parts shall be positioned by using clamps, clips, dogs, jigs and other suitable means and fasteners (bolts and welds) shall be placed in a balanced pattern. If the individual components are to be bolted, parallel and tapered drifts shall be used to align the parts so that the bolts can be accurately positioned.

Items like roof trusses, galleries, plate girders etc. shall be trial assembled keeping in view the actual site conditions, prior to despatch to site for erection so that they can be conveniently preassembled before erection or conveniently preassembled during erection. Necessary match marks shall be made on these components before disassembly in the shop and despatching.

For columns which are fabricated in two or more parts, controlled assembly shall be carried out in the fabrication yard before despatch to the erection site.

9.5.10 Bolting

Every bolt shall be provided with a washer under the nut so that no part of the threaded portion of the bolt is within the thickness of the parts bolted together.

Flat washers shall be circular of a diameter 2.5 times that of bolt and of suitable thickness. Where bolt heads/nuts bear upon the beveled surfaces they shall be provided with the square tapered washers of suitable thickness to afford a seating square with the axis of the bolt.

All bolts and nuts shall be of steel, with well-formed hexagonal heads unless specified otherwise, forged from the solid and shall be dipped in hot boiled linseed oil as soon as they are made. The nuts shall be good fit on the bolts and two clear threads shall show through the nut when it has been finally tightened up.

Notwithstanding anything to the contrary contained in IS:1363, IS:1364, and IS:1367, the unthreaded length of the bolt shall be equal to total thickness of metal being bolted together plus 2 mm. The threaded length shall be equal to at least the diameter of bolts plus 6 mm.

9.6 Welding

The works shall be done as per approved fabrication drawing which would clearly indicate various details of joints to be welded, type of weld, length and size of weld, whether shop or site weld. Symbols for welding on fabrication drawings shall be according to IS:813. Efforts shall be made to reduce site welding so as to avoid improper welding due to constructional difficulties.

9.6.1 Welding of structural steel work

Welding of Structural Steel shall be done by an electric arc process. The procedure to be followed, materials, plant and equipment to be used, testing and inspection procedures to be applied shall be subject to the approval of the Project Engineer and Executing Agency and shall conform generally to relevant acceptable standards viz. IS:816, IS:9595, IS:814, IS:4354 and Indian Standard Hand Book for metal arc welding, and other standard codes of practice internationally accepted.

Submerged-Arc-Welding/MIG (using Carbon dioxide) welding process employing semi-automatic welding machine and fully automatic welding machine (of approved make) shall be used for welding all butt joints and longitudinal fillet welds (connecting flange with web) respectively for fabrication of columns, framing beams & crane gantry girders, unless manual arc welding is specifically approved by the Project Engineer and Executing Agency. Necessary jigs & fixtures and rotation of structures shall be so arranged that vertically down-hand position of welding becomes possible.

'Open-Arc-Welding' process employing coated electrodes shall be employed for fabrication of other welded connections not covered under 6.02.02 and field welding.

Wherever welding is done for assembling the components of structures, the job shall be so positioned that down hand welding is possible. In cases where positioning of job is not possible other manual welding positions could be resorted to.

Any structural joint shall be welded only by those welders who are qualified for all welding procedures and positions required in such joint that is welded. The entire weld of any structure joint shall be made by one welder.

Each welder shall be assigned an identification mark and such mark shall be marked on the structure adjacent to the weld on completion of any structural welded joint.

The Concessionaire shall maintain records of all the welders identification marks, the joints welded by each welder, the welding procedure adopted, welding machine employed, pre and post heating done & any non destructive test done and stress relieving heat treatment performance on such joints. All such records for entire welding operation shall be accessible to the Project Engineer and Executing Agency for scrutiny & such record shall be countersigned by Project Engineer and Executing Agency for welding work accomplished in the preceding months as token of acceptance. But such acceptance shall not relieve the Concessionaire of his responsibility regarding adequacy & safety of welding operation.

9.6.2 Edge preparation for welding

Proper edge preparation shall be made for jointing of materials before welding. Suitable edge preparation shall be done for all processes of welding except for square-butt welds. Type of edge preparation shall depend on the thickness of parent materials that are to be joined. The edge forms shall be chosen to suit the design, technology and production conditions and shall be subject to the approval of the Project Engineer and Executing Agency. The edge form of weldments shall be prepared either by machines or by automatic gas cutting with surface roughness of the welding area not exceeding Rs.50/- All edges cut by flame shall be ground before they are welded.

9.6.3 Electrodes

The electrodes used for welding shall be of suitable type and size depending upon specifications of the parent materials, the method of welding, the position of welding and quality of welds desired e.g. normal penetration welds or deep penetration welds. However, only low Hydrogen electrodes shall be used for plates thickness above 40 mm for IS:2062 steel and for all thickness of high strength steel conforming to IS:8500.

All low hydrogen electrodes shall be baked and stored before use as per manufacturers recommendation. The electrodes shall be rebaked at 250°C - 300°C for one hour and later on cooled in the same oven to 100°C. It shall be transferred to an holding oven maintained at 60°C - 70°C. The electrodes shall be drawn from this oven for use. Rutile type electrodes shall not be kept in the same oven.

Where coated electrodes are used they shall meet the requirements of IS:814 and relevant ASME-SEC IX and IIC. Coating shall be heavy to withstand normal conditions of handling and storage. They shall be free from all defects which would interfere with performance of electrodes.

Only those electrodes which give radiographic quality welds shall be used for welds which are subjected to radiographic testing.

Where bare electrodes are used these shall correspond to specification of the parent material. The type of flux-wire combination for submerged arc welding shall conform to the requirements of IS:3613. The electrodes shall be stored properly and the flux shall be baked before use in an oven in accordance with the manufacturer's requirements as stipulated.

Specific approval of the Project Engineer and Executing Agency shall be taken by the Concessionaire for the various electrodes proposed to be used on the work before any welding is started.

9.6.4 Preheating inter-pass temperature and post weld heat treatment

Mild steel plates conforming to IS:2062 and thicker than 20 mm, may require preheating of the parent plate prior to welding as mentioned in Table - 1. For high strength steel conforming to IS:8500 the minimum preheat temperature shall be as specified in Table - 1. However, higher preheat temperature may be required as per approved welding procedure and same shall be followed. In welding materials of unequal thickness, the thicker part shall be taken for this purpose.

Base metal shall be preheated, not withstanding provisions of IS:9595 to the temperature given in Table - 1 prior to welding or tack welding. When base metal not otherwise required to be preheated is at a temperature below 0 deg. C it shall be preheated to at least 20 deg.C, prior to tack welding or welding. Preheating shall bring the surface of the base metal to the specified preheat temperature and this temperature shall be maintained as minimum interpass temperature while welding is in progress.

Table - 1: Minimum Preheat Interpass Temperature for Welding

		Welding	**used**	
Thickness of thicker part at point of welding	Other than low hydrogen electrode IS:2062 steel	IS:8500 steel	Low hydrogen electrodes/ or submerged arc welding IS:2062 steel	IS:8500 Steel
1	2	3	4	5
Upto 20 mm including	None	welding by this	None	None
Over 20 mm including	66ºC	electrode not allowed	20ºC	66ºC
Over 40 mm to 63 mm including	not allowed	-	66ºC	110ºC
Over 63 mm	not allowed	-	110ºC	150ºC

Preheating may be applied by external flame which is non-carbonising like LPG, by electric resistance or electric induction process such that uniform heating of the surface extending upto a distance of four times the thickness of the plate on either side of the welded joint is obtained.

Thermo-chalk, thermo-couple or other approved methods shall be used for measuring the plate temperature.

All butt welds with plater thicker than 50 mm require post weld heat treatment as per procedure given in AWS D-1.1. Post heating shall be done upto 600 deg c and rate of application shall be 200 deg C per hour. The post heat temperature shall be maintained for 60 minutes per 2.5 cm thickness. For maintaining slow and uniform cooling, asbestos pads shall be used for covering the heated areas. The Concessionaire shall submit and finalize post weld heat treatment procedure at the time of finalization of quality plans.

9.6.5 Sequence of welding

The sequence of welding shall be carefully chosen to ensure that the components assembled by welding are free from distortion and large residual stresses are not developed. The distortion should be effectively controlled either by a counter effect or by a counter distortion. The direction of welding should be away from the point of restraint and towards the point of maximum freedom.

Each case shall be carefully studied before finally following a particular sequence of welding.

Butt weld in flange plates and/or web plates shall be completed before the flanges and webs are welded together.

The beam and column stiffeners shall preferably be welded to the webs before the web and flanges are assembled unless the web and flanges to the beam or column are assembled by automatic welding process.

Approval of welding sequence and procedure shall not relieve the Concessionaire of the responsibility for the correct welding and for minimizing the distortion in the finished structure which in no case shall exceed that laid down in Indian Standards.

All welds shall be finished full and made with correct number of runs, the welds being kept free from slag and other inclusions, all adhering slag being removed from exposed faces immediately after such run.

Current shall be appropriate for the type of electrode used. To ensure complete fusion, the welding procedure should go proper and rate of arc advancement should not be so rapid as to leave the edges unmelted.

Puddling shall be sufficient to enable the gases to escape from the molten metal before it solidifies.

Non-uniform and heating and cooling should be avoided to ensure that excessive stresses are not locked up resulting ultimately in cracks.

The welding shrinkage shall be minimized by adopting the correct welding procedure and method. In long and slender members extra length should be provided, at the time of fabrication, for shrinkage.

The ends of butt welds shall have full throat thickness. This shall be obtained on all main butt welds by the use of runoff and run on pieces adequately secured on either side of main plates. Additional metal remaining after the removal of extension pieces shall be removed by grinding or by other approved means and the ends and surface of the welds shall be smoothly finished.

The fusion faces shall be carefully aligned. Angle shrinkage shall be controlled by presetting. Correct gap and alignment shall be maintained during the welding operation.

All main but welds shall have complete penetration and except where it is impracticable they shall be welded from both sides, back surface of the weld being gauged out clean before first run of the weld is given from the back. However, partial penetration butt weld shall be permitted, when specifically shown in the fabrication drawings.

Intermittent welds shall not be permitted without the approval of the Project Engineer and Executing Agency. These shall be permitted only when specifically approved in the fabrication drawings.

9.6.6 Testing of welders

All the welders to be employed for the job shall have to qualify the appropriate tests laid down in IS:817 and IS:1181. If the welder fails in these tests, two further set of tests shall be undertaken and the welder to qualify must pass both these sets of tests.

The Project Engineer and Executing Agency also reserves the right to have any welder retested at any time. All the necessary arrangements required for the testing of welders are to be provided by the Concessionaire.

9.6.7 Inspection of welds

- **Visual inspection**

100 percent of the welds shall be inspected visually for external defects. Dimensions of welds shall be checked. The lengths and size of weld shall be as per approved fabrication drawings. It may be slightly oversized but should not be undersized. The profile of weld is affected by the position of the joint but it should be uniform. The welds should have regular height and width of beads. The height and spacing of ripples shall be uniform. The joints in the weld run shall as far as possible be smooth and should not show any humps or craters in the weld surface. Welds shall be free from unfilled craters on the surface, under-cuts, slags on the surface and visible cracks. Such inspection shall be done after cleaning the weld surface with steel wire brushes and chisel to remove the spatter metal, scales, slag etc. If external defects mentioned above are noticed, there is every possibility of internal defects and further radiographic / ultrasonic examination shall be undertaken as per Indian Standards. Weld gauges shall be used to measure the size of the welds.

- **Mechanical testing**

Test plates shall be incorporated on either side of 10% of main butt welds & the weld shall be continuous over the test plate. The test plate shall be cut from extensions of the main plates and shall be fixed so that metal lies in the same direction as that of the main plate. Test plates shall be prepared and tested in accordance with the accepted Standards, in the presence of the Project Engineer and Executing Agency or his authorized representative. All testing equipment and facilities for carrying out these tests shall be provided by the Concessionaire should any of these tests fail, further radiographic examination of the welds in question on the main members, shall be undertaken by the Project Engineer and Executing Agency as specified in the specification. These tests for the test plates and radiographic examination are additional to those contemplated

under routine inspection and testing. The Concessionaire shall carry out these additional radiographic tests as per normal testing procedure.

- **Non-destructive and special testing**

In addition to the normal supervision and testing procedure, radiographic/ultrasonic or other non-destructive examination shall be carried out, as stipulated in the Fabrication/Erection checklist on butt or fillet welded joints and/or on test specimens, as per Annexure - B. All test of welds shall be carried out by the Concessionaire at his own cost as per Annexure - B. However, for checking the quality of weld, the Executing Agency shall carry out additional tests at his own cost. The Concessionaire shall provide necessary supporting facilities free of cost, as may be required by the Project Engineer and Executing Agency, including cordoning of radiation zone while Radiography testing is in progress. Prepared etched section of the welds may be required for examination. The Concessionaire shall, at his own cost, provide these prepared sections.

The case of failure of any of the tests, the cost of re-test of that portion of the test shall be recovered from the Concessionaire.

Rectification of defective welding work wherever defects like improper penetration, extensive presence of blow holes, undercuts, cracking, slag inclusion, etc. are noticed by visual inspection / other tests, the welds, in such location shall be removed by gouging process. The joints shall be prepared again by cleaning the burrs and residual matters with wire bushes and grinding, if necessary, and rewelded. The gouging shall as far as possible be done using gouging electrodes. Flame gouging shall be resorted to only in special cases with specific permission of the Project Engineer and Executing Agency.

9.7 Acceptance of welded structures

The acceptance of the welded work shall depend upon current dimensions and alignment, absence of distortion in the structure, satisfactory results from the inspection and testing of the joints and the test specimens as per quality check list and upon general workmanship being good meeting the tolerance requirements given in the quality check list as per Annexure - B.

9.8 Erection procedure

9.8.1 Erection marks

The erectability of the structures shall be checked by the Concessionaire before commencement of the fabrication work to avoid future modification.

Before any steel work leaves the Concessionaire's fabrication site, it shall be suitably marked in accordance with the approved fabrication drawings and according to an approved marking plan.

The erection marks assigned to various components of the structural steel work, excepting secondary beams, shall also contain an erection sequence number indicating the sequence in which the various components are to be erected.

Erection marks shall be clearly painted on the work item, each piece being marked in at least two places. Each piece shall also have its weight marked thereon. In order to help identification, each erection piece, i.e. erection mark item, shall bear its items erection mark and erection sequence number. Erection marks shall be painted on the structures, during the process of fabrication to facilitate their identification during inspection. Where a number of components are identical and bear the same erection mark, these components shall be further identified by assigning numerals in addition to the common erection mark.

The centre lines of all column, elevations and girder bearings shall be marked on the sections with the utmost care to ensure proper alignment and assembly of the pieces at site.

9.8.2 Erection

The Concessionaire shall submit for approval of the Project Engineer and Executing Agency his Erection Scheme for the erection of all types of structures. Erection shall commence only after approval of the Concessionaire's proposed erection scheme.

The erection scheme shall give full details of the method of handling, transport, hoisting and erection including false work/staging, temporary bracing, guying temporary strengthening etc. It will also give the complete details of the quantity and capacity of the various items of erection equipment that will be used. Any modifications to the erection scheme as directed by the Project Engineer and Executing Agency for various reasons or due to the interference with the work of other agencies shall be incorporated by the Concessionaire.

The Concessionaire shall examine the site conditions and transportation clearances before deciding whether columns are to be fabricated and erected in one piece or more than one piece. Erection of structures is to be carried out preferably with a crane and in case this is not possible, only the upper portion of the columns can be erected with a derrick. Further, the erection of

columns and portals etc. shall be carried out in one single piece as far as practicable. No column shall be fabricated and erected in more than 3 pieces. Proper splicing shall be provided at the erection joints indicated in fabrication drawings. When erection joints are provided in columns, their location shall generally be just above a floor level.

The structural steel shall as far as practicable be erected frame wise. Thereafter, the frames shall be progressively aligned and all erection welding completed. The secondary beams shall thereafter be erected, aligned and welded completely as per the approved schedule of work. Touch up painting in these areas shall be completed and as soon as a particular portion of the structure/floor is completed in all respects, it shall be handed over to other Concessionaires for carrying out other civil works as well as mechanical/ electrical erection works. Conveyor galleries shall generally be erected as a completely fabricated box, i.e. the bottom chord and bracings, top chord and bracings, side vertical posts and bracings, end portals and roof-trusses shall be completely welded prior to erection. The inside sheeting runners and roof sheeting purlins may be erected individually.

9.8.3 Protection against damage in transit

All steel work shall be efficiently and sufficiently protected against damage in transit to site from any cause whatsoever. All projecting plates or bars and ends of members at joints shall be stiffened, all straight bars and plates shall be bundled, all screwed ends and machined surfaces shall be suitably packed and all bolts, nuts, washers and small loose parts shall be packed separately in cases so as to prevent damage or distortion during transit. Should there be any distortion of fabricated members the Concessionaire shall immediately report the matter to the Project Engineer and Executing Agency. Distorted steel received from stores or distorted during transport from stores to the fabrication yard shall not be used in fabrication unless the distortions are minor which in the opinion of the Project Engineer and Executing Agency can be removed by acceptable methods.

These distortions shall be rectified by the Concessionaire by cold-bending. If heating is necessary to rectify the defects, the details of the procedure shall be intimated to the Project Engineer and Executing Agency whose approval shall be taken before such rectification. The temperature of teat treatment shall not exceed the limits beyond which the original properties of the steel are likely to be impaired.

If in the opinion of the Project Engineer and Executing Agency the steel has been unduly bent in transit from the project stores to the fabrication yard or during handling by the Concessionaire which cannot be rectified in the opinion of the Project Engineer and Executing Agency, such steel shall be counted as wastage .

9.8.4 Stability of structures

The Concessionaire shall be responsible for the stability of the structure at all stages of its erection at site and shall take all necessary measures by the additions of temporary bracings and guying to ensure adequate resistance to wind and also to loads due to erection equipment and their operations. Guying and bracing shall be done in such a way that it does not interfere with the movement or working of other agencies working in the area. For the purpose of guying, the Concessionaire shall not use other structures in the vicinity which are likely to be damaged by the guy.

- **Setting column bases**

Column bases shall be set so that the column load is uniformly transmitted to the foundation. The Concessionaire shall carefully check the location and layout of anchor bolts embedded in foundations constructed to ensure that the structures can be properly erected as shown on the drawings.

The Concessionaire shall be responsible for the correct alignment and leveling of all steel work on site to ensure that the columns are in plumb. The permissible erection tolerances for the structural members are given in Table 'A' given at the end of this specification.

Before erection of columns on their foundations, the top surface of base concrete shall be thoroughly cleaned with wire brushes and by chipping to remove all laitance and loose material. The Concessionaire shall also be responsible to provide all packing and shim, plates. No steel structure shall be erected on their foundation unless such foundations have been certified fit for erection of steel by the Engineer. Adequate number of air release holes and inspection holes shall be provided in the base plate. The grouting/under pinning of base plate and chipping of foundation to desired level are also in scope of Concessionaire.

9.8.5 Painting

After inspection and issue of test and acceptance certificate, all steel surfaces shall be painted or otherwise treated. Except where encased in concrete, all steel work shall be given one coat of approved metal protection as may be specified, applied evenly and thoroughly and well worked into the joints and other open spaces.

Materials

i) The touch-up primers and paints shall consist of Red oxide Zinc Chromate conforming to the requirements of IS:2074 with a pigment to be specified by the Executing Agency. However, the Concessionaire may have to use other type of primer wherever specified.

ii) The contents of paint drums shall be thoroughly mixed so that no material remains at the bottom before the paint is used and the paint shall be stirred at regular intervals while being applied.

iii) The primers should not be diluted or thinned except as hereinafter specifically provided. Where the paint has thickened due to loss of Solvent by evaporation in partially used tins it may be brought to consistency for application, in consultation with the manufacturer who shall give necessary information particularly with regard to appropriate viscosity.

iv) Material shall be of best quality available and procured directly from approved manufacturers. Samples shall be submitted to the Executing Agency or approval before procurement.

- **Preparation of surface**

i) The surface preparation shall be done in accordance with IS:1477 (Part I) Code of Practice for Finishing of Ferrous Metals in Buildings: Painting and Allied Finishes: Part I (Operation and Workmanship).

ii) The surface shall be cleaned and degreased in accordance with one or more of the methods given in Clause 6.1 of IS:1477 (Part I).

iii) The surface shall be derusted and de-scaled either mechanically or chemically by one or more of the methods given in Clause 6.2 of OS:1477 (Part I) to the satisfaction of the Executing Agency. However flame cleaning, sand, blasting, and shot blasting are excluded from the scope of Concessionaire.

iv) While cleaning with power wire-brush, care shall be taken not to do it excessively, since mill scale easily gets burnished to a smooth even surface to which paints does not adhere, and this will be detrimental to the performance of paint. All accessible weld flux and splatter shall be removed by power tools.

- **Application of priming coat, touch-up paint**

i) Primers are generally applied by brushing. In areas which are difficult to reach either by brushing or spraying, daubers, mops or both may be used by dipping the same in paints and pulling or pushing them through the narrow spaces unless otherwise specified one coat of primer of 25 micron thickness shall be applied in shop.

ii) During the painting, the air temperature shall be well above the dew point and not less than 4 C and relative humidity not greater than 80%. The time of painting shall be such that moisture does not condense on the structure before or during painting or until the painting is dry.

iii) Primer coats shall be applied without any time lag after the pre-cleaning or pretreatment and care shall be taken to ensure that paint is not applied to damp surface (in early morning, under humid conditions dew etc.)

iv) Surfaces of fabricated steel where shop priming coat has been removed or damaged during transit or defaced during welding including site welded locations shall be cleaned and applied with touch up primer coat of paint.

- **Shop connections**

i) Surfaces to be permanently in contact shall receive a priming coat immediately prior to being jointed together at the works except where jointed by welding.

ii) Galvanised steel shall not be prepared or painted at site.

Machined, sliding or rocking surfaces of casting blocks, slabs or pins shall be coated with a mixture of white lead and tallow after the work has been inspected and approved by the Executing Agency. Molybdenum disulphate (grease) will be used in rider pin connections.

Surfaces not in contact, but inaccessible after shop assembly shall receive two coats of shop paints, positively of different colours or such material to prove use of two coats before assembly. This does not apply to the interior of sealed hollow sections.

Shop contact surfaces shall be cleaned by effective means before assembly, but not painted.

In the case of surface to be welded, the steel shall not be painted or metal coated within minimum 50 mm distances of any edges to be welded, if the paint specified or the metal coasting would be harmful to welders or impair the quality of the welds. Welds and adjacent parent metal shall not be painted prior to deslaggings, inspection and acceptance.

Site preparation of contract surface

i) The paint, on all contact surfaces, which was applied in the fabrication shop shall be carefully removed and a fresh coat of priming paint shall be applied to all surfaces in permanent contact, and the surfaces shall be brought together while the paint is still wet.

ii) The Concessionaire shall provide and use sufficient number of drop cloths, covers, tarpaulin and other screens to protect adjacent surfaces and shall remove all spatter and stains from such surfaces. The Concessionaire shall also protect his own work.

iii) The Concessionaire shall provide and use sufficient number of drop cloths, covers, tarpaulin and other screens to protect adjacent surfaces and shall remove all spatter and stains from such surfaces. The Concessionaire shall also protect his own work.

iv) Painting shall be discontinued during rain and dust-storm and shall not commence until the surfaces are perfectly dry and clean. Wherever practicable, surfaces shall be painted when in shade or when the temperature is failing.

v) Welds and adjacent metal shall not be painted or touched up prior to deslagging inspection and approval.

vi) Parts of the steel structures to be encased in concrete shall not be painted.

vii) One coat of primer and touch-up paint shall be applied except for the item which shall be not dip galvanized.

9.9 Steel grading

All grating units shall be rectangular in pattern and welded grating assembly. The size and the spacing of the bearing bars and cross bars shall be as approved in detailed drawings. The detail

fabrication drawings for gratings shall be prepared by Concessionaire on the basic of approved design for grating.

The gratings shall be made up in panel units designed to coincide with the span of the structural steel framing as indicated in the drawings or as directed by the Project Engineer and Executing Agency. The size of each panel shall be as approved by Project Engineer and Executing Agency.

The grating unit shall be accurately fabricated and finished, free from wraps, twists or any defects that would impair their strength, serviceability and appearance.

Grating work shall include cut outs and clearance opening for all columns, pipes, ducts, conduits or any other installation penetrating through the grating work. Such cut outs and clearances shall be treated as follows.

The gratings shall be notched, trimmed and neatly finished around flanges and webs of the columns, moment connections, cap plates and such other components of the steel structures encountered during the placement of the gratings. In all such cases, the trimming shall be done to follow the profile of the components encountered. After trimming, the binding strip shall be provided on the grating to suit the profile so obtained.

Opening in gratings for pipes or ducts that are 150 mm in size or diameter or larger shall be provided with steel bar toe plates of not less than 5 mm thickness and appropriate width, set flush with the bottom of the bearing bars.

Penetrations in gratings that are more than 50 mm but less than 150 mm in size or diameter shall be welded with plates of size shown in the detailed drawings set flush with the bottom of the grating panel.

Unless otherwise indicated on the drawings, grating units to all penetrations shall be made up in split section, accurately fitted and neatly finished to provide for proper assembly and erection at the job site.

Grating units shall be provided with all necessary clips, bolts, nuts and lock washers required for proper assembly and rigid installation and fastening to abutting units and supporting structural steel framing members.

All fabricated grating section and accessories shall be primed and finish painted in the shop prior to erection at site. Painting shall consist of two coats of red lead primer and two coat of black enamel finish.

Prior to painting all surfaces shall be cleaned free from rust, millscale, grease, oil, or any other foreign matter that might affect the adherence of the paint by sand blasting. While the primer shall be applied by spray guns or by brushes, the final coat of finished paint shall necessarily be applied by means of spray guns only.

The applied coatings shall be uniform, free from voids and streaks, drilled or punched holes shall be touched up prior to erection or assembly.

Maximum deviation in linear dimension from the approved dimension shall exceed 12 mm.

9.10 Stairs, railings and ladders

All stairs and intermediate landings shall be constructed to size dimensions and design, as indicated on the detailed drawings. Such stairway shall be fabricated as a complete unit which shall include struts, hangers, posts, cross bracings, cleats and accessories, as required for connection to structural steel framing and concrete.

Stair treads shall be furnished complete with punched and slotted carrier plates attached ready to bolt to stair stringers. Treads shall be provided with antislip nosing using chequered plate and set flush with the stair treads.

Pipe handrails, as specified in detailed drawings shall be assembled with flush type fittings and welded joints, ground and polished smooth. Railings shall be provided with all necessary fittings posts brackets, bolts, plates and similar accessories as shown on the approved drawings and as required for proper installation.
Hand rails shall be of standard weight black steel pipes of flush welded construction, ground smooth using 32 mm nominal bore medium class pipes with double rail about 1 metre above platform level and pipe posts spread not more than 1.5 metres apart.

Smooth uniform curves and bends are to be provided at stair returns and also wherever specified/required. The open ends of all pipe posts shall be plugged and welded. A minimum radius of 3 times the pipe diameter shall be provided at all points of direction changes in the hand rails.

Vertical ladders shall be as called for on the approved drawings. The ladders shall be provided with support arms formed of bent steel plate or clip angles. Where shown on the drawings the ladders shall have loose neck supports, designed to form hand grabs and end brackets for fastening to abutting construction. Maximum deviation in the linear dimensions of railings, stairs and ladders, from the approved dimensions, shall not exceed 12 mm.

9.11 Chequered plate

Chequered plates shall be fixed to supporting members by welding as specified in relevant drawings or as directed by the Project Engineer and Executing Agency. The edges shall be made smooth and no burrs or jagged ends shall be left. While splicing care should be taken so that there is continuity in pattern between the two portions. Care should also be taken to avoid distortion of the plate while welding of stiffening angles/vertical stiffening ribs.

9.12 Ash storage silo / intermediate hopper

Shape of the silo/intermediate hopper shall be circular in plan. Bottom hopper portion shall be of conical shape and/or flat bottom type as specified in mechanical section.

For general requirements, fabrication and construction details, including design criteria, IS:9178 (Pt.I, II & III) shall be followed as general guidance.

Side walls shall be made of mild steel plates having horizontal and vertical stiffeners at regular interval as per the design requirements. Stiffeners shall be provided on the external face. Joints between the walls inside the silos should be continuously welded to ensure complete sealing. However, for the stiffeners provided on the outer shell, intermittent welding may be adopted.
Bending of plates and rolled sections to the required shape for fabrication shall be done by plate bending machine or cold bending process without resorting to heating, hammering, angle smithy and black smithy process.

Poking hole and 10 mm thick striking plate shall be provided to facilitate ash flow. Poking holes shall have circular m.s. pipe and cover cap as shown in the drawing.

9.12.1 Lining

To cater for corrosion, abrasion or smoothness lining shall be provided in sloping/conical portion as specified in mechanical section. Lining shall generally be in the form of stainless steel sheet of 3 mm thickness of grade SS 316 or 10 mm thick alloy C.I. liners of 300-350 BHN (min.).

9.12.2 Intermediate/buffer and storage silos hoppers

The hoppers shall be conical in shape with valley angle as 55 degrees and the details of hopper specifications are covered elsewhere in these specifications.

9.13 Sampling, testing and quality control

9.13.1 General

a) The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International Standards and shall conduct such tests as called for by the Project Engineer and Executing Agency. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Project Engineer and Executing Agency. Tests shall be done in the field and at a laboratory approved by the Project Engineer and the Concessionaire shall submit to the Project Engineer and Executing Agency, the test results in triplicate within three days after completion of a test. The Project Engineer and Executing Agency may, at his discretion, waive off some of the stipulations given for small and unimportant operations.

b) Material / work found unsuitable for acceptance, shall be removed and replaced by the Concessionaire. The work shall be redone as per specification requirements and to the satisfaction of the Project Engineer and Executing Agency.

c) Radiography and ultrasonic testing of welds shall be carried out by specialist agency only. In case, the Concessionaire does not have the required expertise, he shall engage specialist agency for this purpose.

An indicative programme of Inspection and testing for raw materials, welds and dimensional tolerances for fabrication & erection of steel structures are given in Annexure - B. The Concessionaire shall draw-up a comprehensive programme for executing the works based on this indicative programme.

Annexure - B

Inspection, testing and quality check list

1 Inspection & testing

The Concessionaire shall carry out a comprehensive inspection and testing programme of inspection / testing on the basis of details given below. The testing of all the materials supplied by the Concessionaire shall be carried out by him. This is however, not intended to form a comprehensive programme as it is the Concessionaire's responsibility to draw-up and carry out such a programme duly approved by the Project Engineer and Executing Agency. Such approval shall not relieve the Concessionaire of the responsibility about the correctness and adequacy of workmanship, materials etc.

1.1 Raw material inspection

1.1.1 Steel

i) Conformity with specifications

a) The conformity of the materials with the specification and the availability of the relevant test certificates shall be checked. Carbon equivalent value shall also be made available.

b) Plates above 25 mm thickness shall be subjected to ultrasonic test as per ASTM A435 or equivalent to check the presence of lamination.

ii) Physical conditions:

a) Steel shall not be pitted and should be free from scales and rust.

b) If the rolled sections and plates are bent or distorted, bend or distortion shall normally be removed by cold treatment etc.

c) Straightening under hot stage shall be resorted only under specific permission from the Project Engineer and Executing Agency.

d) If any rolling defects, viz. lamination, cracks etc. are discovered in the steel during the processing, it is to be rejected.

iii) Storage

a) Steel plates of different specifications shall be stacked separately.

b) Steel of IS:2062 (different grades) and IS:8500 quality shall be given distinctive identification mark.

c) Rolled sections shall be stacked profile-wise separately.
d) Steel sections shall be stacked over spacers supported on posts of about 50 cm. height above ground. Passages and space between the stacks shall be sufficient for rigging operations.

1.1.2 Electrodes

i) Electrodes for all welding shall be procured as envisaged in the welding procedure sheet predetermined before actual welding operation starts/

ii) Electrodes shall be properly stored dry as required by the IS Code or by the manufacturer.

iii) Electrodes shall bear the ISI or equivalent Certification mark.

iv) The approval for all the consumables for welding shall be specifically obtained beforehand.

1.1.3 Nuts, bolts etc.

i) The quality of these shall be as per relevant IS codes.

ii) They shall be stored properly according to grade, diameter and length. However, special bolts like HSFG shall be stored separately as per the relevant clause.

iii) Bolts of well known manufacturers are acceptable with manufacturer's test certificates. However, in case the Concessionaire is not able to produce the test certificate, the bolts can be accepted only after satisfactory cold bend and flattening tests. For the purpose of these tests, the inspecting officer should select at random 3 specimens each for cold bend and flattening tests. For the purpose of these tests, the inspecting officer should select at random 3 specimens each for cold bend and flattening tests out of each consignment of 1000 Nos. or less and instruct the Concessionaire to carry out the tests in his presence. Cost of testing shall be borne by the Concessionaire.

1.1.4 Paints/primers

i) The relevant IS or equivalent mark on sealed tins shall be checked.

ii) A few tins shall be opened at random to check the condition of the paint. Paint from old stock and showing signs of solidification shall not be accepted.

1.1.5 Cement

i) The quality of cement shall conform to relevant IS code.

ii) Cement is to be stored in a place of easy access for proper inspection and identification. It should be placed in a weather tight building, so that dampness and loss due to other causes is minimum.

1.2 Welding procedure qualification

Welding procedure shall be established as per ASME Section IX or equivalent Indian Standards. Welding procedure, specifications shall be submitted by the Concessionaire for review and approval of the Executing Agency. Typical welding procedure data sheet is given in Proforma A.P-1.

1.3 Welders qualification test

Welders qualification test shall be as per ASTM Section IX or equivalent Indian Standards.

1.4 Inspection for tack assembly set up :

i) Bevel
ii) Gap
iii) Off-setting
iv) Shrinkage allowance
v) Fitment Sequence
vi) Principal overall size

1.5 Preheating:

Temperature control by Thermochalk or suitable equivalent method.

Inspection of main welds of principal components for columns, crane girders, framing beams, trusses, etc.

I) Fillet welds for :

i) Check size

ii) Macrotech examination of production test coupons for main fillet weld.
iii) 100% visual examination
iv) 100% dye penetration test/magnetic particle test - Major welds (including welds subjected to tension) like web to flange connection, splice plates, moment/shear connection.
v) 10% All other areas.

II) Butt welds :

a) Columns, Beams etc.

i) 100% Visual examination

ii) 100% Dye penetration test after back gouging shall be carried out. Final weld shall also be tested.

iii) Mechanical testing of production test coupons - Minimum one joint per column/built up beam and crane grinder etc. The Project Engineer and Executing Agency may reduce the frequency of this test, after getting consistently satisfactory results for initial 10 tests.

iv) 100% Radiography test on tension zone (bottom flange of the girder) welds and 10% spot Radiography on compression zone for minimum 300 mm length (top flange of the girder) welds of crane girder shall be carried out. Where Radiography test is not possible, ultrasonic test shall be carried out after grinding the surface wherever required with prior approval of the Project Engineer and Executing Agency.

v) All other butt welds and full penetration welds shall be subjected to 10% spot Radiographic test and for the balance ultrasonic test. Wherever Radiography is not possible, ultrasonic testing shall be carried out with prior approval of the Project Engineer and Executing Agency.

b) **Dry ash silo :**

i) Dye penetration test after back gouging and for all finished welds.

ii) 10% spot Radiography test on fabrication shop butt welds and 10% spot Radiography test on site erected butt joints shall be carried out where access is available.

c) In case of failure of any weld in spot radiography the percentage for retesting shall be doubled at that particular location.

1.6 Final inspection

i) Dimensional check as per fabrication check list detailed elsewhere.
ii) Marking for holes for fitments or connection and hole sizes.
iii) Erection mark
iv) Painting

a) Dressing and surface preparation.

b) Final painting including dry film thickness (DFT) by using Elcometer or any other approved method. In addition, the rate of application (coverage) as per manufacturer's recommendation shall be checked.

1.7 Inspection during fabrication and erection

a) All structural components/members shall be checked for dimensional tolerance during fabrication and erection.

b) Tolerance on dimensions for fabrication of structures shall be according to IS:7215 and check list given under table A-1 to A-5. In case of any conflict between the provisions of IS:7215 and those mentioned under the table, the stipulation of the latter shall govern.

c) Tolerance on dimensions for erection of steel structures shall be according to IS:12843. Relevant portion of the same is given under Table A-6 for ready reference.

1.8 Welding tests on welds and weld defects

Mechanical testing of welds (destructive tests): Butt welds having one or more of thefollowing defects are not acceptable.

i) Bend Test : No crack on root/face on being bent through 180 degree with mandrel of 41 where t is the thickness of plate.

ii) Tensile Test : Weld strength not less than parent metal's strength.

1.8.1 Radiographic examination

Sections of welds that are shown by Radiography to have any of the following type of imperfections shall be judged unacceptable:

1) Any type of crack or zone of incomplete fusion or penetration.

2) Any elongated slag inclusion which has length greater than :

   i) 6mm for t upto 20 mm
   ii) 8mm for t from 20 mm to 32 mm
   iii) 't' = thickness of weld

3) Any group of slag inclusion in line that have an aggregate length greater than 't' in a length of 12t, except when distance between the successive imperfections exceed 6L where 'L' is length of longest imperfection in group.

4) Rounded indications in excess of that specified by the acceptance standard given in Appendix 4 of ASME section VIII Div. 1.

1.8.2 Ultrasonic examination

The welded joints will be tested by suitable combination of Angle and Normal beam probe techniques to ensure scanning of the entire cross-section of weldments.

Acceptance standard

All indications which produce a response greater than 20% of the reference level shall be investigated to the extent that operator can determine the shape, identify and location of all such reflectors and evaluate them in terms of the acceptance standards given in (a) and (b) below:

a) Discontinuities are unacceptable if the amplitude exceeds the reference level and discontinuities have lengths which exceed.

   i) 6 mm for‘t’ upto 20 mm inclusive

   ii) 8 mm for‘t’ from 20 mm to 50 mm inclusive

   iii) 20 mm for‘t’ over 50 mm

Where‘t’ is thickness of weld being examined. If a weld joins two members having different thickness at the weld,‘t’ is thinner of these two thickness.

b) Where discontinuities are interpreted to be cracks, lack of fusion, or incomplete penetration, they are unacceptable regardless of discontinuities or signal amplitude.

1.8.3 Visual examination:

Following defects are not allowed:

1. Unsatisfactory appearance
2. Incomplete weld
3. Molten metal flow
4. Pits
5. Surface crack, lack of penetration
6. Insufficient length
7. Surface defects exceeding 5% of weld seam area

1.8.4 Dye penetration test:

All surfaces to be examined shall be free of:

a) Relevant linear indications

b) Four or more rounded defects in a line separated by 1.5mm or less (edge to edge) except where the specification for the material establishes different requirements for acceptance so far as defects are concerned.

Evaluation of indicators

i) Linear indications are those indications in which the length is more than 3 times the width. Only indicators with major dimensions greater than 1.5 mm shall be considered relevant.

ii) Rounded indications or indications which are circular or elliptical with length less than 3 times the width.

iii) Any questionable or doubtful indications shall be tested to verify whether or not actual defects are present.

iv) Localised surface imperfections may occur from machining work surface conditions or an incomplete bond between base metal & cladding may produce similar indications which are relevant to the deletions of unacceptable discontinuities.

Table:1 - Tolerable deviation from designed linear dimensions in mm in the parts processed for fabrication

S. No.	Characteristic	Deviation / tolerances in mm					
		1.5m &Below	1.5m to 2.5m	2.5m to 4.5m	4.5m to 9.0m	9m to 15m	15m & above
1	2	3	4	5	6	7	8
1a	Deviation in length and width of part cut out by:						
	i) Manual gas cutting	2.5	3.0	3.5	4.0	4.5	5.0
	ii)Gas cutting by automatic and semi-automatic machines	1.5	2.0	2.5	3.0	3.5	4.0
	iii) Shear or saw cutting	1.5	2.0	2.5	3.0	3.5	4.0
	iv) Parts machined by edge-planning or milling machines	0.5	1.0	1.5	2.0	2.5	3.0
b	Difference in diagonal lengths of sheet parts:						
	i) For butt welding	4.0	4.0	4.0	5.0	6.0	6.0
	ii) For lap welding	5.0	5.0	5.0	8.0	10.0	10.0
c	Deviation in distances between hole centres, formed as per:						
	i) Marking of extreme ones	2.0	2.0	2.5	3.0	3.5	4.0
	ii) marking of adjacent ones	1.5	1.5	1.5	1.5	1.5	1.5
2	Deviation in the dimensions of structural despatch members after finishing:						
a	When assembled upon assembly benches as per marking.	3.0	4.0	5.0	7.0	10.0	15.0
b	When assembled in the jig and other devices fastening with fixtures.	2.0	2.0	3.0	5.0	7.0	10.0
c	Dimensions (length and breadth) between milled surface (after finishing)	0.5	1.0	1.5	2.0	2.5	3.0
3	Distance between groups of erection holes (in finished members):						

S. No.	Characteristic	Deviation / tolerances in mm					
		1.5m &Below	1.5m to 2.5m	2.5m to 4.5m	4.5m to 9.0m	9m to 15m	15m & above
1	2	3	4	5	6	7	8
a	Formed during machining of separate parts installed when assembling as per marking.	3.0	4.0	5.0	7.0	10.0	15.0
b	Formed during machining of parts, installed when assembling with the help of fixtures.	2.0	2.0	3.0	5.0	7.0	10.0
c	Drilled with the help of templates in finished members.	0.5	1.0	1.5	2.0	2.5	4.0

Fabrication Check List

Table 2 : Tolerable deviations of fabricated members from designed geometrical shape

Sl. No.	Characteristic	Deviation / Tolerance	Remarks
1.	Curvature of assembly Parts		
	a) Gap between a sheet and a steel rule face over 1 m length	1.5 mm	
	b) Gap between a taut string and vertex face of an angle flange or web of channel and joist.	0.001 L, but not greater than 10 mm.	L-length of member
2.	Deviation of edge line steel sheet parts from theoretical profile:		
	a) During butt and toe welding	2 mm	
	b) During lap welding	5 mm	
3.	Deviation of radius of the bend:		
	a) Clearance between template and the surface of rolled sheet flange or face of cold bend profile.	2 mm	Template length (1.5m along the curve)
	b) -do- for hot bend profile	3 mm	-do
	c) Ellipticity (difference of diameters) in space sheet structures.	0.005D	D-diameter of circumference
	d) -do- in erection joints	0.003D	-do-
4.	Deformation of dispatch members:		
	a) Inclination of flanges with the web:		
	i) at junction	0.005b	b-width of

Sl. No.	Characteristic	Deviation / Tolerance	Remarks
			flange
	ii) at other places	0.01b	-do-
	b) Transverse bending of flanges:		
	i) at junction with members	0.005b	b-width of flange
	ii) at other places	0.01b	-do-
	c) Warping of the web	0.003h	h-depth of the member
	d) Sag of member	L/750 but not more than 15 mm	L-length of the member
5.	Other deviations:		
	a) Shifting of axes of riveting/ bolting lines for lattice structures from theoretical eccentricity.	3.0 mm	
	b) Inclination of the milled surface from designed position.	1/1500	

Fabrication Check List

Table 3: Acceptance deviations in as fabricated steel structures

S. No.	Characteristic	Deviation / Tolerance
1.	**Columns**	
	a) Deviation in length 'L' measured distance from bottom surface of the column footings, to the group of holes for 'trusses', fasteners, collar beams, purlins and other elements to be connected to column.	
	When L is under 10 m	± 10 mm
	When L is over 10 m	± 15 mm
	b) Deviation in distance 'L' from bottom surface of the column footing to the top of crane bracket.	
	When L is under 10 m	± 5 mm
	When L is over 10 m	± 10 mm
	c) Deviation in distance from bearing surface of the bracket to the first fastener of the element to be connected to column.	± 1 mm
	d) Deviation in distance between any group of holes for connection of bracings to columns.	± 2 mm
	e) Sag of column element (curvature)	1/1000 of length element but not

S. No.	Characteristic	Deviation / Tolerance
		more than 15 mm.
	f) Difference in web depth of column	
	i) At splice joint	± 2 mm
	ii) At any other location	± 10 mm
	g) Deviation in distance from supporting surface of milled end of the dispatched element of column to the clear or heating plate or column to the cleat or seating plate for fastening of collar beams, purlins, girders etc. (Fish plates, brackets).	± 3 mm
2.	**Trusses**	
	a) Deviation in span 'L' of the truss between end erection holes in gussets of supporting units or between external planes of supporting gussets or angles when trusses are resting on brackets or supports:	
	When L is under 25 m	± 7 mm
	When L is over 25 m	1/2500 but not more than 10 mm
	b) Deviation in distance between the centres of holes or webs of angles for fastening bracing, purlins, monitors, etc.	± 3 mm
	c) Deviation in distance between the first row of erection holes and the	more than 15 mm.
	d) Distance between holes for fasteners to top and bottom chords of trusses on supports.	± 3 mm
	e) Sag of separate elements between node points.	1/1500 of length of element but not more than 10 mm.
3.	**Beams**	
	a) Deviation in span L of beams between bend erection holes, outer surfaces of end plates:	
	When L is under 25 m	± 10 mm
	When L is over 25 m	± 1/2500 length but not more than 15 mm
	b) Deviation in the height of beam as measured from the bearing surface to the top of upper flange	± 3 mm
	c) Deviation in distance between the group of holes for fastening of purlins, monitors, bracings, bracing grids etc.	± 3 mm
	d) Sag (curvature) of the girder despatch member	1/1000 length but not more than 15 mm
4.	**Elements of framework**	Bracings, purlins etc.

S. No.	Characteristic	Deviation / Tolerance
	a) Deviation in distance between end erection holes, determining the span of element.	± 3 mm
	b) Sag of despatch members	1/1000 length but not more than 15 mm
	c) Deviation in distance between the groups of erection holes of the element	± 3 mm
	d) Gratings, Stair, Railings, ladders, etc.	± 12 mm
5.	Shop assembly (before for erection)	Despatch
	a) Columns weighing more than 20 T	i) Every first and further every tenth set of identical structure to be put for control assembly.
	b) Roof trusses of 30 m or more span	
	c) Crane girders with span more than18 m	
	d) Bunkers	i) Number of erection bolts shall be atleast 30% of the total No. of holes.

Fabrication check list

Table 4: Acceptable deviation in holes or bolts

S. No.	Characteristic	Deviation	Tolerance No. of deviation in each group
1.	a) Deviation of dia of holes for rivet and bolts:		
	Upto 16 mm	± 1 mm	No limit
	Over 16 mm	± 1.5 mm	
	b) Deviation of dia of turned and fitted bolts:		
	Nominal dia of bolts and holes	Upper limit: + 0.125 mm	
		Lower limit: 0.00	No limit
2.	Ovalness (difference between the greatest and lesser dia)		
	Upto 16 mm hole dia	+ 1 mm	No limit
	Upto 16 mm hole dia	+ 1.5 mm	
3.	Deformity in size greater than 1.5 mm and cracks in the edge of holes.	Not permitted	
4.	Misalignment of holes in separate plates in the joints:		

S. No.	Characteristic	Deviation	Tolerance No. of deviation in each group
	i) Upto 1 mm		Upto 50%
	ii) From 1 to 1.5 mm		Upto 10%

Note: In holes shall be removed, the depth and width of countersunk hole shall not deviate from the standard by more than 1.5 mm.

Fabrication check list

Table 5: Permissible fabrication deviation of structural steel

S. No.	Type of structures and constructions	Name of deviations	Value of deviation (Tolerance)
1.	Column	Assembly fits	
		a) Base plate and column	0.1 mm
		b) Frame Joints	2.0 mm
		c) Web and flange	1.5 mm
		d) Web & stiffeners	1.5 mm
		e) Flange & stiffeners Intermediate stiffeners& Bearing stiffeners	1.5 mm
		f) Cap plate & column	0.1 mm
		g) Crane girder seat	0.1 mm
		h) Beam brackets	2.0 mm
2.	Beams	(c), (d), (e) of S.No. 1 above	1.5 mm
3.	Crane Girders	(c), (d), (e) of S.No. 1 above and knife edge supports	0.1 mm
4.	Silos & hoppers	a) Ring beam and wall	1.5 mm
		b) Stiffeners and walls	1.5 mm
		c) Stiffeners and ring beams	1.5 mm
		d) Deflection of straight section of compression cord from the plane of truss, collar beam or girder.	1/1500 of span but nore more than 10mm
5.	Purlin	Deviation in distance between purlins.	5 mm

Erection check list

Table 6: Maximum permissible tolerances in steel structures

S. No.	Description	Tolerance
1.	Erected steel columns:	
	i) Deviation of column axis at foundation top level with respect to true axis:	
	a) in longitudinal direction	± 5 mm

S. No.	Description	Tolerance
	b) in lateral direction	± 5 mm
	ii) Deviation in the level of bearing surface of columns at foundation top with respect to true level	± 5 mm
	iii) Out of plumbness (verticality) of column axis from true vertical axis as measured at column top:	
	a) For columns without any special requirements:	
	1) upto and including 30 m height	$\pm \frac{H}{1000}$ or ± 25 mm whichever is less
	2) over 30 m height	$\pm \frac{H}{1200}$ or ± 35 mm whichever is less
	b) For column with special requirements like cranes or such similar requirements:	
	1) upto and including 30 m height	$\pm \frac{H}{1000}$ or ± 25 mm whichever is less
	2) over 30 m height	$\pm \frac{H}{1500}$ or ± 25 mm whichever is less
	iv) Deviation in straightness in longitudinal and transverse of column at any point along the height.	$\pm \frac{H}{1500}$ or ± 10 mm whichever is less
	v) Difference in the erected positions of adjacent pairs of columns along length or across width of building prior to connecting trusses/beams with respect to true distance.	± 5 mm
	vi) Deviation in any bearing or seating level with respect to true level.	± 5 mm
	vii) Deviation in difference in bearing levels of a member on adjacent pair of columns both across and along the building.	± 5 mm

Notes:

1. *Tolerance specified under iii (a) and iii (b) should be read in conjunction with iv and v.*
2. *'H' is the column height in mm.*

Table 6 (Contd.)

S. No.	Description	Tolerance
2.	Erected steel trusses	
	I) Shift, at the centre of span of top chord member with respect to vertical plane passing through the centre of bottom chord.	$\pm \frac{1}{250}$ of height of truss in mm at centre of span or ± 15 mm whichever is less.

S. No.	Description	Tolerance
	ii) Lateral shift of top chord of truss at the centre of span from the vertical plane passing through the centre of supports of the truss.	± 1/1500 of span of truss in mm or ± 10 mm whichever is less.
	iii) Lateral shift in location of truss from its true axis in plan.	± 10 mm
	iv) Lateral shift in location of purlin from true position.	± 5 mm
	v) Deviation of difference of bearing levels of trusses from the true difference.	± 1/1200 of span of truss in mm or ± 20 mm whichever is less.
3.	Erected Crane Girder and Rails	
	i) Shift in the centre line of crane rail with respect to centre line of web crane girder.	±(Web thk in mm) + 2 mm / 2
	ii) Shift in plan of alignment of crane rail with respect to true axis of crane rail at any point.	± 5 mm
	iii) Deviation in crane track gauge with respect to the gauge:	
	a) For track gauge upto and including 15 mm	± 5 mm
	b) For track gauge more than15 mm	± (5 + 0.25(S-15)) mm subject to a maximum of ± 10 mm, where S in meters is true track gauge.
	iv) Deviation in the crane rail level at any point from true level	± 10 mm
	v) Difference in levels between crane track rails at:	
	a) Supports of crane girders	15 mm
	b) Mid span of crane girders	20 mm
	vi) Relative shift of crane rail surface at a joint plan and elevation.	2 mm subject to grinding of surfaces for smooth transition.

Proforma - A.P.1

Typical welding procedure data sheet

Concessionaire……Address……

Quality of weld……Specification……

Material Specification……Thickness……Batch/

Cast No……Joint preparation (Fig)……

Gap……Location of Specimens……

Whether condition……Type of Day……

Wind break used……

Electrode Group No……Make……Specimen……

Pre and Post Heating……

Welding position……

Size of reinforcement……Whether removed……

Welding Sequence……

Backing strip used……Type……

Welding process……

Current conditions Polarity……

Size of electrode……

Amperage and Voltage……

Number of Electrodes used per run……

Cleaning method……

Remarks……

Welding Engineer

Executing Agency

Signature

(Inspecting Authority)

For and behalf of Concessionaire

Date:_____

Sub section - C10
Technical specification for glass and glazing

Sub section - C10

Technical specification for glass and glazing

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Sub section - C10: Technical specification for glass and glazing

10.1 Scope

The work in general shall consist of supplying and fixing all glass and glazing including all clips, putty, mastic cement, etc. wherever required.

10.2 Installation

10.2.1 General

The Concessionaire shall supply and install all glass and glazing as required for various doors, windows, sashes, ventilators and fixed louvers, miscellaneous glazing and partitions, as approved by the Executing Agency, having very high optical clarity, brighter appearance, uniform thickness, consistent product quality manufactured out of molten glass coming out of the furnace floats on molten tin, thus being formed into float glass. The glass shall be delivered to site in containers with the maker's name, guarantee, type of glass and thickness, or weight of glass attached to the outside of the containers. Glass cut to size shall be straight and free from chips, spalls or any other damage on any cut edge.

10.2.2 Materials

(a) Clear glass shall be flat drawn sheet glass and shall be atleast 4 mm thick conforming to IS:2835. Sheet glass for doors shall be minimum 5.5 mm thick.

(b) Wired glass shall be thick rolled glass with centrally embedded 24G wire mesh of Georgian type. This may be of clear or coloured glass as shown in drawings and shall conform to IS:5437.

(c) Composite double glazing shall be made of double glazing of two 6 mm thick sheet glass either both sheets of tinted glass or one glass tinted & other plain or both sheets of plain sheet glass. Both the glasses shall be separated by an air gap of 12 mm. The trapped air shall be kept dry by means of suitable desiccant. The sealing shall be under strict quality control. The composite glazing shall be procured as finished product from reputed manufactures. Toughen glass conforming to IS:2553 shall be used.

(d) Obscure glass shall have a cast surface on one side.

(e) Coloured and figured glass shall be as per the approved sample.

(f) In general, the putty shall conform to IS:410 latest edition and be of best quality from an approved manufacturer. It shall be brought to site in the manufacturer's original packing.

Quick setting putty shall be used for windows and sashes except when glare reducing glass is used where it shall be of non-setting type.

(g) Neoprene gaskets with snap-fit glazing shall be fixed as per manufacturer's instructions and shall fit firmly against the glass to give a leak proof installation.

10.3 Glazing, setting and finish

All glazing clips, bolts, nuts, putty, mastic, cement, etc., shall be supplied by the Concessionaire.

All glass shall be thoroughly cleaned before placing in position. Each glass pane shall be held in place by special glazing clips of an approved type. Four glazing clips shall be provided per glass pane, except for large panes where six or more clips shall be used as instructed by the Project Engineer and Executing Agency. All holes that may be necessary for holding the clips, glazing beads and all other attachments shall be drilled by the Concessionaire.

Glass panes shall be set without springing, and shall be bedded in putty and back puttied, except where mouldings or gaskets are specified. Putty, mastic cement etc., shall be smoothly finished to a true even line. Obscure and figured glass shall be set with smooth side out.

After completion of glazing work, the Concessionaire shall remove all dirt, stains, putty, etc., clean the glass panes and leave the work in perfectly acceptable condition. All broken, cracked or damaged glass shall be replaced by new at the Concessionaire's own cost.

10.4 Acceptance criteria

(a) All installations shall be free from cracked, broken or damaged glass. Edges of large panes of thicker glass and heat absorbing glass shall be inspected carefully for chipped, cracked or unground edges.

(b) Glazing shall be carefully done to avoid direct contact with metal frames.

(c) All glass shall be embedded in mastic or fixed by neoprene gaskets to give a leak-proof installation.

(d) At completion the panes shall be free from dirt, stains, excess putty, etc., to the complete satisfaction of the Project Engineer and Executing Agency.

10.5 IS codes

Some of the important applicable Indian Codes for this section are listed below. Latest editions of these codes shall be followed:

IS:3548 Code of Practice for glazing in building.

IS:1083 Code of practice for fixing and glazing metal doors, windows and ventilators.

IS:419 Putty for use on window frames.

Sub section - C11

Technical specification for MS doors, windows, ventilators, louvers, etc.

Sub section - C11

Technical specification for MS doors, windows, ventilators, louvers, etc.

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Sub section - C11: Technical specification for MS doors, windows, ventilators, louvers, etc

11.1 Scope

The work in general shall consist of supplying, erecting and installing of all MS doors, windows, ventilators, louvres, glazed partitions etc. as required with all materials, complete excluding supply of glass and glazing. Supplying and/or fixing of all door and window accessories and hardware are also included in the scope.

11.2 Installation

11.2.1 Materials

Steel sections used for fabrication of doors, windows, etc. shall be standard rolled steel sections specified in IS:1038 and IS:1361. Mild Steel sheets for frames, shutters, louver blades, etc. shall be of the gauge mentioned in this specification.

Hardwares and fixtures of the best quality from approved manufacturers only shall be used. The Concessionaire shall specifically state the particular manufacturer's materials, proposes to use. All hardware and fixtures shall be able to withstand repeated use. Door closers shall conform to IS:3564 latest edition and shall be suitable for doors weighing 61-80 kg unless otherwise stated. Each closer shall be guaranteed against manufacturing defect for one year and any defect found within this period shall be rectified or the closer replaced free of charge. Concealed doors closers shall be either floor mounted or transform mounted suitable for installation with metal doors. They shall conform to the performance requirements and endurance test stated in Appendix A of IS 3564 (latest edition).

Aluminium sections for fabrication of doors, windows, partitions etc. shall be extruded section conforming to IS:1948 and 1949 or as manufactured by Indian Aluminium Company Ltd. or approved equivalent. The alloy used shall conform to IS designation HE-9-WP of IS:733. Heavy duty double acting floor springs where specified shall conform to IS:6315, shall be suitable for door shutters weighing upto 125 kg. shall be hydraulically regulated, shall be constructed of cast brass casting cover and shoe, gun metal piston player and all other parts of mild steel.

The Concessionaire shall submit samples of each type of hardware to the Project Engineer and Executing Agency. The approved samples shall be retained by the Project Engineer and Executing Agency for comparison of the bulk supply. The samples shall be returned to the Concessionaire towards the end for incorporation in the job.

The mastic for caulking shall be of best quality from a manufacturer approved by the Project Engineer and Executing Agency. In general the mastic for fixing of metal frames shall be as per IS:1081 latest edition and/or as approved by the Project Engineer and Executing Agency.

11.2.2 Fabrication

- **Steel doors, windows, ventilators, louvers, etc.**

(a) Door frames :

Frames shall be fabricated from 16 G sheets. They shall be mortised, reinforced, drilled and tapped for hinges, lock and bolt strikes. Where necessary, frames shall be reinforced for door closers. Welded construction with mitred corners shall be used. Rubber door silencers shall be furnished and for the striking jamb, Loose 'T' masonry anchors shall be provided. Frames shall finish flush with the floor and adjustable floor anchors shall be supplied. Frames shall be brought to site with the floor ties/weather bars installed in place.

(b) Double plate flush door shutter

Door shutters shall be 45 mm thick completely flush design and shall comprise of two outer sheets of 18G steel sheets rigidly connected and reinforced inside with continuous vertical 20 G stiffeners, spot welded in position at not more than 150mm centres. Both edges of doors shall be joined and reinforced to full height by steel channels placed immediately inside and welded to the door faces. The tops and bottoms of doors shall be reinforced horizontally by steel channels running to the full width of the door. Doors shall have proper level on lock stiles and rails to operate without bending and shall be reinforced at the corners to prevent sagging or twisting. Pairs of double doors shall have meeting stile edges bevelled or rebated. Wherever required the doors shall be sound deadened by filling the inside voids with mineral wool or other suitable approved materials.

Door shall be mortised, reinforced, drilled and tapped in the shop for hinges, locks and bolts. They shall also be reinforced for closers, push plates and other surface hardware where necessary.

Any drilling and tapping required on the surface shall be done at site. Wherever required provision shall be made for fixing glazing, vision panels, louvers, etc. Glazing mouldings shall be of 18 g steel as directed by the Project Engineer and Executing Agency. Louvre blades shall be V or Z shaped and made out of 16 G sheets.

(c) Single sheet door shutters

Single sheet doors shall be made from best quality 18 G mild steel sheets and shall present a flush surface on the outside. The inside shall be stiffened with a semitubular edge and central stiffening rail which shall support the lock and other furniture. The frames shall be made from best quality 16 G mild steel sheets.

Wherever required provision for fixing glass panels, louvers, etc. shall be made.
Fabrication shall be as specified in 2.02.01 (b) "Double Flush Door Shutters".

(d) Sliding doors

Sliding doors shall be either double plate or single plate construction as required and made out of 18 gauge steel sheets with adequate stiffeners.

The Concessionaire shall specify the weight of the door in his shop drawing and submit the manufacturer's catalogue of the sliding gear he proposes to use. The Concessionaire shall make provisions where necessary for openings in the door for monorail beams. Doors shall close positively to exclude rain water from seeping in. Sliding doors shall withstand specified wind loads without buckling or jamming. The door shall slide freely under all ambient conditions.

(e) Steel windows, sashes, ventilators, etc.

These shall conform in all respects to IS:1038 and IS:1361 latest editions. The details as called for in the above codes shall be applicable for coupling mullions, transoms, weather bars, pivot arrangements for ventilators, etc.

All welds shall be flush butt welded to form a solid fused joint, so that all frames are square and flat.

Where composite unit openings are envisaged the individual windows units shall be joined together with requisite transom and mullions. All windows shall be outside glazed fixed with putty or metal glazing beads. Where aluminium glazing beads are specified they shall be extruded aluminium channel 9.5 mm x 9.5 mm x 1.6 mm (Indal section No.2209) aluminium beads shall be given one coat of zinc chromate primer before fixing to windows.

- **Welding**

The joints for steel doors, windows, ventilators, etc. shall be electrically flash butt welded joint at all corners and junctions to form a solid fuses right angle joint.

- **Fabrication of aluminium doors, windows, frames, etc.**

Extruded sections shall have a minimum 3 mm wall thickness. All sections shall be approved by the Project Engineer and Executing Agency before fabrication is taken up. Doors, windows, frames, mullions, transformers etc. shall be anodized in bath of sulphuric acid to provide a clear coating of minimum 10 micro-meter. The anodized materials shall then be sealed by immersing in boiling water for 15 minutes. A protective transparent coating shall be applied to the sections before shipment from the factory.

Fabrication drawings shall be submitted by the Concessionaire which shall also include the weights of the materials used and got approved from the Project Engineer and Executing Agency.

11.2.3 Shop coat of paint

The shop paint for steel doors, windows, etc. shall be best red oxide, zinc chromate primer paint from approved manufacturer conforming to IS:2074, latest edition. All surfaces shall be thoroughly cleaned of rust, grease, loose mill scales, etc. and given one coat of shop paint. Portions like mullions transoms, etc. which will be inaccessible after assembly of units shall be given an extra coat of paint before assembly.

11.2.4 Handling and storage of fabricated material

All metal doors, windows, etc. shall be packed and crated properly before despatch to ensure that there will be no damage to the fabricated materials. Loading into wagons and trucks shall be done with all care to ensure safe arrival of materials at site in an undamaged condition. All metal doors, windows, etc. shall be stored under cover and handled in a way to prevent damage or distortion. Special care shall be taken to prevent staining of aluminium products by rust, motor etc.

11.2.5 Assembly and erection at site

In general the fixing of steel doors, windows, ventilators, louvres, etc. shall conform to IS:1081 latest edition. The Concessionaire shall assemble and install all steel doors, windows, sashes, fixed metal louvres, etc. including transoms and mullions for composite units in respective places keeping proper lines and levels, and in an approved workman like manner to give a trouble free and leak proof installation. If required by the Project Engineer and Executing Agency, the installation shall be carried out under the supervision of the manufacturer's staff.

After installation of steel doors, windows, etc., all abrasions to the shop-coat of paint shall be retouched and made good with the same quality of paint.

All coupling mullions, transoms, frames, etc. in contact with adjacent steel and other members shall be well bedded in mastic. The Concessionaire shall bring to site the mastic cement in original sealed containers of the manufacturer and shall apply it as per the manufacturer's instructions.

Floor, shutters, partitions, hardware fixtures, etc. shall be fixed only after the major equipment has been installed in the rooms.

Wherever required, nylon cords of approved quality shall be supplied along with pivoted sashes. These shall be adequate length to terminate one metre from the floor. Loose ends of cords shall have a metal or plastic pull as approved by the Project Engineer and Executing Agency.

11.3 Acceptance criteria

11.3.1 For fabricated items

(a) Overall dimensions shall be within ± 0.5mm of the size.

(b) Mullions, transoms, etc. shall be in one length and permissible deviations from straightness shall be limited to plus minus 0.5 mm from the axis of the member.

(c) Door and window shutters shall operate without jamming. The clearance at head and jamb for door shutters shall not exceed 1.5mm. For double leafs the gap at the meeting stiles shall not be more than 1.5mm.

(d) Door leafs shall be undercut wherever required.

(e) Doors, windows, frames, etc. shall be on a true plane, free from warp or buckles.

(f) All welds shall be dressed flush on exposed and contact surfaces.

(g) Correctness of hardware and smoothness of operation of all shop installed hardware and fixture.

(h) Provisions for hardware and fixtures to be installed at site.

(i) Glazing beads shall be cut with mitred corners.

(j) Shop coats shall be properly applied.

(k) Exposed aluminium surface shall be free from scratches, stains and discolouration. Anodized surfaces shall present a uniform and pleasing look.

11.3.2 For installed items

(a) Installation shall be at the correct location, elevation and in general on a true vertical plane.

(b) All frames of external walls shall be mastic caulked to prevent leakage through the joint between frames and masonry.

(c) All openable sections shall operate smoothly without jamming.

(d) Locks, fasteners, etc. shall engaged positively. Keys shall be non-interchangeable.

(e) Cutting to concrete or masonry shall be made good and all abrasions to shop paint shall be touched up with a paint of the same quality as the shop paint.

(f) Aluminium doors, windows etc. shall be free scratches, stains or discolouration.

(g) It shall be the responsibility of the Concessionaire to see that the material is protected from mortar, paint, plaster, terrazzo framing members.

11.4 Information to be submitted

Before starting fabrication of any metal doors, windows, etc. the Concessionaire shall submit detailed fabrication drawings to the Project Engineer and Executing Agency for approval. The fabrications shall be started only after approval of the drawings.

11.5 IS codes

The important IS codes to be followed are listed below:

IS:1083 Steel doors, windows and ventilators.
IS:1361 Steel windows for industrial buildings.
IS:1451 Steel door frames.

Sub section - C12
Technical specification for rolling steel shutters / grills

Sub section - C12

Technical specification for rolling steel shutters / grills

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Sub section - C12: Technical specification for rolling steel shutters/grills

12.1 Scope

This specification covers the design, supply of materials, fabrication, delivery and erection of rolling shutters grills with motor drives and/or manual operation during all accessories as hereinafter specified. All electrical work shall be in strict accordance with the latest Indian Electricity Rules.

12.2 Installation

12.2.1 Components

a) States for rolling shutters shall be made from tested bright, cold rolled, annealed M.S. strips, not less than 0.9 mm thick for shutters upto 3.5 m wide and not less than 1.24 mm thick for shutters 3.5 m wide and above, machine rolled at 75 mm rolling centres, interlocking with each other. The profile will be such as to prevent excessive deflection under specified wind load.

b) Rolling grills shall be constructed out of 6 mm dia. rods at 35 mm centres running horizontally flexibly connected with vertical links spa ed not more than 200 mm centres. Alternatively, rolling grills shall be made from perforated slats of approved design, reinforced with 6 mm dia rods.

c) End locks shall be heavy type M.C.I./C.I. and shall be provided at each end of alternate slats.

d) Bottom bars shall be finished with two angles not less than 6 mm thick for external shutters. When shown on drawings, a flexible weather strip shall be applied to make tight contact with the floor.

e) Guide shall be of such depth as to retain the shutter under a wind pressure of 150 kg/sq.m. The minimum thickness of guide shall be 126.

f) Shafts shall be of steel pipes of sufficient size to carry the torsional load with a maximum deflection of 1/360th of span. Grease packed ball bearings or bushings shall be provided for smooth trouble, free operation.

g) Hoods shall be formed of not less than 20 gauge steel, suitably reinforced to prevent sag.

h) Locks shall be side belt and hasp or cylinder lock operable from one or both sides. Provision for to securing hand chain with pad-lock, provision for removable handle for hand cranks etc. shall be made as desired by the Project Engineer and Executing Agency.

i) Power unit shall be suitable for 3 phase, 50 cycle, 400 volt A.C. Power supply and shall be either floor or wall mounted unit. The motors shall be of sufficient capacity to move the shutter in either direction at a speed of 0.3 metres per second. In addition to the gear motor, each standard power unit shall include a magnetic brake, reversing starter with built-in overload protection, a geared limit switch and one push button station located inside the building unless otherwise stated. It is desirable that the button bar or motor operated doors

shall be provided with a sensitive edge, electrically connected to stop the travel of the door on meeting an obstruction.

j) Operating chains shall be of tested quality, heavily galvanized and with all ends rounded to assure smooth operation and hand protection.

k) Reduction gears shall be of high strength grey cast iron, machine moulded from machine cut patterns.

12.2.2 Manually operated shutters/grills

Manually operated shutters shall be easily operable by one person. The speed of operation shall be about 0.3 metres per second.

In general, manually operated shutters shall be push-pull type for opening upto 9 sq. metre in area. Larger shutters shall be either chain and gear operated or crank and gear operated. The crank handle shall be removable. All shutters shall be lockable from one or both sides as desired by the Project Engineer and Executing Agency.

12.2.3 Power operated shutters/grill

These shall be operable from a push button station conveniently located beside the door or as shown on drawings. One emergency hand chain-crank operation shall also be provided for use in case of failure of the electrical system.

12.2.4 Shop coat

Shutters shall be painted with one coat of red lead or zinc chromate primer. Where specified, doors shall be galvanized and subsequently painted with one coat of zinc chromate for adhesion of field coat.

12.3 Acceptance criteria

12.3.1 Shop inspection

After completion the manufacture of different components of the rolling shutter, an arrangement for shop inspection by the Project Engineer and Executing Agency shall be made to check the conformity with approved shop drawings.

12.3.2 Field inspection

After installing the shutters, the Concessionaire shall test the performance of the shutter in the presence of the Project Engineer and Executing Agency. The doors shall be smoothly operable under all ambient conditions. All control and locking devices shall give fault- free performance.

12.3.3 Guarantee

The Concessionaire shall give one year's guarantee for the successful operation of the shutters.

12.4 IS codes

IS:6248 Metal rolling shutters and rolling grills.

Section - WS1

Technical specifications for laying of pipes and fittings / specials

Section - WS1

Technical specifications for laying of pipes and fittings / specials

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Section - WS1: Technical specifications for laying of pipes and fittings / specials

1. Scope

The work shall include providing of materials, all necessary plant and equipment, providing adequate engineering supervision and technical personnel, skilled and unskilled labour, etc. as required to carry out the entire work as indicated on the drawings and/or described herein subsequently and/or as directed by the Project Engineer and Executing Agency. The Concessionaire shall carry out all works meant within the intent of this specification even if not explicitly mentioned herein.

All works shall be executed to the satisfaction of the Project Engineer and Executing Agency.

2. Applicable codes

The laying of pipes and fittings/specials shall comply with all currently applicable statutes, regulations, standards and codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the standards/codes shall be referred to.

In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decision of Project Engineer in such case shall be final and binding on the Concessionaire.

Any approval, instructions, permissions, checking, review, etc. whatsoever by the Project Engineer and Executing Agency, shall not relieve the Concessionaire of his responsibility and obligation regarding adequacy, correctness, completeness, timely completion, safety, strength, quality & workmanship etc.

The Concessionaire shall make his own surveying arrangements for locating the coordinates and positions of all work and establish the reduced levels (RLs) at these locations, based on two reference grid lines and one bench mark which will be furnished by the Executing Agency. If need be the Executing Agency reserves the right to have the Concessionaire re-verify the coordinates at no cost to Executing Agency. The Concessionaire has to provide at site, all the required survey instruments, along with qualified surveyors, to the satisfaction of the Project Engineer and Executing Agency so that the work can be carried out accurately and according to the specifications and drawings.

2.1 Codes of practice

All applicable standards, specifications, etc. and codes of practice shall be the latest editions, including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the Concessionaire.

All work shall be carried out as per the stipulations contained in various sections of these specifications and the latest Indian Standards, Act, Codes and best practices.

In case of conflict between the stipulations contained in various sections of these specifications and stipulations of Indian Standard Codes, etc. the requirements of stipulations contained in various sections of these specifications shall prevail over that of Indian Standards, Codes, etc. Concessionaire is responsible to notify Executing Agency in writing well in advance of such conflicts prior to execution of the work.

Some of the applicable Indian Standards, Codes are referred to herein below:

(a) IS.783 - Code of practice for laying of concrete pipes
(b) I.S. 3114 - Code of practice for laying of cast iron pipes
(c) I.S. 3764 - Excavation work - code of safety
(d) I.S. 5822 - Code of practice for laying of electrically welded steel pipes for water supply
(e) I.S. 6530 - Code of practice for laying of asbestos cement pressure pipes
(f) I.S. 1726 - Specifications for Cast Iron Manhole covers & frames
(g) I.S. 5455 - Specifications for C.I. steps for manholes.
(h) I.S.4111(Part -1) - Code of practice for ancillary structures in sewerage system (manholes)

3. Carting & handling

Pipes and fittings/specials shall be transported to all the work sites at places along the alignment of pipe line as directed by Project Engineer and Executing Agency. Concessionaire shall be responsible for the safety of pipes and fittings/specials in transit, loading/unloading storage etc. Every care shall be exercised in handling pipes and fittings/specials to avoid possible damage. While unloading, the pipes and fittings/specials shall not be dropped down from the truck on to any hard surfaces. They should be unloaded on timber skids with steadying ropes or by any other approved means. Padding shall be provided between coated pipes, fittings/ specials and timber skids to avoid damage to the coating. Suitable gaps between pipes/stacks of pipe should be left at intervals in order to permit free access from one side to the other. In case of spigot & socket pipes care should be taken regarding orientation of pipes while unloading. As far as possible pipes shall be unloaded on one side of the trench only. The pipes shall be checked for any visible damage (such as broken edges, cracking & spalling of pipe etc.) while unloading and shall be sorted out for replacement. Any pipe which shows any damage to preclude it from being used shall be

discarded. Dragging of pipes and fittings/specials along concrete and similar pavement with hard surfaces shall be prohibited.

4. Storage

4.1 Each stack of pipes shall contain only pipes of same class and size, with consignment or batch number marked on it with particulars of suppliers wherever possible. Storage shall be done on firm level and clean ground and wedges shall be provided at the bottom layer to keep the stack stable. The stack shall be in pyramid shape or the pipes laid lengthwise and crosswise in alternate layers. The pyramid stack shall be made for smaller diameter pipes for conserving space in storing them. The height of the stack shall not exceed 1.5 m. Also necessary security arrangements should be provided to avoid these till the pipes are finally used.

4.2 Fittings/specials shall be stacked under cover and separated from pipes and with suitable security measures.

4.3 Rubber rings shall be stored in a clean & cool store away from windows, boiler, electrical equipment and petrol, oils or other chemicals. Particularly in the field where the rubber rings are being used it is desirable that they do not be left out on the ground in the sun or overnight under heavy frost or snow conditions.

5. Laying

5.1 General

The Concessionaire shall visit the site before tendering and get himself acquainted with site conditions and the regulations regarding the laying of pipes in congested areas, heavy traffic areas etc.

5.2 Excavation

Before excavating the trench the alignment of pipeline shall be approved by Project Engineer and Executing Agency. The excavation of trenches and pits for manholes/chambers shall be carried out in accordance with the specifications contained herein below and shall be done in such a manner that IT DOES NOT GET FAR AHEAD OF THE LAYING OPERATION as approved by Executing Agency.

After excavation of trenches, pipes shall not be lowered in position unless the dimensions of trenches and bedding work at the bottom of the trenches are-approved and measured by Project Engineer and Executing Agency. Pipes and fittings shall be carefully lowered in the trenches. Special arrangements such as cranes, tripods with chain pulley block etc. for lowering the pipes

and fittings shall be made by Concessionaire at his own cost. In no case pipes shall be dropped. Slings of canvas or equally **NON ABRASIVE MATERIAL** of suitable width and strength or special attachment to fit the ends of pipes and fittings shall be used to lift and lower the coated pipes and fittings. The pipes and fittings shall be inspected for defects and, be struck with light hammer preferably while in suspended position to detect presence of any cracks. If doubt persists, further confirmation shall be done by pouring a littleParaffin on the inside of the pipe at the suspected spot and after doing vigilant investigation whether the Paraffin is leaking on to the external side of the pipe or not then only the non leaking pipe should be considered fit for use. Pipes and fittings damaged during lowering or aligning shall be replaced by Concessionaire at no extra cost.

To protect the persons from injury and to avoid any damage to property, adequate barricades, construction signs, red lanterns and guards, as required for smooth functioning of work and to avoid any minor or major accidents, shall be placed and maintained during the progress of the construction work and until it is safe for the traffic to use the roadways. The relevant Indian Standards and the rules and regulations of local authorities in regard to safety provisions shall be observed.

Suitable fencing/barricades shall be provided along the sides of trenches and pits. The posts of fencing shall be of timber securely fixed in the ground not more than 3 m apart and they shall not be less than 75 mm. in diameter or less than 1.2 m. above the surface of the ground. There shall be two rails, one near the top of the posts and the other about 450 mm. above the ground and each shall be from 50 mm. to 70 mm. in diameter and sufficiently long to run from post to post to which they shall be bound with strong rope. The method of projecting rails beyond the posts and tying them together where they meet will not be allowed on any account. All along the edges of the excavated trenches a bund of earth about 1.2 m. high shall be formed where required by Project Engineer and Executing Agency (but due care shall be taken while stacking the excavated stuff to cause least inconvenience for day to day site activities) for further protection. The above work shall not be paid for separately and the Concessionaire shaft takes into account the costs of such works and quote accordingly.

Total quantity of water required for entire work including for testing- pipes and fittings at work site shall be arranged by Concessionaire at his own cost. Dragging of pipes and fittings along concrete and similar pavements with hard surfaces shall be prohibited.

The road metal and also the rubble packing obtained out of road surface excavations etc. shall first be stripped off for the whole width and entire length of the trench/pit and separately deposited in such place or places as may be determined by Project Engineer and Executing Agency. In case of the metal packing or "Khandkies" not being so deposited or being mixed up with excavated materials and not available for backfilling and making good the excavation, the cost of the new metal, packing or "Khandkies" required shall be charged to the Concessionaire.

The portions of trenches in stony or rocky ground are to be excavated all along to the entire length and for the full depth such that the bottom of the excavation shall not be higher at any point than the bottom of the concrete' bedding layer below the sewer pipe.

During excavation, large stones and rubble shall be separated and removed from the excavated soil and stacked separately. The material from excavation shall be deposited on either side of the trench leaving adequate clear distance from the edges of the trench and pit or as may be necessary to prevent the sides of the trench/pit to "cave-in" or at such a distance and in such a manner as to avoid covering fire hydrants, sluice valves, manhole covers etc., and so as to avoid abutting the wall or structure or causing inconvenience to the public and other service, organization or otherwise as Project Engineer and Executing Agency may direct.

Concessionaire also shall take into account while quoting his rates for possible additional excavations for trial pits of such sizes and depths that may be required to be undertaken by him as per the instructions of Project Engineer and Executing Agency for determining the locations of various existing underground service line such as water pipes, drains, sewers, gas pipe lines, electric and telephone cable etc. which may be met with. Concessionaire should also as per the instructions of Project Engineer and Executing Agency backfill and thoroughly compact all such additional excavations and make the area as original after the purpose of locating is served. No additional payment will be considered by the Executing Agency on this account.

During the pendency of the contract the Concessionaire should take all due precautions for proper maintenance and protection against damage of all such service lines if met with during excavation, by means of shoring, strutting, planking over, padding- or otherwise as Project Engineer and Executing Agency may direct. Also all precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structures. In case if any such damages have occurred then those shall be made good either by Concessionaire or by other agency, as Executing Agency may decide and wholly in either case at the expense of Concessionaire.

If the work for which the excavation has been made is not completed by the expected date of the setting of monsoon or the setting in of rain whichever is earlier, or before the day fixed by Project Engineer and Executing Agency for filling in any excavation on account of any festival or special occasion, Concessionaire shall backfill such excavation and consolidate the filling at his own expenses as directed by Project Engineer and Executing Agencyand shall re-excavate when required at his own cost.

Project Engineer and Executing Agencymay order portions of shoring to be left in the trenches at such places, where it is found absolutely necessary to do so as to avoid any damage which may be caused (because of pulling out shoring from the- excavated trench/pit) to buildings, cables, gas

mains, water mains, sewers etc. in close proximity of the excavation. Concessionaire shall be paid at the negotiated rate for the shoring left in the trenches / pit if directed by Project Engineer and Executing Agency. Concessionaire shall not claim, for any reasons whatsoever for the shoring which may have been left in position by him at his own discretion. Concessionaire shall not be paid for shoring left in the portions of the rakers, struts, or other timber cut off and not permanently left in the work.

Utmost care shall be taken to see that the width of the trench at the top of pipe is not more than that as specified. In case additional width is required it shall be provided only in the top portion from the ground level upto 300 mm. above the crown of pipe. If any extra width is provided in the area below this portion because of mistake on part of the Concessionaire, Concessionaire shall have to provide remedial measures in the form of lime concrete or rubble masonry or otherwise at the discussion and to the satisfaction of Project Engineer and Executing Agency. Concessionaire shall not be paid any additional for extra excavation as well as for the resulting remedial measures adopted to make up for the additionally done excavation. If rock is met with, it shall be removed to 15 cm. below the bottom of pipes and fittings / specials and the space resulting shall be refilled with granular materials and properly consolidated. No compensation will be paid to the Concessionaire on this account and financial implications for the same should be included by the Concessionaire in his rates. Bottom of trenches / pits shall be saturated with water and well rammed wherever Project Engineer and Executing Agency may consider it necessary to do so.

Wherever a socket or collar of pipe or fitting / special is to be accommodated a strip sufficient enough for this purpose is to be cut in the bottom of the trench or concrete bed to a depth of at least 75 mm. below the bed of the pipe so that the pipe may have a fair bearing on its shaft and does not rest upon its socket. Such strip shall be of sufficient size in every respect to admit the free movements of hand holding necessary tools of the skilled worker, all around the socket in order to make the joint completely water tight and the strip shall be maintained clear until the joint has been approved by Project Engineer and Executing Agency.

All the pipes are to be laid perfectly true both in alignment and to the gradient specified.

When welding is to be carried out with the pipes and specials in the trench, additional excavation of not more than 60 cm. in depth and 90 cm. in length shall be made at joints in order to facilitate welding. The excess volume of this excavation should be brought to the acceptable level by making good with necessary fill material as directed by Project Engineer and Executing Agency. The charges on this account should be included in his rates by the Concessionaire.

The excess excavated material shall be carried away from site of works to a place up to a distance as directed by Project Engineer and Executing Agency. This shall be done immediately so as not to cause any inconvenience to the public or traffic.

5.3 Dewatering

During the excavation, if subsoil water or water mixed with- day/slush- is met with Concessionaire shall have to provide necessary equipment and labourers for dewatering the trenches/pits by bailing out water or clay/slush; if pumping out subsoil water is found to be necessary, Concessionaire shall provide pumps in sufficient numbers/type for the same. In both the above cases the excavation shall be done to the required level and the pipes shall be laid to proper alignment and gradient. Concessionaire shall also make foolproof necessary arrangement for the disposal of drained water to nearby storm water drain or in a pit if allowed by Project Engineer and Executing Agency. In no case the water shall be allowed to- spread indiscriminately over the adjoining area. Before discharging this water into public sewer/drain, Concessionaire shall take necessary permission from all the local authorities before implementing the draining arrangements.

5.4 Special foundation in poor quality soil

Where the bottom of the trench at subgrade is found to consist of material which is unstable to such a degree that in the opinion of Project Engineer and Executing Agency, it cannot be removed and replaced with an approved material thoroughly compacted in place to support the pipe properly, a suitable foundation for the pipes, consisting of piling, timbers or other materials, in accordance with relevant drawings and as instructed and approved by Project Engineer and Executing Agency shall be constructed.

When the work of constructing the pipe lines has to be carried out in soft underground strata, such as puddle etc. or in a reclaimed land, a good foundation shall be provided for the pipes and manholes. For the former, excavation in the trench shall be taken 75 mm. deeper than what is ordinarily required and for this depth the whole of the trench shall be covered over with M-150 bed concrete of the required width, reinforced with B.R.C. fabric No.9 or any other fabric- approved-by the Project Engineer and Executing Agency.
The fabric shall be suitably cut to the requirement and securely joined together with adequate laps which should not be less than 200 mm. The fabric in the pipe line must also be securely jointed together. The rates in both the cases shall be held to include all lapping, jointing and also any probable wastage.

5.5 Wooden shoring

Concessionaire shall suitably design polling boards, walling and struts to meet different soil conditions that might be encountered in excavating trenches/pits. The horizontal and vertical spacing of struts shall, be such that not only the sides of trenches shall be prevented from collapse but also easy lowering of pipe in trenches shall be ensured without creating undue obstructions for the excavation of the work. Any inconvenience and/or delay that might be caused in lowering

pipes in trenches as a result of adopting improper spacing of struts by Concessionaire shall be his sole responsibility. No part of shoring shall at any time be removed by Concessionaire without obtaining permission from Project Engineer and Executing Agency. While taking out shoring planks the hollows of any form must simultaneously be filled in with soft earth well watered & rammed with rammers.

Project Engineer and Executing Agency may order portions of shoring to be left in the trenches/pits at such places, where it is found absolutely necessary to do so as to avoid any damage which may be caused to the adjacent buildings, cables, gas-mains, water mains, sewers etc. in close proximity of the excavation, by pulling out the shoring from the excavations. Concessionaire shall not claim, on any reason, whatsoever for the shoring which may have been left in by him at his own discretion.

5.6 Steel plate shoring

Where the subsoil conditions are expected to be of a soft and unstable character in trench/pit excavation the normal method of timbering may prove insufficient to avoid subsidence of the adjoining road surfaces and other services. In such circumstances Concessionaire will be required to use steel trench sheeting or sheet piling adequately supported by timber struts, walling etc., as per the instructions, manner and method directed by Project Engineer and Executing Agency. Concessionaire shall supply, pitch drive and subsequently remove trench sheeting or piling in accordance with other items of the specification.

5.7 Boning staves and side rails

In laying the pipes and fittings/specials the centre for each pipe line shall be marked by a peg. Concessionaire shall dig holes for and set up two posts (about 100 mm. x 100 mm. x 1800 mm.) at each junction of pipe lines at nearly equal distance from the peg and at sufficient distances there from to be well clear of all intended excavation, so arranged that a side rail when fixed at a certain level against the post shall cross the centre line of the manhole / chamber or pipe lines. The side rail shall not in any case be more than 30 m apart, intermediate rails shall be put up if directed by Project Engineer and Executing Agency.

Boning staves of 75 mm. x 50 mm size shall be prepared by Concessionaire in various lengths, each length being of a certain whole number of metres and with a fixed tee-head and fixed intermediate cross pieces, each about 300 mm. long. The top-edge of the cross piece must be fixed below the top-edge of this tee-head at a distance equal to the outside diameter of the pipe or the thickness of the concrete bed to be laid as the case may be. The top of cross pieces shall indicate different levels such as excavation for pipe line, top of concrete bed, top of pipe etc. as the case may be.

The side rail of size 250 mm. x 40,mm. shall be screwed with the top edge resting against the level marks. The centre line of the pipe shall be marked on the rail and this mark shall denote also the meeting point of the centre lines of any converging pipes. A line drawn from the top edge of one rail to the top edge of the next rail shall be vertically parallel with the bed of the pipe and the depth of the bed of pipe at any intermediate point may be determined by letting down the selected boning staff until the tee head comes in the line of the sight from rail to rail.

The post and rails shall be perfectly square and planed smooth on all sides and edges. The rails shall be painted white on both sides, and the tee heads and cross piece of the boning staves shall be painted black.

For the pipes converging to a manhole / chamber at various levels, there shall be a rail fixed for every different level. When a rail comes within 0.60 M. of the surface of the ground, a higher sight rail shall be fixed for use with the rail over the next point.

The posts and rails shall be in no case be removed until the trench is excavated, the pipes are laid and Project Engineer and Executing Agency gives permission to proceed with the backfilling.

5.8 Encasing / being / hunching etc.

The pipes shall be provided with encasement / bedding / hunching etc. as specified in drawings.

5.9 Laying of pipes and fittings / specials

All precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structure / pipe line of water, gas, etc. and excavation to proceed in accordance with the relevant of Clause of this specifications.

All the pipes are to be laid perfectly true both in alignment and to gradient specified In case of spigot and socket pipe the socket end of the pipe shall face upstream **EXCEPT WHEN THE PIPE LINE RUNS UPHILL IN WHICH CASE THE SOCKET ENDS SHOULD FACE THE UPGRADE**. The laying of pipes shall always proceed upgrade of a slope. After placing a pipe in the trench, the spigot end shall be centered in the socket and the pipe forced home and aligned to required gradient. The pipes shall be secured in place with approved backfill material tamped under it except at the socket. Pipes and fittings / specials which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipes and fittings/ specials of proper dimensions to ensure such uniform space: Precaution shall be taken to prevent dirt from entering the jointing space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by Project Engineer and Executing Agency. During the period that the plug is on, the Concessionaire shall take proper precautions against flotation of the pipe owing to entry of water into the trench: Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or

where long radius curves are permitted, the deflection allowed at joints shall not exceed 2½°. In the case of pipes, with joint to be made with loose collars, the collars shall be slipped on before the next pipe is laid. The pipes shall be laid such that the marking on pipes appears at the top of the pipes.

The cutting of pipe for inserting valves, fittings or closure pieces /specials shall be done in a neat and workmanlike manner without damage to the pipe so as to leave a smooth end at right angles to the axis of the pipe. For this purpose, pipe cutting machine shall be used and skilled labourers only should be allowed to achieve this task.

5.10 Thrust blocks

Thrust blocks shall be provided as directed by Project Engineer and Executing Agency to counteract hydraulic thrust, at places wherever directed and as per relevant drawing.

Where the hydraulic thrust is in an upward direction, anchor blocks as per the relevant drawing shall be provided to which the pipes shall be secured with steel straps.

5.11 Jointing of pipes

Jointing for pipes and fittings / specials shall be done in accordance with: the relevant specifications depending on type of pipes being used.

5.12 Testing and commissioning

Testing and commissioning of pipes shall be done in accordance with the relevant specifications.

5.13 Backfilling

Trenches shall be backfilled with approved selected excavated material only after the successful testing of the pipe line. The tamping around the pipe shall be done by hand or other hand operated mechanical means. The water content of the soil shall be as near the optimum moisture content as possible. Filling of the trench shall be carried out simultaneously on both sides of the pipe in such a manner that the level of filling rises gradually and unequal pressure does not occur on the pipe. Back filling shall be done in layers not exceeding 30 cm. Each layer shall be consolidated by watering, ramming, care being taken not to damage to the pipe line. In case of mild steel pipes / specials, the spiders provided during assembly and welding shall be retained until the trench is refilled and consolidated. Where timbers are placed under the pipe line to aid alignment, these timbers shall be removed before backfilling.

5.14 Reinstatement of road / footpath

Reinstatement of road / footpath shall be done as per requirements of local authorities and the relevant specifications after the completion of work.

5.15 Clearing of site

All surplus materials, and all tools and temporary structures shall be removed from the site as directed by Project Engineer and Executing Agency and the construction site left clean to the satisfaction of Project Engineer and Executing Agency.

6. Measurement

The measurements for excavation in trenches shall be done in following manner and will be paid accordingly.

(i) Length (L) As per the actual length of pipe and fittings / specials laid at work site.

(ii) Width (B) O.D. + 600 mm. only where O.D. is the outside dia. of pipes in mm.

(iii) Depth (D) Average depth of trench from ground level to invert of pipe and fittings.

Excavation of asphalt road and reinstatement of road shall be measured on per square metre basis and the length and width at top of trench shall be considered same as those mentioned for excavation of trench.

The rate for this item should be inclusive of all excess excavated material to be transported from site of work to a place upto a maximum distance of 5 km. as directed by Project Engineer and Executing Agency immediately after his instructions so as not to cause any inconvenience to the public or traffic.

In case the excavation is done in wet condition either by bailing out water or by resorting to pumping, the respective items shall be paid according to the items in schedule of quantities and rates. The measurement for these items shall be made as per the units for relevant item(s) in schedule of quantities and rates. However, Project Engineer and Executing Agency will decide on site the mode of dewatering and his decision shall be final and binding on Concessionaire.

Shoring (open/ close) if to be paid separately shall be measured on the square metre basis of the actual area of trenches shored.

The measurement for removal of excess excavated material upto a specified distance shall be as per the relevant item(s) in the Schedule of Quantities and Rates and shall be measured on cubic metre basis. In case of soil 30% deduction shall be done to take account for voids where as it will be 40% in case of rubble.

Measurement for pipes and fittings / specials shall be in accordance with the relevant clause(s) of specification for particular type of pipes.

7. Notes

Fencing provided along the sides of trenches and pits shall not be paid for separately and Concessionaire shall take into account the costs of such works and quote accordingly.

In case of the road metal packing or dressed stones not being deposited as specified or being mixed up with excavated materials and not available for the reinstatement of road / pavement, the cost of the new metal packing or dressed stones required shall be charged to Concessionaire by Executing Agency.

Service lines if damaged during excavation shall be made good either by Concessionaire or by other agency as Executing Agency may decide and wholly in either case at the expense of Concessionaire.

Concessionaire shall not be paid any additional compensation for excess excavation over what is specified as well as for any remedial measures that are specified.

The excess excavated material shall be carried away from site of works as specified, failing which in view of public safety and traffic convenience at Concessionaire cost.

8. Data Sheet – A

- Hydrostatic Test Pressure at Work Site - 30 m.
- Leakage Test Pressure at Work Site - 30 m.
- Bedding - As per drawing
- Width of trench - O.D. + 600 mm. only where O.D is the outside dia. of pipes in mm

Section - WS2

Technical specifications for laying of jointing of cast iron pipes and fittings (cast iron)

Section - WS2

Technical specifications for laying of jointing of cast iron pipes and fittings (cast iron)

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Section - WS2: Technical specifications for laying of jointing of cast iron pipes and fittings (cast iron)

1. Scope

This specification covers the requirements for collecting from stores / warehouses as suggested by the Executing Agency, transporting to work sites, laying, jointing and field testing of cast iron pipes and fittings for the water distribution and transmission Network.

2. Applicable codes

Various operations such as transporting to work sites, lowering in trenches, laying, jointing and field testing of cast iron pipes and fittings shall comply with all currently applicable standards. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the standards shall be referred to. In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decis ion of Project Engineer in such case shall be final and binding on the Concessionaire.

a) Cast Iron Pipes - LA Class - IS : 1536
b) Specials (Tees, crosses, bends etc.) - IS : 1538
c) Property connections & Fittings - IS: 1239 (Part I & II)
d) Laying of C.I. pipes -IS: 3114
e) Sluice Valves - IS : 780 and IS : 2906
f) Butterfly Valves (Double flanged long body) - BS : 5155 / IS: 13095
g) Kinetic Double Air Valves with isolating sluice valve - IVC make
h) Fire Hydrants - IS : 908
i) Rubber Gasket for Flanged Connection - IS : 638
j) Ferrules - IS: 2692
k) Specification for rubber sealing rings for gas mains, water mains and sewers. IS:5382
l) Scour valve including C.I. L.A class drain pipe of dia. equivalent to that of Scour valve and 6 m. length IS:780 & IS:2906

3. Laying

For Clauses No.3.0 i.e. Carting and Handling, 4.0 i.e. Storage and 5.0 i.e. Laying - please refer Sub-Section WS-1 for "Technical Specifications for Laying of Pipes and Fittings / Specials" which are common for this item also.

4. Valves

4.1. General

i. Valves shall be as per internationally recognized standards. Flanges shall be machined on faces and edges and conform to ISO 7005, IS 6392 or BS 4504.

ii. Valves shall be double flanged type and the face shall be parallel to each other and flange face should be at right angles to the valve centerline. Back side of valve flanges shall be machined or spot faced for proper seating of the head and nut.

iii. Valve buried or installed in underground chamber, where access to a hand wheel would be impractical shall be operated by means of extension spindle and / or keys.

iv. Valve of diameter 450 mm. and above shall be provided with lifting eyes and shall have detachable bolted covers for inspection, cleaning and servicing.

v. Valve shall be suitable for frequent operation as well as operation after long periods of idleness in either open or closed position.

vi. The valve stem, thrust washers, screws, nuts and all other components exposed to the water shall be of a corrosion resistant grade of stainless steel.

vii. Valves shall be free from sharp projections.

4.2. Butterfly valves

(a) Butterfly valve shall be as per IS 13095 / BS 5155. Valve shall suitable for mounting in any position.

(b) The valve seat shall be secured to the valve body. When the valve is fully closed, a seal shall seat firmly so as to prevent leakage. The seat surfaces shall be machined smooth to provide a long life for the seal.

(c) The valve seal shall be replaceable and securely clamped to the edge of the disc by stainless steel seal retention members, or equivalent so as to prevent leakage and to hold the seal securely during operation. The seal retention member shall be securely clamped with stainless steel fasteners. All fasteners shall be set flush so as to offer the least resistance possible to the flow-through the valve.

(d) Valve shall be suitable for throttling purpose.

(e) All valve spindles and hand wheels shall be positioned to give good access for operational personnel.

(f) Valve of diameter 450 mm. and above shall be provided with enclosed gear arrangement for ease of operation. The operation gear shall be such that they can be opened and closed by one man against an unbalanced head 15%in excess of the maximum specified rating.

Valve and any gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 400 N.

(g) All hand wheels shall be arranged to turn in a clockwise direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels

4.3. Sluice valves

(a) Sluice valve shall conform to IS 780 and IS 2906 or relevant internationally recognized standards.

(b) They shall be of rising or non-rising spindle type depending on application. The valve shall be furnished with a bushing arrangement for replacement of packing without leakage. They shall also have renewable channel and shoe linings. The gap between the shoe and channel shall be limited to 1.5 mm.

(c) The gate face rings shall be screwed into the gate or alternatively securely pegged over the full circumference.

(d) Valves of 450 mm. and above shall be provided with thrust bearing arrangement for ease of operation.

(e) Valves of diameter 450 mm. and above shall be provided with enclosed gear arrangement for ease of operation. The operation gear of all valves shall be such that they can be opened and closed by one man against an unbalanced head 15% in excess of the maximum specified rating. Valve and any gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 400 N.

(f) Al1 valves, spindles and hand wheels shall be positioned to give good access for operational personnel.

(g) All hand wheels shall be arranged to turn in a clockwise direction to close the valve, the direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels.

4.4. Non-return valve

(a) The valve shall be suitable for mounting on a horizontal pipeline and flow direction shall be clearly embossed on the valve body.

(b) The valves shall possess high speed closing characteristics and be designed for minimum slam condition when closing.

(c) In case of multi door swing type check valve, the non-slam characteristic shall be achieved by providing suitable combination of door and hydraulic passages without any external damping arrangements or passages. The angle of sealing and door weight shall be designed to provide the most efficient working with least restriction to flow.

(d) Valve of diameter greater than 450 mm. shall be provided, in addition to others, feet and jacking screws. Hinge pins / shaft shall preferably be square in section to ensure positive location of flaps and provide for secure fixing.

4.5. Air valves

(a) The valve shall be capable of exhausting air form pipe work automatically when being filled. The air being released at a sufficiently high rate to prevent the restriction of the inflow rate. Similarly the valve shall be capable of ventilating pipe work automatically when being emptied, the air inflow rate being sufficiently high to prevent the development of a vacuum in the pipelines. The valve shall also automatically release air accumulating in pipe work during normal working conditions.

(b) Air valve shall be of the double orifice type with a large orifice for ventilation or exhaust of the pipeline and smaller orifice for automatic release of air under normal working pressure.

(c) Air valve shall be designed to prevent premature closure prior to all air having been discharged from the line. The orifice shall be positively sealed in the closed position but the float (ball) shall only be raised by the liquid and not by a mixture of air and liquid spray. The seating shall be designed to prevent the floats sticking after long periods in the closed position.

4.6. Pressure relief valves

1. Pressure relief valves shall be capable of relieving pressure in the system to prevent the system being pressurized in excess of a preset maximum allowable pressure. The valves shall be drop tight under normal operating conditions.

2. The valve operation shall be achieved by the interaction of the inlet pressure and an intermediate pressure produced by a pilot valve or relay system acting on the upper side of the main valves.

3. The pilot valve or relay system shall be actuated by a diaphragm connected to the inlet pressure on its underside and a constant pressure on its upper side derived either from weight or from a spring.

5. Jointing

5.1. Tyton joints

The rubber rings shall be stored in a cool dark, dry and dust free environment. The storage location shall not be exposed to direct sunlight or any heat radiating appliances. The rings shall not be allowed to come in contact with any fuels and shall be stored free of tension.

Rubber rings shall be clearly labeled in bundles to indicate the type of ring, the size of pipe which they are to be used, the manufacturer's name or trademark and the month and the year of the manufacture.

The rings shall comply with IS:5382 regarding their material finish, tolerance in dimensions and physical requirements. Rubber ring bundles from every lot shall carry with them manufacturer's test certificate showing the results of following tests:

[a] Hardness
[b] Tensile Strength
[c] Compression test
[d] Oil immersion test
[e] Water absorption test
[f] Stretch test and visual examination

The test procedures, the scale of sampling and the criteria for acceptance shall be as per IS:5382 and lS:3400.

The rubber rings shall be such that they shall not show any signs of deterioration for any reasons during the contract period plus the defects liability period. Entire expenses associated with correcting defects in this regard including replacement of rubber rings shall be fully borne by the Concessionaire.

In jointing cast iron spigot and socket pipes and fittings with tyton flexible joints, the Concessionaire shall take into account the manufacturer's recommendations as to the methods and equipment to be used in assembling the joints, in particular the Concessionaire shall ensure that thespigot end of the pipe to be jointed is smooth and has been properly chamfered, that the rubber ring as per IS::5382 is correctly positioned in the socket and that the two pipes are accurately in line, before the joint is made. The rubber rings and any recommended lubricant shall be procured

only through the reputed pipe supplier or as directed by the Project Engineer and Executing Agency.

5.2. Flanged joints

In case of flanged joints, the jointing material used between flanges of pipes and fittings shall be compressed fibre board or rubber conforming to IS:638 of thickness between 1.5 mm. to 3 mm. The fibre board shall be impregnated with chemically neutral mineral oil and shall have a smooth and hard surface. Its weight per sq.m. shall be not less than 112 g./mm. thickness. Each bolt shall be tightened a little at a time taking care not to tighten the bolt which is located immediately adjacent to the tightened bolt and the bolt which is located diametrically opposite each other should alternatively be tightened.
The practice of fully tightening the bolts one after another shall not be allowed. The bolts shall be of mild steel unless otherwise specified.

5.3. Lead caulking joint

The jointing shall be done with molten lead and spun yarn. Pig lead shall be of uniform quality, clean and free from any impurities and any foreign materials. It shall be of uniform softness capable of being easily caulked or driven. It shall conform to IS::782. Spun yarn shall be of clean hemp and of good quality. It shall conform to IS: 65S7. The quantity of lead and spun yarn to be used for jointing of different diameters of C.I. pipes and fittings shall be as per Table 1 of IS::3114.

Lead shall be heated in a melting pot kept in easy reach of the joint to be poured so that the molten metal will not be chilled in being carried from the melting pot to the joint and shall be brought to a proper temperature so that when stirred it will show a rapid change of colour. Before pouring, all scum shall be removed. Each joint shall be made with one continuous pour filling in the entire joint space with solid lead. Spongy or imperfectly filled joints shall thoroughly cleaned by heating/burning till all the contents of the imperfectly tilled lead in the joint are cleared. After clearing the joint it should be re-poured as per the original procedure.

The joint runner shall fit snugly against the face of the socket and a bund of clay should be made on outside of the pipe to form a pouring lip to provide for filling the joint flush with the face and to the top of the socket.

The jointing is done by first caulking in spun yarn, then filling the remainder of the joint space by running in molten lead, taking care that no dross enters the joint, and then thoroughly caulking the lead. The spun yarn shall be used to centre the spigot in the socket and to prevent the flow of molten lead into the bore of the pipe.

After the lead has been run into the joint the lead shall be thoroughly caulked. Caulking of joints shall be done after a convenient length of the pipes shall been laid and leaded. The leading ring shall first be removed and any lead outside the socket shall be removed with a flat chisel and then the joint caulked around three times with caulking tools of increasing thickness and hammer of 2 kg weight. Lead run joints shall be preferably finished 3 mm. behind the socket face. The joints shall not be covered till the pipe line has been tested under specified hydrostatic test pressure, though the rest of the pipe line should be covered up to prevent expansion and contraction due to variation in temperature.

5.4. Proposed jointing of C.T. pipes

It is proposed to use spigot and socket pipes with rubber ring tyton joints and flanged joints for valves and other appurtenances.

The pipeline shall be laid such that the socket ends should face the upstream on level ground. When the line runs uphill the socket end should face the upgrade.

Whenever valve or hydrant connection is to be made socket and flanged specials or T specials as shown in the drawings shall be used.

In case of rubber ring joints, the groove and the socket shall be thoroughly cleaned before inserting the rubber gasket. While inserting the gasket, it shall be made sure that it takes the proper direction and that it is correctly seated in the groove. After cleaning dirt or foreign materials from the plain end, lubricant shall be applied in accordance with the pipe manufacturer's recommendations. The plain end of the pipe shall be pushed into the socket of the pipe and while pushing, the pipe shall be kept straight. If any deflections are to be made in the alignment, it may be made after the joint is assembled.

For joints between pipe and valve, socket and flanged specials shall be used. The gasket used between flanges of valves and pipe shall be compressed fibre board or natural / synthetic rubber (IS::63S) of thickness between 1.5 to 3.0 mm. The fibre board shall be impregnated with chemically neutral mineral oil and shall have a smooth and hard surface. Its weight per square meter shall be not less than 112 g/mm thickness. Each bolt should be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively. The practice of fully tightening the bolts one after another is highly undesirable.

5.5. Property connections

A property connection should consist of following parts

(i) Brass ferrule

(ii) Communication pipes with couplings, bends, elbows, union etc. (Length as per drawings)
(iii) Cap at the end of the communication pipe near the plot boundary.

The plot Executing Agency is expected to construct and connect the remaining portion of property connections at plot boundary. The desired arrangement of property connection is shown in Drawing No.15-A-101.

5.6. Connection at main

Boring on water main should be done on top of main to reduce possible entry of silt into pipe and subsequently damaging of meters. A manual drilling and tapping machine should be used for this purpose. A bore shall be drilled and tapped on CI main and a ferrule shall be screwed directly into the bore. Upto 38 mm size of property connections, ferrules shall be used where as for higher size property connections, T connection shall be given. Ferrule shall be of gunmetal or brass as per IS: 2692. The ferrule should be so set in the main that the communication pipe leads off in line with the main before curving round right handed into its proper course as show in Drawing No. 15-A-I01. G I. Pipes to be used as property connections shall confirm to IS: 1239. Class C. the pipe should be provided, external protection of bitumen coating with hession cloth wrapped over it. It should be provided with PVC sheathing wherever they are exposed such as in case of drain crossings.

The specials to be used at crossing of pipelines, T joints, 90 deg. bends and valve joints are shown in the Drawing No. 15-A-101.

5.7. Testing

After the pipes and specials are laid, jointed and the trench partially back filled except at the joints the stretch of pipe line as directed by Project Engineer and Executing Agency shall be subjected to pressure test and leakage test. Where any section of the rising main is provided with concrete thrust blocks or anchorages, the pressure test shall not be made until atleast five days have elapsed after the concrete was cast. If rapid hardening cement has been used in these blocks or anchorages, the test shall not be made until atleast two days have elapsed after concreting.

Each section of pipe line shall be slowly filled with water and all air shall be expelled from the pipe by tapping at points of highest elevation before the test is made and plugs inserted after the test have been completed. Specified pressure as per Data Sheet A, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe as directed by Project Engineer and Executing Agency. The duration of test shall not be less than 5 minutes. Where the field test pressure is less than two-third the work test pressure, the period of test should be increased to atleast 24 hours. If a drop in pressure occurs, the quantity of water added in order to re-establish

the test pressure should be carefully measured. This should not exceed 0.1 litre/mm, dia. per km. of pipe line length per day for each 30 m. head of pressure applied. The exposed joints shall be carefully examined and all such joints showing visible leaks shall be rectified until it becomes fully water tight. Any cracked or defective pipes and fittings as a consequence of this pressure test shall be removed from site and replaced by acceptable quality of pipes by Concessionaire and the test shall be repeated to the satisfaction of Project Engineer and Executing Agency.

After the satisfactory completion of pressure test, the section of pipeline shall be subjected to leakage test at a pressure as specified in Data Sheet A. The duration of test shall be 2 hrs. No pipe installation shall be accepted until the leakage is less than the number of CUM./hr. as determined by the formula;

$$qL = \frac{ND\sqrt{p}}{3.3}$$

where,

q L = the allowable leakage in CUM./hr.
N = number of joints in the length of the pipeline
D = diameter in mm. and
p = the average test pressure during the leakage test in kg./sq.cm.

Should any test of pipe laid disclose leakage greater than that specified above the defective joints shall be repaired by Concessionaire at no extra cost to the Executing Agency until the leakage is within the specified allowance.

Necessary equipment and water used for testing shall be arranged by Concessionaire at his own cost. Damage during testing shall be Concessionaire's responsibility and shall be rectified by him at no extra cost to the Executing Agency. Water used for testing shall be drained out from the pipe to safe location and should not be released in the excavated trenches.

After the tests mentioned above are completed to the satisfaction of Project Engineer and Executing Agency, the backfilling of trenches shall be done as per specification.

5.8. Disinfection of water mains

The mains intended for potable water supplies should be disinfected before commissioning them for use.

After pressure testing the main, it should be flushed with water with sufficient velocity to remove all dirt and other foreign materials. When this process has been completed the process of disinfection (using liquid chlorine, sodium or calcium hydrochloride) can proceed by one of the following methods.

5.9. Continuous feed

In this method, water from the distribution system or other approved source and the chlorine are fed at a concentration of atleast 20 to 50 mg./litre. A properly adjusted hydrochloride solution injected into the main with a hydro chlorinator, or liquid chlorine injected into the main through a solution feed chlorinator and booster pump shall be used. The residual chlorine should be checked at intervals to ensure that the proper level is maintained. Chlorine application should continue until the entire main is filled. The water should remain in the main for a minimum of 24 hours, during which time all valves, hydrants, etc. along the main should be operated to ensure their proper disinfection. Following the 24 hours period not less than 10 mg./l. residual chlorine should remain in the main.

5.10. Slug method

In this method a continuous flow of water is fed with .a constant dose of chlorine but with rates proportioned to give a chlorine concentration of atleast 300 mg./l. The chlorine is applied continuously for a period of time to provide a column of chlorinated water that will contact all interior surface of the main for a period of atleast three hours. As the slug passes tees, crosses etc., valves must be properly operated to ensure their disinfection. This method shall be used principally for large diameter mains.

Regardless of the method used, it is necessary to make certain that back flow of the strong chlorine solution into the supplying line does not occur. The' chlorinated water should be flushed to waste until the remaining water has a chlorine residual approximating to 0.2 tng./l. that throughout the rest of the system bacteriological tests should be taken and if the result fails to meet minimum standards, the disinfecting procedure must be repeated and the results again tested before placing the main in service.

6. Measurement

The measurement for pipe laying shall be on running metres of net length along the centre line of pipe as laid including specials. The length of pipes shall not include the portion of spigots within the sockets of fittings and pipes.

The rate for providing and laying of C.I. pipes shall be deemed to include the extra excavation required for ordinary bedding of pipes as per IS: 783 and also for sockets or flanges if any and cost of jointing material.

6.1. Procedure of measurements

i. Length (L): As per the actual length of pipe and fittings / specials laid at work site.

ii. Trench Width (B): For payment of excavation, the width of trench shall be considered as O. D. + 600 mm. only where O.D. is the outside diameter of the pipe in mm.

iii. Depth (D): Average depth of trench from ground level to invert of pipe and fittings.

7. Data sheet - A

7.1. Hydrostatic test pressure at work site - 30 m

7.2. Leakage test pressure at work site - 30 m.

7.3. Bedding - As per drawing

8. Notes

Fencing provided along the sides of trenches and pits shall not be paid for separately and Concessionaire shall take into account the costs of such works and quote accordingly.
In case of the road metal packing or dressed stones not being deposited as specified or being mixed up with excavated materials and not available for the reinstatement of road / pavement, the cost of the new metal packing or dressed stones required shall be charged to Concessionaire by Executing Agency.

Service lines if damaged during excavation shall be made good either by Concessionaire or by other agency as Project Engineer and Executing Agency may decide and wholly in either case at the expense of Concessionaire.

Concessionaire shall not be paid any additional compensation for excess excavation over what is specified as well as for any remedial measures that are specified.

The excess excavated material shall be carried away from site of works as specified, failing which in view of public safety and traffic convenience Executing Agency / Project Engineer may carry out the work by any other agency at Concessionaire's risk and cost.

Portion of shoring left in the excavated trenches or pits shall be measured and paid separately, if instructed by Project Engineer and Executing Agency to do so.

Section G4.1
General mechanical specifications

Section – G4.1

General mechanical specifications

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Section G4.1: General mechanical specifications

1. Double entry split casing pumps

The pumping unit shall consist of a horizontal split-case, single stage and double suction impeller directly connected through a flexible coupling to a horizontal induction motor. The pump shall be designed such that the rotating element can be removed without disturbing the pipework or the pump motor. All rotating parts individually and in assembly shall be statically and dynamically balanced to prevent vibration through a range of normal and reverse speeds.

The pumps shall be designed to operate satisfactorily without detrimental surges, vibration noise, or dynamic imbalance over the required head range. The head-capacity curve of the pump shall have a continually rising head characteristic with decreasing capacity over the whole range of total head.

The Concessionaire shall guarantee that adequate required Net Positive Suction Head (NPSH) is available to ensure that pumps can operate without cavitation under the worst operating conditions. The required NPSH at duty point shall be at least 0.5 M less than the available NPSH at the lowest water level in the sump.

Each pump must be capable of running satisfactorily in parallel with 3 to 5 other sets in the system without throttling and by itself, without cavitation or overload under all operating conditions within the system resistance indicated.

The unit shall be designed to operate safely at the maximum speed attainable in the reverse direction of rotation due to water returning through the pump at times when the power supply to the motor is interrupted and the discharge valve fails to close.

Pumps shall run smooth without undue noise and vibration. The velocity of vibration shall be within the 4.5 mm / sec. Noise level shall be limited to 85 dBA at a distance of 1.86 m.

Automatic float type air valve with cock shall be fitted in the highest part of the casing to assist priming.

Small bore pipework shall be provided for gland water drainage. Gland water drainage shall be piped to the drainage channel.

All the pumps shall be supplied with machined pads to allow the fitting of portable vibration monitoring transducers.

The pump casing shall be of the double suction type. Either single or double volute type could be adopted, to produce smooth flow with gradual changes in velocity. Unbalanced, hydraulic, radial thrust acting upon rotating elements shall be kept minimum.

Flanges shall be machined on faces and edges and conform to ISO 7005, IS 6392 or BS 4574. Back faces of flanges shall, where necessary, be machined to ensure they are parallel to the front faces and that flange bolts can be fitted flush to the flanges.

The pump casing shall be provided with removable and renewable wearing rings where there are close-running clearances between the impeller and the casing. Suitable tapped holes shall be provided for air vents and for drains. The casing shall be so constructed that the drains will unwater the entire casing. One tapped hole shall be provided in the discharge flange and the suction flange for connection of pressure gauges.

The casing stuffing box and gland shall be designed to be suitable for easy maintenance of the conventional gland packings.

The pump base, or the supporting bracket, shall be drilled in the shop for doweling to the baseplate at the site.

The impeller shall be the enclosed type and shall be fastened to the shaft in such a manner as to make it readily removable. The water passages of the impeller shall be hand finished to remove rough spots and excessive irregularities. Removable and renewable wearing rings shall be provided on the impeller where there are close running clearances between the impeller and the casing. Materials and hardness of the casing and impeller wearing rings shall be selected to ensure that they are not susceptible to galling and premature wear.

The shaft shall be provided with replaceable stainless steel sleeves with proper hardness where it passes through the stuffing boxes and water passages. Water deflectors shall be provided on the shaft to prevent water from passing along the shaft and entering the pump bearings.

A stationery guard shall be provided for the coupling conforming to all relevant safety codes and regulations. Guard shall be designed for easy installation and removal, complete with necessary support, accessories and fasteners.

The stuffing box shall be provided with a readily accessible soft packings of conventional type. The material of packing shall be of technically advanced and commercially available type.

The pump shaft shall be supported by two bearings of anti-friction type, one located on each side of the pump. Bush bearing will not be accepted. The bearings may be of the oil or grease lubricated, ball or roller bearing type. One bearing on the pump shall be of the thrust type,

designed to withstand the unbalanced axial hydraulic thrust. Suitable fittings shall be furnished for the type of lubrication provided. Bearings shall have a minimum life of 40,000 hours of operation.

It is desired that bearings be furnished which do not require water for cooling. If the bearings are water cooled, the water shall be taken from the pump discharge and returned to the pump suction. Suitable cooling water supply piping and return drain piping shall be supplied, and a y-type strainer with blow off shall be provided in the cooling water supply piping.

Seals shall be provided to prevent loss of lubricant and entrance of moisture and dirt.

The pumping unit shall be provided with a structural / steel baseplate. The pump and motor may be mounted on a common baseplate or on separate baseplates. The baseplates shall be of sufficient size and rigidity to maintain the pump and motor in proper alignment and position. All contact surfaces between the pump and baseplate and between the motor and baseplate shall be machined. Means shall be provided for transmitting the entire load due to discharge shutoff pressure to the concrete structure. After the unit has been installed and properly aligned, the baseplates will be drilled and reamed for the dowels. The necessary dowels shall be furnished with the pumping unit.

2. End Suction Pumps

End suction pumps shall be horizontally mounted complete with drive motor on a common base plate. The pump / drive coupling shall be of the spacer type to facilitate removal of the pump rotating element and bearing housing without dismantling the pump casing, adjoining pipework or drive motor.

The bedplate shall be of substantial fabricated steel construction with floor fixing bolt holes ready drilled. All holding down bolts etc. shall be supplied with the units.

Impellers shall be provided with means to prevent abrasive matter reaching the glands and with fully shrouded impellers, to prevent the trapping of matter between the impeller vanes and the casing.

The speed of any pump(excluding non-clog pumps) shall not exceed 1,500 rpm.

Glands may be fitted with suitable mechanical seals or conventional soft packing. The gland arrangement shall be designed for ease of adjustment or removal of the seal or packing material. Shafts shall be sleeved around the area of the gland when soft pack glands are used.

Flushing facilities shall be provided for mechanical seals or packed glands, where pump fluid may be contaminated with abrasive material. Where soft packed glands are used, means shall be provided for collection of the gland leakage water, which shall be piped into the drainage system through adequately sized ports.

Lubrication arrangements shall be so designed that there is no contamination of the pumped fluid.

The pumps and associated pipework shall be, wherever possible, arranged so that air can be completely expelled during priming. Where this is not possible, facilities shall be provided for the removal of the trapped air. Adequate facilities shall be provided for drainage of the pumps for inspection purposes.

Tappings shall be provided at both the suction and discharge flanges for pressure gauge equipment.

3. Submersible pumps

Submersible pumps shall be of the totally submersible centrifugal or mixed flow type capable of operating below a 15m. head of water. The pumping unit shall be suitable for continuous operation, designed to meet the desired performance and capable of handling the pumped medium without undue wear and tear.

A built-in cooling system must allow the motor to operate continuously at its rated output regardless of whether the electric motor is submerged or not.

The motor shall be direct coupled to its pump and rated for continuous full load operation above or under water.

The insulation rating of the motor shall be Class F rated to run at Class B and supply rated output at deviations of upto $\pm$ 5% of the rated frequency and voltage. The motor shall be to IP68 BS 5490.

The cable termination shall be water tight and provided with a cable sleeve and strain relief.

The motor shall have ball type bearings permanently greased and maintenance free.

The pump and motor shall be separated by two mechanical face seals. The lower seal shall rotate in the water medium and the upper seal shall rotate in an oil bath medium.

The pump shall have a non-overloading performance characteristic and its efficiency shall be high at the duty point and remain at a reasonably high level over the duty range of the pumping system.

Rotating assemblies of pumps shall be statically and dynamically balanced.

The pump wear rings shall be easily replaceable.

4. Induction motor

4.1 Design Requirements

The motors shall generally conform to IS:325 or relevant, equivalent internationally approved standards. Additionally the specific requirements mentioned in the following clauses shall also be met.

4.2 Performance and Characteristics

(a) Motors shall be capable of giving rated output without reduction in the expected life span when operated continuously under the following supply conditions :

(i) Variation in supply voltage $\pm$ 10%

(ii) Variation in supply frequency $\pm$ 5%

(iii) Combined voltage and frequency variation $\pm$ 10%

(b) Motors shall be suitable for full voltage direct-on-line starting.

(c) The power rating of the motor shall be the larger of the following :

(i) 115% of the power input to the pump at duty point.

(ii) Maximum power input while operating within maximum and minimum system resistance.

4.3 Insulations

(a) Any joints in the motor insulation such as at coil connections or between slot and winding sections, shall have strength equivalent to that of slot sections of the coil. The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot, humid and tropical climate. The motors shall be provided with class F insulation with temperature rise limited to that of class B insulation.

(b) Motors shall be given power house treatment. This comprises an additional treatment to the winding over and above the normal specified treatment. After the coils are placed in slots and all connections have been made, the entire motor assembly shall be impregnated by completely submerging in suitable insulating compound or varnish followed by proper baking. At least three such submersions and bakings shall be applied to the assembly.

4.4 Constructions Features

(a) The motor construction shall be suitable for easy disassembly and reassembly. The enclosure shall be sturdy and shall permit easy removal of any part of the motor for inspection and repair.

(b) Motors weighing more than 25 kg. Shall be provided with eyebolts, lugs or other means to facilitate safe lifting.

(c) The rotor bars shall not be insulated in the slot portion between the iron core laminations for squirrel cage motors.

4.5 Terminal Box

(a) Terminal boxes shall be of weather proof construction designed for outdoor service. To eliminate entry to dust and water, gaskets of neoprene or approved equivalent shall be provided at cover joints and between box and motor frame. It shall be suitable for bottom entry of cables. It shall be capable of being turned through 360 degrees in steps of 90 degrees.

(b) The terminals shall be of the stud type with necessary plain washers, spring washers and check-nuts. They shall be designed for the current carrying capacity and shall ensure ample phase to phase and phase to ground clearances. Suitable cable glands and cable lugs shall be supplied to match specified cables.

4.6 Accessories

Two independent earthing points shall be provided on opposite sides of the motor, for bolted connections. These earthing points shall be in addition to earthing stud provided in the terminal box.

4.7 H.V. Motors

a) Motors shall be capable of starting and accelerating the load with the applicable method of starting, without exceeding acceptable winding temperatures, when the supply voltage is 80% of the rated voltage.

b) Motors shall be capable of satisfactory operation at full load at a supply voltage of 80% of the rated voltage for 5 minutes, commencing from hot condition.

c) The locked rotor withstand time under hot conditions at 110% rated voltage shall be more than starting time at minimum permissible voltage by atleast two seconds or 15% of the accelerating time whichever is greater. The locked rotor current of motors shall not exceed 600% of full load current of motors which is inclusive of 20% tolerance.

d) Motors when started with the drive imposing its full starting torque under the specified supply voltage variations shall be capable of withstanding atleast two successive starts from cold condition and one start from hot condition without injurious heating of windings. The motors shall also be suitable for three equally spread starts per hour under the above referred supply conditions.

e) The three phases shall be segregated by metal barriers within both line and neutral terminal box.

f) The earthing pads shall be of non-corrodible metal, welded / brazed at two locations on opposite sides. The pad size shall be 75 x 65 x 25 mm. With two holes drilled at 40 mm. centers, tapped and provided with suitable bolts and washers for connecting the earthing strip.

g) At least six resistance type temperature detectors for the stator winding each having D.C. resistance of 100 ohms at 0 degrees Celsius, embedded in the stator winding at locations where highest temperatures may be expected, shall be provided. The material of the RTD's shall be platinum.

h) Motors shall have space heaters suitable for 240 V single phase 50 Hz AC supply. These shall be placed in easily accessible position in the lower part of motor frame. Provision shall be made to measure temperature of bearing by inserting hand held temperature measuring device.

i) Motors shall have drain plugs so located that they will drain water, resulting from condensation or other causes from all pockets in the motor casing.

4.8 L.V. Motors

(a) Motors shall be suitable of starting and accelerating the load with the applicable method of starting, without exceeding acceptable winding temperatures, when the supply voltage is 85% of the rated motor voltage.

(b) The locked rotor current of the motor shall not exceed 600% of full load current (subject to tolerance as per the applicable standard).

(c) Motors shall be designed to withstand 120% of rated speed for two minutes without any mechanical damage, in either direction of rotation.

(d) Stator leads shall be brought to the terminal box as insulated cable through a suitable barrier and terminated in clamp type terminals.

5. Valves

5.1 General

(a) Valves shall be as per internationally recognised standards. Flanges shall be machined on faces and edges and conform to ISO 7005, IS 6392 or BS 4504.

(b) Valves shall be double flanged type and the face shall be parallel to each other and flange face should be at right angles to the valve centreline. Back side of valve flanges shall be machined or spot faced for proper seating of the head and nut.

(c) Valve buried or installed in underground chamber, where access to a handwheel would be impractical shall be operated by means of extension spindle and / or keys.

(d) Valve of diameter 450 mm. and above shall be provided with lifting eyes and shall have detachable bolted covers for inspection, cleaning and servicing.

(e) Valve shall be suitable for frequent operation as well as operation after long periods of idleness in either open or closed position.

(f) The valve stem, thrust washers, screws, nuts and all other components exposed to the water shall be of a corrosion resistant grade of stainless steel.

(g) Valves shall be free from sharp projections.

5.2 Butterfly Valve

(a) Butterfly valve shall be as per IS 13095 / BS 5155. Valve shall suitable for mounting in any position.

(b) The valve seat shall be secured to the valve body. When the valve is fully closed, a seal shall seat firmly so as to prevent leakage. The seat surfaces shall be machined smooth to provide a long life for the seal.

(c) The valve seal shall be replaceable and securely clamped to the edge of the disc by stainless steel seal retention members, or equivalent so as to prevent leakage and to hold the seal securely during operation. The seal retention member shall be securely clamped with stainless steel fasteners. All fasteners shall be set flush so as to offer the least resistance possible to the flow through the valve.

(d) Valve shall be suitable for throttling purpose.

(e) All valve spindles & handwheels shall be positioned to give good access for operational personnel.

(f) Valve of diameter 450 mm. and above shall be provided with enclosed gear arrangement for ease of operation. The operation gear shall be such that they can be opened and closed by one man against an unbalanced head 15% in excess of the maximum specified rating. Valve and any gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 400 N.

(g) All handwheels shall be arranged to turn in a clockwise direction to close the valve, the direction of rotation for opening and closing being indicated on the handwheels.

5.3 Sluice Valves

(a) Sluice valve shall conform to IS 780 and IS 2906 or relevant internationally recognised standards.

(b) They shall be of rising or non-rising spindle type depending on application. The valve shall be furnished with a bushing arrangement for replacement of packing without leakage. They shall also have renewable channel and shoe linings. The gap between the shoe and channel shall be limited to 1.5 mm.

(c) The gate face rings shall be screwed into the gate or alternatively securely pegged over the full circumference.

(d) Valves of 450 mm. and above shall be provided with thrust bearing arrangement for ease of operation.

(e) Valves of diameter 450 mm and above shall be provided with enclosed gear arrangement for ease of operation. The operation gear of all valves shall be such that they can be opened and closed by one man against an unbalanced head 15% in excess of the maximum specified rating. Valve and any gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 400 N.

(f) All valves, spindles and handwheels shall be positioned to give good access for operational personnel.

(g) All handwheels shall be arranged to turn in a clockwise direction to close the valve, the direction to close the valve, the direction of rotation for opening and closing being indicated on the handwheels.

5.4 Non-Return Valve

(a) The valve shall be suitable for mounting on a horizontal pipeline and flow direction shall be clearly embossed on the valve body.

(b) The valves shall possess high speed closing characteristics and be designed for minimum slam condition when closing.

(c) In case of multidoor swing type check valve, the non-slam characteristic shall be achieved by providing suitable combination of door and hydraulic passages without any external damping arrangements or passages. The angle of sealing and door weight shall be designed to provide the most efficient working with least restriction to flow.

(d) Valve of diameter greater than 450 mm. shall be provided, in addition to others, feet and jacking screws. Hinge pins / shaft shall preferably be square in section to ensure positive location of flaps and provide for secure fixing.

5.5 Air Valve

(a) The valve shall be capable of exhausting air form pipework automatically when being filled. The air being released at a sufficiently high rate to prevent the restriction of the inflow rate. Similarly the valve shall be capable of ventilating pipework automatically when being emptied, the air inflow rate being sufficiently high to prevent the development of a vacuum in the pipelines. The valve shall also automatically release air accumulating in pipework during normal working conditions.

(b) Air valve shall be of the double orifice type with a large orifice for ventilation or exhaust of the pipeline and smaller orifice for automatic release of air under normal working pressure.

(c) Air valve shall be designed to prevent premature closure prior to all air having been discharged from the line. The orifice shall be positively sealed in the closed position but the float (ball) shall only be raised by the liquid and not by a mixture of air and liquid spray. The seatings shall be designed to prevent the floats sticking after long periods in the closed position.

5.6 Pressure Relief Valve

(a) Pressure relief valves shall be capable of relieving pressure in the system to prevent the system being pressurised in excess of a preset maximum allowable pressure. The valves shall be drop tight under normal operating conditions.

(b) The valve operation shall be achieved by the interaction of the inlet pressure and an intermediate pressure produced by a pilot valve or relay system acting on the upper side of the main valves.

(c) The pilot valve or relay system shall be actuated by a diaphragm connected to the inlet pressure on its underside and a constant pressure on its upper side derived either from weight or from a spring.

6. Electric Actuator

(a) All local controls shall be protected by a lockable cover.

(b) Each actuator shall be adequately sized to suit the application and be continuously rated to suit the modulating control required. The gearbox shall be oil or grease filled, and capable of installation in any position. All operating spindles, gears and headstocks shall be provided with adequate points for lubrication.

(c) The actuator shall be capable of producing not less than 1½ times the required valve torque and shall be suitable for at least 15 minutes continuous operation.

(d) The actuator starters shall be integrally housed with the actuator in robustly constructed and totally enclosed weatherproof housing. The motor starter shall be capable of starting the motor under the most severe conditions.

(e) The starter housing shall be fitted with contacts and terminals for power supply, remote control and remote positional indication, and shall also be fitted with internal heaters so as

to provide protection against damage due to condensation. Heaters shall be suitable for single phase operation. The heaters shall be switched "ON" when the starters are "OFF" and shall be switched "OFF" when the starters are "ON".

(f) Each starter shall be equipped as follows :

(i) 2 Nos. - Three phase magnetically operated line contactors with no-volt release and electrical and mechanical interlock.

(ii) 1 No. - Three phase terminal cut-out device.

(iii) 1 No. - Control circuit transformer fully protected by fuses on primary and secondary circuit.

(iv) 1 No. - Set of "Open", "Close" and "Stop" buttons.

(v) 1 No. - Local - Off-remote switch with padlocking facilities.

(vi) 1 No. - Set of torque and limit switches for "Open" and "Close" positions.

(vii) Valve position indicator and handwheel for manual operation.

(ix) Reduction gear unit.

(g) Gearbox shall have a life of 1,00,000 hours, and be selected in accordance with AGMA recommendation.

7. Pipe Work

All pipes, fittings, bolts, nuts, jointing materials and appurtenances for piping required for execution of the Works shall be manufactured and erected in accordance with the erection plans, specifications and directives of the Project Engineer and Executing Agency. All pipework and fittings shall be to a class in excess of the maximum pressure attained in service including any surge pressure.

The pipework installation shall be so arranged to offer ease of dismantling and removal of pumps or other major items of equipment. Flanged adapter shall be included in the suction and delivery pipe work of all pumps as well as on delivery header for easy dismantling, and provision shall be made for a flexible joint arrangement to building structures. All loose flanges shall be secured to fixed flanges by suitable tie-bolts. All pipe work shall be adequately supported with purpose-made fittings. When passing through walls, pipe work shall incorporate a puddle flange or other suitable sealing device. Flange adapters and unions shall be supplied and fitted in pipe work runs,

wherever necessary, to permit the simple disconnection of flanges, valves and equipment. The final outlet connection of the pipe work shall match the connecting point of the transmission main.

Flanged joints shall be made with minimum 3 mm thick full face, fabric reinforced rubber gaskets, pierced to take the bolts, and the face of all flanges shall be machined to give a true angle of 90^{o} to the centre line of the pipe or fittings. All necessary supports, saddles, slings, fixing bolts and foundation bolts shall be supplied to support the pipe work and its associated equipment in an approved manner. Valves, meters and other devices mounted in the pipe work shall be supported independently of the pipes to which they are connected.

The whole of the jointing work and materials necessary to fix and connect the pipes, including adequate and efficient pipe support shall be included in the Contract. The Concessionaire shall be responsible for ensuring that the internal surface of all pipe work is thoroughly clean before and during erection and before commissioning. Cleaning shall include removal of all dirt, rust, scale and welding slag due to site welding. Before despatch from the manufacturer's works, the ends of the pipes, branch pipes, etc., shall be suitably capped and covered to prevent any accumulation of dirt or damage. This protection shall not be removed until immediately prior to connecting adjacent pipes, valves or pumps. All small bore pipes shall be blown through with compressed air before connection is made to instruments and other equipment. No point of passage of pipes through floors or walls shall be used as a point of support, except with the approval of the Project Engineer and Executing Agency.

Material of steel pipes and fittings shall conform to IS:2062. Fabrication and testing shall be in accordance with IS:3589 for pipes and IS:6392, ISO 7005 or P.S. 4804 for flanges.

All the underground buried mild steel piping shall be protected by the application of hot coal tar enamel and fibre glass wrapping. The coating shall consist of one coaltar primer coat, one coaltar enamel coat, wrapping of fibre glass and one more coat of enamel and then final wrap of enamel impregnated fibre glass.

8. Hand operated travelling cranes

Hand operated travelling cranes shall be manufactured in accordance with medium duty class 2.

The term crane shall be deemed to include also hoists, gantry, rails end stops, holding down bolts and all other items required for complete installation.

Sufficient slings, ropes, shackles, lifting beams and all other necessary equipment shall be supplied to handle all items of plant served by the crane. They shall be labelled or marked with

their safe working load in accordance with the safety code and with the purpose, for which they are intended.

9. Sluice Gate

9.1 Design Requirements and Construction Features

(a) The construction of sluice gates shall be in accordance with the Specification and generally as per AWWA C 501 or IS:13349.

(b) The sluice gates shall be capable of performing the duties set in this Specification without undue wear or deterioration. They shall be constructed so that maintenance is kept to a minimum. All parts of sluice gate, including lifting mechanism components shall be designed for the heads specified with a minimum safety factor of five.

(c) All sluice gates shall be of the rising spindle type.

9.2 Frame

The frame shall be of ample section and cast in one piece. All surface forming joints and bearings shall be machined. The frame shall be of the flange back type and shall be machined on the rear face to bolt directly to the machined face of the wall thimble.

9.3 Guide

(a) Guide shall be bolted to the frame or cast integrally with it and shall be machined on all bearing and contact faces.

(b) The length of guide shall be such that it should support the gate upto the horizontal line of stem nut pocket.

(c) Arrangement shall be made to prevent lateral movement of bolted on guides. They shall be capable of taking the entire thrust produced by water pressure and wedging action. Wedges shall be attached securely to the guides at points where, in the closed position, they will make full contact with the wedging surfaces on the slides.

9.4 Seating Faces

(a) Seating faces shall be made of full width, solid section. They shall be secured firmly by means of counter sunk fixings in finished grooves in the frame and slide faces in such a way as to ensure that they will remain permanently in place, free from distortion and loosening during the life of the sluice gates.

(b) The faces shall be of ample section and finished smooth. The maximum clearance between the seating surfaces, with the slide in the closed position shall not exceed 0.10 mm.

9.5 Wedging Devices

Sluice gates shall be equipped with adjustable side, top and bottom wedging devices as required to provide contact between the slide and frame facing when the gate is in closed position. All faces shall be machined accurately to give maximum contact and wedging action. Wedges shall be fully adjustable with suitable adjusting screws and locknuts and so designed that they will remain in the fixed position after adjustment.

9.6 Gate Slides

(a) The slide shall be with strengthening ribs where required and a reinforced section to receive the seating faces.

(b) The slide shall have tongues on each side extending its full length, and the tongues shall be machined accurately on contact surfaces. Surfaces of the slide that come in contact with the seat facing and wedges shall be machined accurately. The maximum allowable clearances between the slide and the slide guide shall be 1.6 mm.

(c) An integrally cast stem nut pocket with reinforced ribs shall be provided above the horizontal centre line of the slide. The stem nut pocket shall be provided with drain.

9.7 Stem Nut and Lift Nut

Gate shall be provided with a lower fixed stem nut for connecting the stem to the slide and a revolving lift nut located in the lifting mechanism in the head stock. They shall be of ample design to endure the thrust developed during gate operation under maximum gate operating condition loads in opening and closing direction. The stem nut and slide shall be constructed to prevent turning of the stem nut in the pocket in the slide. The stem be threaded and keyed or threaded and pinned to the stem.

9.8 Stem

The threads of the stem shall be machined cut or rolled and of the square or acme type. The number of threads per inch shall be such as to work most effectively with the lift mechanism used. The top of the stem be provided with a stop collar.

9.9 Stem Coupling

The coupling shall be threaded and keyed or threaded and bolted, and shall be of greater strength than the stem.

9.10 Stem Guides

Stem guides shall be cast, with bushings and mounted on cast brackets. Guides shall be adjustable in two directions and shall be so constructed that when properly spaced they shall hold the stem in alignment. Number of stem guides shall be such that unsupported length of stem shall not exceed one hundred times its diameter.

9.11 Lifting Mechanism

(a) Sluice gate shall be operated through suitable lifting mechanism which shall incorporate suitable gearing, if required.

(b) Lifting mechanism shall be suitable for operation by one man under all conditions. Lifting mechanism shall incorporate a strong locking device suitable for use with a padlock or padlock and chain.

(c) The manual operation shall be of the handwheel or crank operated type and shall have a lift nut threaded to fit the operating stem. Crank shall be removable. Ball or roller thrust bearings shall be provided above and below the flange on the lift nut to take the load developed in opening and closing the gate with a torque of 14 kg-m. on the crank. Fittings shall be provided to lubricate gears and bearing.

(d) The design of the lift mechanism of the hand operated gates shall be such that the slide can be operated with a torque of not more than 7 kg-m. on the operator after the slide is unseated from wedges based on the operating head. The maximum crank radius shall be 380 mm.

(e) All gears and bearings shall be enclosed in a cast iron housing with labyrinth seals. The lifting mechanism shall be with a cast iron pedestal, machined and drilled to receive the gear housing and suitable for bolting to the operating floor. The gates shall close with

clockwise rotation of the crank. The direction of rotation to close the gates shall be indicated on the lift mechanism.

(f) A suitable means shall be provided for lubricating the stem threads directly adjacent to the lift nut. An inspection cover shall be provided to access the lift nut and gearing.

(g) Stem shall be provided with a GI pipe cover shall be fixed to the head stock.

9.12 Fasteners

All anchor bolts, assembly bolts, screw, nuts, etc. shall be of ample section to safety withstand the forces created by operation of the gate.

9.13 Wall Thimbles

(a) Wall thimbles shall be made of cast iron and shall be supplied along with the gate. The wall thimbles shall provide a rigid mounting, designed to prevent warping of the gate frame during installation.

(b) The cross section of the thimble shall have the shape of the letter 'F'. The front, or mounting flange, shall be machined and shall be drilled and tapped to the same template used for its particular gate frame. The frame shall be attached to the thimble with bolts of studs. The depth of the wall thimbles shall not be less than 300 mm.

(c) To permit entrapped air to escape as the thimble is being encased in concrete, holes not lesser than 35 mm. diameter at more than 600 mm. span, shall be cast or drilled in each entrapment zone formed by the reinforcing ribs or the flange and water stop.

9.14 Lifting Lugs

Lifting lugs shall be provided for all gates.

Section - G5.1
General electrical specifications

Section G5.1: General electrical specifications

1. Scope of works and responsibility of the concessionaire

The concessionaire is advised to peruse the document in full and understand the scope of work as detailed elsewhere in this document. He is / they are also advised to make himself / themselves aware of the site requirements and conditions before submission of his / their bid. Clarification, if any, required shall be made with the consultant before submission of bid.

However, nothing shall absolve the concessionaire to carry out and complete the entire works including those minor / incidental works required for the completion of the work whether it is explicitly brought out in this document or not.

The Concessionaire shall make appropriate arrangement for power supply provisions during Construction Period. All power and lighting circuits shall be constructed with due regard for personnel safety and shall comply with recognized codes of practice and local regulations. All circuits shall be fitted with earth leakage systems.

This specification is a general specification and the applicability of various component requirements shall be as per actual requirements from site to site basis

2. Interpretation

All the technical terms referred in this document shall have the interpretation as per the relevant Indian standard code / Indian Electricity Rules / Indian Electricity Act etc., In case on any doubt in any of the meanings / interpretations, the tenderer shall get the same clarified from the owner prior to submission of bid.

3. Electrical 's license

The electrical works shall be carried out by persons holding valid competency certificate issued / recognised by the Licensing Board of the locality / State in which the works is to be done. The Concessionaire holding valid Licence / Authorisation from the Licensing Board of the locality / State for carrying out the installation work of such nature and voltage grade.

4. Design philosophy

All equipment offered by the Concessionaire shall offer the following features:-

- Safety to personnel and equipment during operation and maintenance.
- Reliability of Services.

- Ease of maintenance.
- Facility for ready addition of future loads.
- Convenience of operation.
- Maximum Inter-changeability of equipment.
- Minimum fire risk.

5. Codes and Standards

Whether explicitly mentioned in this specification document or not, all the engineering, systems, equipment, materials and works being provided by the Concessionaire for this project shall conform to the requirements of the respective latest editions / amendments of the Indian Standards Specifications. In particular cases where relevant Indian Standards are not available, other International Codes and Standards may be accepted, subject to Executing Agency's specific approval.

The design and the installation shall be in accordance with established and sound engineering practices, standard specifications and must conform to the statutory regulations applicable.

The equipment and installation shall conform to (but not be limited to) the following (Latest versions/editions).

- Indian Electricity Act, 1910
- Indian Electricity Rules, 1956
- The Factory Act, 1948

In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decision of Project Engineer in such case shall be final and binding on the Concessionaire.

6. Electrical system

Unless and until specified, otherwise the complete electrical system shall be suitable to work satisfactorily with the following system parameters

System Voltage (High Voltage)	:	11 kV (E) 3 wire 50 Hz AC system of supply and subject to permissible variations as per IE Rules
System Voltage (Medium Voltage)	:	415 Volts, 3 phase, 4 Wire AC system of supply subject to permissible variations as per IE rules
System Voltage (Low Voltage)	:	240 Volts Single phase 3 wire AC system of supply subject to permissible variations as per IE rules

Frequency	:	50 Hz and subject to permissible variations as per IE rules
Neutral Earthing	:	Solidly earthed
Fault Level	:	50 kA at Main / Incomer level
Control Voltage	:	110 Volts AC

7. Service conditions

All equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

Maximum ambient temperature (deg C)	:	50
Maximum temperature in shade (deg C)	:	45
Average temperature in air (deg C) in shade	:	35
Relative Humidity (%)	:	60 to 80
Maximum altitude above mean sea level (Meters)	:	1000
Operating Environment	:	Moderately hot and humid tropical climate conducive to rust & fungus growth.

8. Drawings and data

The concessionaire shall furnish the following drawings and data as part of the work:

i. General arrangement showing plan, elevation and typical section views.
ii. Foundation plan showing location of fixing channels, floor openings etc.
iii. Schematic wiring drawings for each breaker.
iv. Technical literature on the equipment offered.
v. Make/ Model No. of various major electrical equipment

The Concessionaire shall also furnish the following drawings for each major equipment such as HV panels, Transformers, MV panels, APFCR Panel, Street lighting Poles etc., after the award of contract.

(i) Overall outline dimensions and general arrangement including plan, front elevations, clearances required in front and back etc.,.
(ii) Schematic control diagrams to cover controls, protection, interlocks, switch instruments, space heaters, etc., for each type of module.
(iii) Itemized bill of material for each module, listing all devices mounted and cable glands, indicating all type, rating quantity and special notes, if any.

(iv) Detailed internal wiring diagram of each type of module, including terminal block number, ferrule numbers and the external cable connection designations.

(v) Inter panel interconnection wiring diagram including terminal numbers and ferrule numbers.

9. The energy measurement point:

(i) The "point of supply" of the utility connections for measuring the electrical energy consumption when the Facilities are running on utility power.

(ii) The Concessionaire shall also install meters and gauges at the DG Sets to measure the total number of energy units (in kWh) consumed from the DG Sets in each month of the O&M Period.

(iii) If the Concessionaire sets up a Power Plant at the Site, then the Concessionaire shall install meters at the Power Plant to measure the total number of energy units (in kWh) generated from the Power Plant in each month of the O&M Period.

(iv) All the energy recording meters shall be in conformance with the required class of accuracy and type as mandated by the utility rules and regulations.

10. Specific project requirements for electrical equipment

10.1. 11 KV Ring Main Unit (RMU)

❖ **Scope**

This specification describes the minimum requirement for design, manufacture, inspection and testing before despatch, packing and delivery F.O.R. (Destination) of SF6 insulated RMUs complete with other accessories and auxiliaries equipments and mandatory spares, described herein and required for their satisfactory operation.

The objective of the RMUs is for extremely small construction width, compact, maintenance free, independent of climate, easy installation, operational reliability, safe and easy to operate, minimum construction cost, minimum site work and minimum space requirement.

The RMUs shall conform in all respects to high standards of Engineering design, workmanship and latest revisions of relevant standards at the time of offer.

The type of the 11 KV circuit breaker shall be VCB. Insulating medium for load break isolators, Earth switch, 11 KV Buses and other associated equipment's should be SF6 gas.

❖ **General**

The insulation / dielectric media inside the stainless steel welded tank should be SF6 gas. The RMU should be of extensible type on both sides with provision of attaching /connecting with SNAP FIT arrangement without external bus bars additional load break switches and circuit breakers in future whenever required.

The RMU shall be for a nominal voltage of 12 KV for 11 kV RMU using SF6 gas as insulating and Vacuum as arc quenching medium. The RMU and combination shall be tropicalized and outdoor metal enclosed type. The RMU metal parts shall be of high thickness, high tensile steel which must be grit /short blasted, thermally sprayed with Zinc alloy, phosphate or should follow the 7 tank pre-treatment process and be subsequently painted with polyurethane based powder paint. The overall paint layer thickness shall be not less than **80 microns**.

Relevant IE rules for clearances, safety and operation inside the enclosure shall be applicable. The enclosure shall be **IP54** and type tested from recognized laboratories by National Accreditation Board of Laboratories (NABL). All live parts except for the cable connections in the cable compartments shall be insulated with SF6 gas.

The SF6 gas tank shall be made of **TIG** welded **stainless steel**, to have the best weld quality. The gas cubicle shall be metal enclosed with stainless steel of minimum 2 mm thickness and should be provided with a pressure relief arrangement away from operator.

The gas tank shall be of completely welded construction. The connection of different welded sections of gas tank by gasket and bolts, to form a RMU chamber is not acceptable.

Both the load break switches and the tee off circuit breaker shall be suitable for **motorization in future**. The cable box of isolators and circuit breakers both should be of front access type. The side and rear access cable box are not preferred as they require greater space for cable connection and maintenance at site. Any accidental over pressure inside the sealed chamber shall be limited by the opening of a pressure-limiting device in the rear-bottom part of the enclosure. Gas will be release to the rear of the switchboard away from the operator and should be directed towards the bottom, into the trench to ensure safety of the operating personnel and the pedestrians / civilians. All the manual operations should be carried out on the front of the switchboard.

The entire units of RMU shall be enclosed in a single compact metal clad, outdoor enclosure suitable for all weather conditions. The switchgear/steel gas tank shall be filled with SF6 as per IEC/IS Standards relative pressure to ensure the insulation and breaking functions. The steel gas

tank must be sealed for life and shall meet the "Sealed pressure system" criteria in accordance with the IEC 298 standard. The RMU must be a system for which no handling of gas is required throughout the 20 years of service life.

The RMU shall have a design such that in the event of an internal arc fault, the operator shall be safe. This should be in accordance with IEC 298 and relevant Test certificates shall be submitted during design and detailed Engineering stage.

❖ **The RMU shall be tested for an minimum internal arc rating of 20 kA for 1 Sec.**

Suitable temperature rise test on the RMU shall be carried out & test reports shall be submitted during design and detailed Engineering stage. Each switchboard shall be identified by an appropriately sized label, which clearly indicates the functional units and their electrical characteristics devices is visible to the operator on the front of the switchboard and operations are visible as well.

The entire system shall be totally encapsulated. There shall be no access to exposed conductors. In accordance with the standards in effect, the switchboards shall be designed so as to prevent access to all live parts during operation without the use of tools.

The entire 11 KV RMU are insulated by inert gas (SF6) suitable for operating voltage up to 12 KV respectively. The 11 KV circuit breakers must be VCB breaker. **It is necessary to fit an absorption material in the tank to absorb the moisture from the SF6 gas**. The SF6 insulating medium shall be constantly monitored via a temperature compensating gas pressure indicator offering a indication at different temperature ranges, like -25, 0, 20, 40, 60 deg centigrade, having distinctive RED and GREEN zones for safe operation.

- **Sulphur Hex fluoride Gas (SF6 GAS)**

The SF6 gas shall comply with IEC 376, 376A and 376B and shall be suitable in all respects for use in 11 KV and 22 kV RMUs under the operating conditions. The SF6 shall be tested for purity, dew point air hydrolysable fluorides and water content as per IEC 376, 376A and 376B.

- **Standards**

Unless otherwise specified elsewhere in this Specification, the RMU, Switchboard (Switchgear), Load break isolators, Instrument Transformers and other associated accessories shall conform to the latest revisions and amendments thereof to the following standards.

- IEC 60 298/IEC 62 271-200/IS 12729:1988 - General requirement for Metal enclosed switchgear

- IEC60129/IEC62271-102/IS 9921 - Alternating current disconnector's (Load break isolators) and earthing switch
- IEC 62 271-100/IEC 60 056/IS 13118:1991 - Specification for alternating current circuit breakers.
- IEC 62 271-1/IEC 60694 - Panel design, SF6/Vacuum Circuit Breakers
- IEC 60044-1/IEC 60185/IS 2705:1992 - Current Transformer
- IEC 60265/IS 9920:1981 - High voltage switches.
- IEC 376 - Filling of SF6 gas in RMU.
- IEC 60273/IS :2099- Dimension of Indoor & Outdoor post insulators with voltage> 1000 Volts.
- IEC 60529/IS 13947(Part-1) - Degree of protection provided by enclosures for low voltage switchgear and control gear.
- Indian Electricity Rules/Bills

Equipment meeting with the requirements of any other authoritative standards, which ensures equal or better quality than the standard mentioned above shall also be acceptable. If the equipment's, offered by the Concessionaire conform to other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. In case of any difference between provisions of these standards and provisions of this specification, the provisions contained in this specification shall prevail. One copy of such standards with authentic English Translations shall be furnished along with the offer.(Hard copy)

- **Specific requirements in RMU**

The RMUs going to be installed in the field network, will be hooked with **SCADA t**hrough RTUs and hence, RMUs used shall be compatible with SCADA **RMU outdoor metal clad enclosure.**

The RMU enclosure must be a metallic, it shall follows an industrialized process of manufacturing**.** The RMU and combination shall be tropicalized and outdoor metal enclosed type. The RMU metal parts shall be of high thickness, high tensile steel which must be grit/short blasted, thermally sprayed with Zinc alloy, phosphate or should follow the 7 tank pre-treatment process and be subsequently painted with polyurethane based powder paint. The overall paint layer thickness shall be not less than 80 microns.

The rating of enclosure shall be suitable for operation on three phase, three wire, 11 KV, 50 cycles, A.C. System with short-time current rating of 20 kA for 3 seconds with RMU Panels. The enclosure should have two access doors one for the operation and relay monitoring and other for the cable access. Both the doors should have the locking facility.

- **Take OFF terminal units for future automation:**

The RMU should be provided with necessary take off terminal units for future automations, located in the front recesses / LV cubical of the RMU.

- **Isolators (Load Break Type)**

The load break isolators for Incoming and Outgoing supply must be provided. These should be fully insulated by SF6 gas. The load break isolators shall consist of 630 Amp fault making/load breaking spring assisted ring switches, each with integral fault making earth switches. The switch shall be naturally interlocked to prevent the main and earth switch being switched 'ON' at the same time. The selection of the main and earth switch is made by a lever on the facia, which is allowed to move only if the main or earth switch is in the off position. The load break isolators should have the facility for future remote operation. Each load break switch shall be of the triple pole, integral earthing arrangement.

The isolating distance between the OFF and the ON position in the isolator should be more than **80 mm**, so as to have enough isolating distance for ensuring safety during DC injection for Cable testing.

- **Earthing of Isolators and breakers (earth switch)**

Necessary arrangements are provided at Load break isolators / Distribution Transformer Breaker for selecting Earth position. Mechanical interlocking systems shall prevent the RMU function from being operated from the 'ON' to 'Earth' on position without going through the 'OFF' position.

- **Tee Off breaker (Vacuum)**

The VCB breaker for the controlling of Transformer must be provided inside welded stainless steel SF6 gas tank with the outdoor metal clad enclosure. The VCB circuit breaker must be a spring assisted three positions with integral fault making earth switch. The selection of the main/earth switch lever on the facia, which is allowed to move only if the main or earth switches is in the off position.

The manual operation of the circuit breaker shall not have an effect on the trip spring. This should only be discharged under a fault (electrical) trip; the following manual reset operation should recharge the trip spring and reset the circuit breaker mechanism in the main off position.

The circuit breaker shall be fitted with a mechanical flag, which shall operate in the event of a fault (electrical) trip occurring. The 'tripped' flag should be an unambiguous colour differing from any other flag or mimic. Both the circuit breaker and ring switches are operated by the same unidirectional handle.

The protection on the circuit breaker shall comprise of the following components:-

- 3 class X protection CT's,
- a low burden trip coil and
- a **self-powered (No external DC or AC source required) IDMT protection relays (Numeric/Microprocessor based)** 3 x over current and earth fault element shall be Definite Time type relay. The protection system should be suitable for protecting transformers of rated power from 250 KVA onwards. The relay should be housed within a pilot cable box accessible.

- **Bushings**

The units are fitted with the standardized bushings that comply with IEC standards. All the bushings are the same height from the ground and are protected by a cable cover.

- **Cable boxes**

All the cable boxes shall be air insulated suitable for dry type cable terminations and should have front access only. Side and rear cable entry / access should be avoided, so not to have extra space at site for cable connection and cable testing. The cable boxes at each of the two ring switches should be suitable for accepting HV cables of sizes 3C x 240 sq.mm and circuit breaker cable suitable up to 3C x 300 sq.mm.

The cable boxes for an isolator in it's standard design should have sufficient space for connecting two cables per phase.

- **Cable testing facility**

It shall be possible to test the cable after opening the cable boxes. The cable boxes should open only after operation of the earth switch. Thus ensuring the earthing of the cables prior to performing the cable testing with DC injection.

- **Voltage indicator lamps and phase comparators**

The RMU shall be equipped with a voltage indication to indicate whether or not there is voltage on the cable. There should be a facility to check the synchronization of phases with the use of external device. It shall be possible for the each of the function of the RMU to be equipped with a permanent voltage indication as per IEC 601958 to indicate whether or not there is voltage on the cables.

- **Extensible**

Each RMU shall have the provision for extension by load break isolators / breakers in future, with suitable accessories and necessary Bus Bar. The equipment shall be well designed to avoid any kind of extension / trunking chamber for connecting and housing extensible Busbars. Extensible isolators and circuit breakers shall be individually housed in separate SF6 gas enclosures. Multiple devices inside single gas tank / enclosure will not be acceptable. In case of extensible circuit breakers, the Breaker should be capable of necessary short circuit operations as per IEC at 20 KA, and the Breaker should have a rated current carrying capacity of 200 A.

- **Wiring & Terminals**

The wiring should be of high standard and should be able to withstand the tropical weather conditions. All the wiring and terminals (including take off terminals for future automation, DC, Control wiring), Spare terminals shall be provided by the Concessionaire. The wiring cable must be standard single-core non-sheathed, Core marking (ferrules), stripped with non-notching tools and fitted with end sleeves, marked in accordance with the circuit diagram with printed adhesive marking strips. The wiring should be of high standard and should be able to withstand the tropical weather conditions. All wiring shall be provided with single core multi strand copper conductor wires with PVC insulation.

The wiring shall be carried out using multi-strand copper conductor super flexible PVC insulated wires of 650/1100 V Grade for AC Power, DC Control and CT circuits. Suitable colored wires shall be used for phase identification and interlocking type ferrules shall be provided at both ends of the wires for wire identification. Terminal should be suitably protected to eliminate sulphating. Connections and terminal should be able to withstand vibrations. The terminal blocks should be stud type for controls and disconnecting link type terminals for CT leads with suitable spring washer and lock nuts.

Flexible wires shall be used for wiring of devices on moving parts such as swinging Panels (Switch Gear) or panel doors. Panel wiring shall be securely supported, neatly arranged readily accessible and connected to equipment terminals, terminal blocks and wiring gutters. The cables shall be uniformly bunched and tied by means of PVC belts and carried in a PVC carrying trough. The position of PVC carrying trough and wires should not give any hindrance for fixing or removing relay casing, switches etc., Wire termination shall be made with solder less crimping type of tinned copper lugs. Core identification plastic ferrules marked to correspond with panel wiring diagram shall be fitted with both ends of each wire.

Ferrules shall fit tightly on the wire when disconnected. The wire number shown on the wiring shall be in accordance with the IS. 375. All wires directly connected to trip circuits of breaker or devices shall be distinguished by addition of a red color unlettered ferrule. Inter-connections to

adjacent Panels (Switch Gear) shall be brought out to a separate set of Terminal blocks located near the slots or holes to be provided at the top portion of the panel. Arrangements shall be made for easy connections to adjacent Panels (Switch Gear) at site and wires for this purpose shall be provided and bunched inside the panel. The bus wire shall run at the top of the panel. Terminal block with isolating links should be provided for bus wire. At least 10% of total terminals shall be provided as spare for further connections. Wiring shall be done for all the contacts available in the relay and other equipment and brought out to the terminal blocks for spare contacts. Color code for wiring is preferable in the following colours.

(a) Voltage supply Red, Yellow, Blue for phase and Black for Neutral
(b) CT circuits similar to the above
(c) DC circuits Grey for both positive and negative
(d) 250 V AC circuits Black for both phase and neutral
(e) Earthing Green

The wiring shall be in accordance to the wiring diagram for proper functioning of the connected equipment. Terminal blocks shall not be less than 650 V grade and shall be piece-molded type with insulation barriers. The terminal shall hold the wires in the tight position by bolts and nuts with lock washers. The terminal blocks shall be arranged in vertical formation at an inclined angle with sufficient space between terminal blocks for easy wiring. The terminals are to be marked with the terminal number in accordance with the circuit diagram and terminal diagram. The terminals should not have any function designation and are of the tension spring and plug-in type.

- **Earthing**

The RMU outdoor metal clad, Switch Gear, Load break isolators, Vacuum circuit breakers shall be equipped with an earth bus securely fixed along the base of the RMU. The size of the earth bus shall be made as per IEC/IS standards Necessary terminal clamps and connectors shall be included in the scope of supply.

All metal parts of the switchgear which do not belong to main circuit and which can collect electric charges causing dangerous effect shall be connected to the earthing conductor made of **copper** having CS area of minimum 75 sq.mm. Each end of conductor shall be terminated by M12/equivalent quality and type of terminal for connection to earth system installation. Earth conductor location shall not obstruct access to cable terminations.

The following items are to be connected to the main earth conductor by rigid or **copper** conductors having a minimum cross section of 75 sq.mm

(a) Earthing switches

(b) Cable sheath or screen
(c) Capacitors used in voltage control devices, if any.

The metallic cases of the relays, instruments and other panel mounted Equipment shall be connected to the earth bus by independent copper wires of size shall be made of IEC/IS standards. The colour code of earthing wire shall be green.

Earthing wires shall be connected on the terminals with suitable clamp connectors and soldering shall not be permitted.

- **Accessories**

The following spares and accessories shall be ensured along with the main equipment's

1) Charging lever for operating load break isolators & circuit breaker of each RMU.
2) The pressure gauges indications – 1 numbers
3) Provision shall be made for padlocking the load break switches/ Circuit breaker, and the earthing switches in either open or closed position with lock & master key.

- **Testing of equipment & Accessories**

Provision for testing CTs, Relays, Breakers and Cables shall be made available. The supplier shall provide procedure and schedule for Periodical & Annual testing of equipments, relays, etc.

- **Tests:**

Type test

The Concessionaire should, after award of contract during design detailed engineering, submit copies of all Type test certificate of their make in full shape as confirming to relevant ISI/IEC of latest issue obtained from a International/National Govt. Lab/Recognized laboratory along with quality plan, inspection plan as per applicable Indian standards.

- **Acceptance and Routine tests**

All acceptance and routine tests as stipulated in the latest IEC/ IS shall be carried out by the supplier in the presence of owner's representative. The supplier shall give at least 7 days advance intimation to the owner to enable them to depute their representative for witnessing the tests. The partial discharge shall be carried out as routine test on each

completely assembled RMU gas tank and not on a sample basis. As this test checks and guarantees for the high insulation level and thus the complete life of switchgear.

- **Additional tests**

The Executing Agency reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/laboratory or at any other recognized laboratory/research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the Executing Agency to satisfy that the material complies with the intent of this specification.

- **Pre-commissioning tests**

All the pre-commissioning tests will be carried out in the presence of the ProjectEngineer and Executing Agency and necessary drawing manual and periodical test tools shall be arranged to be supplied. During the above tests the Concessionaire's representative should be present till the RMUs are put in to service.

- **Inspection:**

The owner may carry out the inspection at any stage of manufacture. The supplier shall grant free access to owner representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the owner shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

The supplier shall keep the owner in advance, about the manufacturing programme so that arrangement can be made for inspection. The owner reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. The owner has rights to inspect the supplier's premises for each consignment for type & routine test. No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested / unless the same is waived by the owner in writing.

- **Quality Assurance Plan:**

The Concessionaire shall invariably furnish following information during Design and detail engineering stage

(i) Statement giving list of important raw materials including but not limited to:

(a) Contact material

(b) Insulation
(c) Sealing material
(d) Contactor, limit switches, etc. in control cabinet.

Name of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of test normally carried out on raw materials in presence of Concessionaire's representative, copies of test certificates.

(ii) Information and copies of test certificates as in (i) above in respect of bought out accessories

(iii) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

(iv) Special features provided in the equipment to make it maintenance free.

(v) List of testing equipment available with the Concessionaire for final testing of RMUs and associated combinations vis-à-vis, the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the relevant schedule i.e. schedule of deviations from specified test requirements. The supplier shall, within 15 days from the date of receipt of Purchase Order submit following information to the owner.

(vi) List of raw materials as well bought out accessories and the names of sub-suppliers selected from those furnished during Design and Detailed Engineering stage.

(vii) Necessary test certificates of the raw material and bought out accessories.

(viii) Quality Assurance Plan (QAP) withhold points for owner inspection. The quality assurance plan and hold points shall be discussed between the owner and supplier before the QAP is finalized.

The supplier shall submit the routine test certificates of bought out items and raw material, at the time of routine testing of the fully assembled breaker.

- **Training**

The supplier shall give rigorous training to the engineers & staff at the site for 2 days in attending trouble shooting and maintenance.

SCADA Connectivity: Specific requirement for SCADA connectivity following requirement shall be fulfilled:

1. FPI shall be provided per isolator
2. **DC control supply system should be 24 V DC.**
3. Battery charger to cater load of minimum 10 motorized operation cycles (CLOSE / OPEN) in absence of battery.
4. Battery to cater load of minimum 10 motorized operation cycles (CLOSE-OPEN) in absence of battery charger. **The battery backup should be minimum of 2Hrs**
5. Availability of MCB's for battery charger supply, RMU Motor supply & FRTU supply (Minimum 2 Amp circuit for future use of FRTU).
6. Individual control circuit of isolator/CB/BC to have point of isolation/protection.
7. Individual motor circuit of isolator/CB/BC to have point of isolation/protection.
8. RMU shall have minimum protection of IP 54 with gland plate & knock outs. Provision for control cable entry should preferably be from Right/ Left top through LV cable box & shall be independent of HV isolator/CB/BC status. It should be vermin proof.
9. Control cable gland plate shall be independent of power cable gland plate.
10. A point of earthing for control cables shall be electrically isolated from power cable earthing.
11. Ambient temperature of 50 degree C max. Allowable temperature rise of battery & battery charger above ambient 40 degree C.
12. Local / Remote switch shall be provided on all the isolator & breaker panels for selection of controls
13. CT & PT terminals for all the circuit breakers only.

Following is the list of I/O requirements for RMU modules. Please note that all DI & DO should be potential free contacts.

a) List of potential free contacts for Isolator (Terminals shall be provided):

Digital Indications

1. Isolator ON
2. Isolator OFF
3. Isolator Earth switch Status (ON/OFF)
4. FPI Operated
5. LOCAL/REMOTE switch position

List of commands

1. Isolator Close
2. Isolator Open
3. FPI reset

b) List of potential free contacts for Circuit Breaker / Bus coupler (Terminals shall be provided):

Digital Indications

1. Circuit Breaker ON
2. Circuit Breaker OFF
3. Auto trip
4. LOCAL/REMOTE switch position

List of commands

1. CB Close
2. CB Open

Requirement for Multifunction Meters (MFMs):

1. Terminals shall be provided for CT and PT connections.
2. Space may be provided for MFM mounting inside control panel.

c) List of potential free signals for AUXILIARY:

Digital indications

1. RMU Battery charger fail
2. Battery Low indication
3. SF6 low

Documentation and drawings

All drawings shall conform to relevant International Standards Organization (ISO) Specification.

The Concessionaire shall submit after award of contract during design and detailed engineering stage, dimensional general arrangement drawings of the equipment's, illustrative and descriptive literature in triplicate for various items in the RMUs, which are all essentially required for future automation.

i) Schematic diagram of the RMU panel

ii) Instruction manuals
iii) Catalogues of spares recommended with drawing to indicate each items of spares
iv) List of spares and special tools recommended by the supplier.
v) Copies of Type Test Certificates as per latest IS/IEC.
vi) Drawings of equipment's, relays, control wiring circuit, etc.
vii) Foundation drawings of RMU.
viii) Dimensional drawings of each material used for item Vii.
ix) Actual single line diagram of RMU/RMUs with or without Extra combinations shall be made displayed on the front portion of the RMU so as to carry out the operations easily.

The following should be supplied to along with the initial supply of the equipment's ordered.

Two copies of printed and bound volumes of operation, maintenance and erection manuals in English along with the copies of approved drawings and type test reports etc.

- **Nameplate**

Each RMU and its associated equipment's shall be provided with a nameplate legible and indelibly marked with at least the following information.

(a) Name of manufacturer
(b) Type, design and serial number
(c) Rated voltage and current
(d) Rated frequency
(e) Rated symmetrical breaking capacity
(f) Rated making capacity
(g) Rated short time current and its duration
(h) Purchase Order number and date
(i) Month and Year of supply
(j) Rated lighting impulse withstand voltage
(k) Feeder name (Incoming and Outgoing), DTs Structure name, 11000 Volts Dangers etc.

Note: Recognized abbreviations may be used to express the above and auxiliary supply shall be stated either on the circuit breaker name plate or any other acceptable position.

- **Fault Passage Indicators (FPI):**

These shall facilitate quick detection of faulty section of line. The fault indication may be based on monitoring fault current flow through the device. The unit should be self-contained requiring

no auxiliary power supply. The FPI shall be integral part of RMU. The FPI shall have ***LCD/LED display***, automatic reset facility. The sensors to be bushing mounted. **FPI shall be provided per Isolator**

- **Tropicalisation**

Due regard should be given to the climatic conditions under which the equipment is to work. Ambient temperature normally varies between 20 °C and 32 °C, although direct sun temperature may reach 50 °C. The climate is humid and rapid variations occur, relative humidity between 60% and 90% being frequently recorded, but these values generally correspond to the lower ambient temperatures. The equipment should also be designed to prevent ingress of vermin, accidental contact with live parts and to minimize the ingress of dust and dirt. The use of materials, which may be liable to attack by termites and other insects, should be avoided.

- **Motorization**

All the functions within the RMU i.e. Isolators / Breakers should be suitable for motor drive mechanism and closing coil making it suitable to make it ON from remote.

Control Supply and Auxiliaries : Following Auxiliaries has to considered

(i) Shunt trip coil – 24VDC for Isolators and Breakers
(ii) Closing Coil – 24VDC
(iii) 6NO+6NC – Potential free auxiliary contacts for breakers / isolator
(iv) Auxiliary supply should be – 24 V DC
(v) Local / Remote switch for breaker and Isolators

- **Metering**

Separate Metering Module consisting of bus connected PT's and metering CT's to be provided for VCB function along with Provision of installing Multifunction meter to be provided. The PT's and CT's provided shall made up of epoxy cast resin with an Accuracy class of 0.5. The CT ratio shall be as per transformer Rating. The metering is required only in breaker functions.

10.1.1. Guaranteed Technical particulars for RMU

The Concessionaire shall submit the Guaranteed Technical particular for RMU during design and detailed Engineering stage.

Sl. No.	Description	Parameter / value	parameters / values as offered by the Concessionaire
I	Tag No. of Panel		
	Quantity		
	Location		
	Service		
	Combination type	2 LBS + 1 VCB	
	Functional Requirement	Service entrance "metering & control"	
	Make / Model		
II	**11 KV Bus Bar**		
	Current carrying capacity	630 Amps.	
	Short time rating current for 3 secs	20 KA	
	Insulation of bus bar	SF6	
	Bus bar connections	Anti-oxide grease	
III	**Parameters for VCB and load break isolators**		
	Type	Metal enclosed	
	No of Phases	3	
	No. of poles	3	
	Rated voltage	12 KV	
	Operating voltage	11 KV	
	Rated lightning impulse withstand voltage	75 KV	
	Rated power frequency withstand voltage	28 KV	
	Insulating gas	SF6	
	Rated filling level for insulation	As per IEC	
	Isolating distance between ON and OFF position in isolator	80 mm (min).	
	Rated short time current	20 KA	
	Rated short time	3 s	
	Rated peak withstand current	50 KA.	
	No of operations in Short circuit	15 Nos (minimum)	
	Operating mechanism	Circuit breaker with spring assisted anti reflex / trip free	

Sl. No.	Description	Parameter / value	parameters / values as offered by the Concessionaire
		mechanism.	
	Rated current (Bus)	630 *A*	
	Rated current (breaker)	200 A	
	Circuit Breaker interrupter	VCB	
	Rated frequency	50 Hz	
	Rated operating sequence	O-3 min - CO	

10.2. 11 kV Metal enclosed switchgear

Applicable standards

The switchgear and its components shall conform to the latest applicable standards specified below. In the event of conflict between any of these Specifications and the Cddes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decis ion of Project Engineer in such case shall be final and binding on the Concessionaire.

IS : 13118	Circuit Breakers
IS : 3427	Metal enclosed switchgear
IS : 2705	Current Transformers
IS : 3156	Voltage Transformers
IS : 5576, 11353	Arrangement for switchgear, bus bars, main connections and auxiliary wiring
IS : 2544	Bus bar support insulators
IS:13947 (Part I)	Degree of Protection
IS:3231, 3842	Electrical relays for power system protection
IS:1248	Electrical indicating instruments
IS:9385	High voltage fuses
IS:722, 8530	AC Electricity Meters
IS : 613	Specification for copper rods and bars for electrical purposes
IS : 6005	Code of practice for phosphating iron & steel
IS : 9920	Alternating current switches for voltages above 1000 V
IS : 13703	Low voltage fuses
IS : 3452	Toggle switches
IS : 10118	Code of Practice for selection, installation and maintenance of switchgear and control gear

IS : 6875	Control switches

- **Features of construction**

(a) The switchgear shall be outdoor, metal enclosed with separate compartments for

(i) Circuit breaker
(ii) Control, metering and relaying devices
(iii) Busbars
(iv) Instrument transformers
(vi) Power cable terminations

(a) Adjacent switchgear cubicles shall be provided with side sheets on either side to ensure complete isolation. The bottom of the switchgear shall be fully covered by sheet steel.

(b) Separate removable gland plates shall be provided for power and control cables. The gland plate for the power cables shall be of non-magnetic material.

(c) All sheet steel work shall be thoroughly cleaned of rust, scale, oil, grease, dirt, and sward by pickling, emulsion, cleaning etc. The sheet steel shall be phosphated and then painted with two coats of zinc rich primer paint. After application of the primer, two coats of finishing synthetic enamel paint over baked / stoved shall be applied.

(d) The circuit breaker shall be fully draw out type. The circuit breaker shall have distinct service and test positions. In the test position, the circuit breakers shall be capable of being tested for operation without energising the power circuits. Four normally open auxiliary contacts shall be provided for each of the service and test limit position switches.

(e) The test position should preferably be obtained without the need to disconnect normal control connections and use of extension cords for testing.

(f) The switchgear shall fully house the breaker both in the service position as well as in the test position.

(g) The current transformers shall be mounted on the fixed portion of the switchgear and not on the breaker truck.

(h) The cable compartment shall house all power cable connections along with associated cable terminations. Wherever zero sequence current transformers are provided for earth fault protection, these shall also be located inside the cable compartment.

(i) Each switchgear cubicle shall be fitted with a label in the front and rear of the cubicle. Each switchgear shall also be fitted with label indicating the switchgear designation, rating and duty. Each relay, instrument, switch, fuse and other devices shall be provided with separate labels.

- **Safety interlocks and features**

(a) Withdrawal or engagement of circuit breakers or disconnecting switch shall not be possible unless it is in the open position.

(b) Operation of circuit breaker or disconnecting switch shall not be possible unless it is fully in service position, or in test position or in fully drawn-out.

(c) Operation of a disconnecting switch shall not be possible unless the associated circuit breaker is open.

(d) Circuit breaker cubicles shall be provided with safety shutters operated automatically by the movement of the circuit breaker carriage to cover the exposed live parts when the breaker is withdrawn.

(e) Caution name plate with inscription 'Caution- Live Terminals' shall be provided at all points, where the terminals are likely to remain live and isolation is possible only at remote end, e.g. incoming terminals of main disconnecting switch.

(f) A draw-out with breaker of given rating shall be prevented from engaging with stationery element of higher rating.

- **Main Bus Bars**

(a) Busbars shall be fully insulated by encapsulation in epoxy resin, with mould caps protecting all joints.

(b) Busbars shall be supported on insulators capable of withstanding dynamic stresses due to short circuit.

(c) Busbars shall be of electrolytic aluminium conductor of hard drawn and high conductivity.

- **Circuit Breakers:**

(a) **Auxiliary contacts:**

Auxiliary switch mounted on the fix portion of the breaker and directly operated from the breaker operating mechanism shall be provided and shall have minimum 6 'NO' and 6 'NC' potential free contracts for Purchaser's use. Any auxiliary relays required for

contact multiplication for other requirements shall be provided. The contacts shall be rated for 10 amps, 240 V A.C and 1 Amp. (Inductive breaking), 110 V D.C. The above auxiliary switches shall not operate when the breaker is withdrawn to test position and operated.

(b) **Spring operated mechanism:**

The operating mechanism shall be complete with motor, opening and closing springs, limit switches for automatic charging and all necessary accessories. Facility for manual charging of the closing spring shall be provided. The operating mechanism shall be trip-free and non-pumping electrically. An anti-pumping relay to achieve electrical anti-pumping feature shall be provided even if the breaker has provision for anti-pumping by mechanical arrangement.

- **Earthing:**

(a) An earthing bus shall be provided at the bottom and extend throughout the length of the switchgear. It shall be bolted / welded to the framework of each unit and each breaker earthing bus.

(b) All non-current carrying metalwork of the switchgear shall be effectively bonded to the earth bus. Hinged doors shall be earthed through flexible earthing braid.

(c) Positive earthing of the circuit breaker frame shall be maintained both in service and test position.

- **Annunciators:**

(a) Facia annunciators, suitable for operation on 24 V DC shall be provided. Facia annunciators shall be:

i. Equipped with 'Sound Cancel', 'Acknowledge' and 'Reset' push buttons common to annunciators on all switchgear aligned together and a 'Lamp Test' push button for each annunciator on individual panels;
ii. Provided with two lamps connected in parallel on each facia window with series resistors;
iii. Suitable for normally open indicating contacts of either 'hand' or 'self" reset type;
iv. Suitable for annunciating subsequent faults with the specified sequence, immediately after acknowledging the previous fault;
v. Facia window of minimum size of 35 mm. x 50 mm;
vi. Designed for an operating sequence indicated below :

Alarm condition	Fault contact	Audible alarm	Visual alarm

Normal	Open	Off	Off
Abnormal	Closed	On	Flashing
Sound Cancel	Closed or Open	Off	Flashing
Acknowledge	Closed or Open	Off	Steady on
Back to Normal	Open	Off	Steady on
Reset	Open	Off	Off
Lamp Test	Open	Off	Steady on

- **Switchgear accessories and wiring**

(a) Switchgear shall be supplied completely wired internally upto equipment and terminal blocks and ready for external cable connections at the terminal blocks. Inner panel wiring between cubicles of same switchgear shall be provided.

(b) All auxiliary wiring shall be carried out with 650 volts grade, single core, stranded copper conductor with PVC insulation. The sizes of wire shall not be less than 1.5 sq.mm.

(c) Terminal blocks shall be of stud type, 650 volts, 10 amps, rated complete with insulated barriers.

(d) All spare contacts and terminals of cubicle mounted equipment and devices shall be wired to terminal blocks.

(e) Accuracy class for indicating instruments shall be 1.0. Instruments shall be 110 mm. Square with 240^{o} scale for flush mounting with only flanges projecting.

(f) Ammeters, voltmeters, shall be of moving iron type. The accuracy class shall be 1.0. The range shall be indicated on the drawing / data sheets. Digital microprocessor based power monitor shall be provided to monitor all electrical parameters, such as KVA, KW with resettable maximum demand recorder and indicator, KVAR, KWH, KVARH, Power Factor PF, Frequency, Voltage current etc. The power monitor shall operate off a PT secondary of 110 volts, suitable for operation on 3-phase, 3-wire system and to measure unbalanced loads.

(g) Relays shall be suitable for flush mounting with only flanges projecting.

(h) All protective relays shall be in draw-out cases with built-in test facilities. Necessary test plugs shall be supplied loose. All auxiliary relays and timers shall be supplied loose. All auxiliary relays & timers shall be supplied in non-draw-out cases. Externally operated

hand reset flow indicators shall be provided on all relays and timers. Timers shall be of electromagnetic or electronic type only.

(i) Control and instrument switches shall be rotary type provided with inscription plates clearly marked to show operating position and suitable for semi-flush mounting with only switch front plate and operating handle projecting out.

(j) Breaker control switches shall be pistol grip black and selector switches shall be oval or knob and black. Breaker control switches shall be three-position spring return to neutral type. Instrument selector switches shall be of the maintained stay-put type. Contacts of the switches shall be spring assisted and contact faces shall be with rivets of pure silver. The contact ratings shall be adequate to meet the requirements of circuit capacity in which they are used.

(k) All push buttons shall have two normally open and two normally closed contacts unless specified otherwise. The contacts shall be able to make and carry 5 A at 110V DC and shall be capable of breaking 1 A inductive load at 110 V DC. They shall be provided with inscription plates engraved with their functions.

(l) Indicating lamps shall be panel mounting type with series resistors. The wattage of lamps shall be 5 to 10 watts.

(m) Space heaters of adequate capacity shall be provided inside each panel. They shall be suitable for 240V, 1 pH, 50 Hz supply. They shall be complete with HRC fuses, isolating switches and thermostat to cut off heater at 45^{o} C.

(n) Each switchgear panel shall be provided with 240 Volts, 1 phase, 50 Hz, 5 amps, 3 pin receptacle with switch located in a convenient position.

(o) An interior illuminating lamp together with operating door switch and protective fuse shall be provided.

(p) Provision shall be made for receiving, distribution, isolating and fusing of auxiliary D.C. and A.C. supplies for controls, space heating, etc. The fuse ratings shall be so chosen as to ensure selective clearance of sub circuit faults.

(q) Fuses shall be HRC cartridge type mounted on plug in type fuse base.

(r) The D.C. and A.C. auxiliary supply shall be distributed inside the switchgear with necessary isolating arrangements at the point of entry and with sub-circuit fuses as required.

- **Instrument transformers**

  (a) The CTS shall withstand momentary and short time current ratings of the associated switchgear. CTS and PTS shall be of the cast resin type and completely encapsulated.

  (b) The core balance CTS shall be suitable for the respective outgoing feeders and shall be suitably supported.

  (c) PTS shall be single phase, draw out type. PTS shall be provided with fuses on both primary and secondary sides, except those terminals that are required to be connected to earth. These shall have an isolating link. Fuses on primary side shall have rupturing capacity equal to the switchgear rating.

- **Cable termination**

  (a) Necessary number of cable glands shall be supplied for terminating auxiliary power and control cables. Glands shall be of heavy-duty brass castings, machine finished and complete with check nut, washers, neoprene compression ring.

  (b) Cable lugs for all power and control cable connections shall be supplied. The lugs shall be tinned copper / aluminium depending on cable conductor and of solder less crimping type.

  (c) All necessary materials required for terminating the power cables such as tapes, filters, binding wires, armour clamps, brass glands etc., shall be supplied.

- **Drawings and data**

a) **The Concessionaire shall furnish the following drawings & data during design and detailed engineering stage:**
   - General arrangement showing plan, elevation and typical section views.
   - Foundation plan showing location of fixing channels, floor openings etc.
   - Schematic wiring drawings for each breaker.
   - Technical literature on the beakers offered.
   - Bill of material listing equipment designation, make type, rating etc., of various equipment mounted on switchgear panel.

b) The Concessionaire shall furnish the following drawings for each panel & switchgear after the award of contract.

- Overall outline dimensions & general arrangement including plan, front elevations, clearances required in front and back, details of bus duct connections, if any.
- Overall outline dimensions & general arrangement including plan, front elevations, clearances required in front and back, details of bus duct connections, if any.
- Schematic control diagrams to cover controls, protection, interlocks, instruments, space heaters, etc., for each type of module.
- Itemized bill of material for each module, listing all devices mounted and cable glands, indicating all type, rating quantity and special notes, if any.
- Detailed internal wiring diagram of each type of module, including terminal block number, ferrule numbers and the external cable connection designations.
- Inter panel interconnection wiring diagram including terminal numbers and ferrule numbers.

10.2.1. Guaranteed Technical particulars for 11 kV panel

Sl. No.	Description	Parameter / value	Offered parameter / value (to be filled in by the concessionaire during Design and detailed engineering stage)
I	Tag No. of Panel		
	Quantity		
	Location	Near STP and pump house	
	Service	Outdoor	
	Functional Requirement	Transformer primary control	
	Type	ICOG	
II	**11 KV Bus Bar**		
	Current Carrying Capacity	630 Amps.	
	Short time rating current for 3 secs	20 KA	
	Insulation of bus bar	Air	
III	**Parameters for VCB**		
	Type	Metal enclosed	
	No of Phases	3	
	No. of poles	3	
	Rated voltage	12 KV	
	Operating voltage	11 KV	
	Rated lightning impulse withstand voltage	75 KV	
	Rated power frequency withstand voltage	28 KV	
	Insulating gas	Air	
	Rated filling level for insulation	As per governing IS	
	Isolating distance between ON and OFF position in isolator	80 mm (min).	
	Rated short time current	20 KA	
	Rated short time	3s	
	Rated peak withstand current	50 KA.	
	No of operations in Short	15 Nos (minimum)	

Sl. No.	Description	Parameter / value	Offered parameter / value (to be filled in by the concessionaire during Design and detailed engineering stage)
	circuit		
	Operating mechanism	Circuit breaker with spring assisted anti reflex / trip free mechanism.	
	Rated current (Bus)	630 *A*	
	Rated current (breaker)	200 A	
	Circuit Breaker interrupter	VCB	
	Rated frequency	50 Hz	
	Rated operating sequence	O-3min- CO	

10.3. 11 kV XLPE Power cables

10.3.1. Scope

The specification covers design, manufacture, shop testing, packing and delivery of 11 kV multi core, cross-linked polyethylene insulated power cables suitable for effectively earthed neutral system.

10.3.2. Standards

Unless otherwise specified elsewhere in this specification, the rating as well as performance and testing of the HT XLPE power cables shall conform to the latest revisions available at the time of placement of order of all the relevant standards as listed in, but not limited to table below

IS: 8130 – 1984	Conductors for insulated electric cables and flexible cords.
IS :7098 (Part 2) – 1985	XLPE PVC sheathed cable for working voltages from 3.3 kV up to and including 33 kV.
IS: 5831 – 1984	PVC insulation and sheath of electric cables.
IS: 3975 – 1988	Mild steel wires , formed wires and Tapes for armouring of cables
IS :10462 (Part I) – 1983	Fictitious calculation method for determination of dimensions of protective coverings of cables.

10.3.3. General constructional requirements

The HT multi core power cables shall normally be with stranded compacted H2/H4 grade aluminium conductor as per IS: 8130 - 1984, provided with conductor screening (of extruded semi-conducting cross link material) and shall be insulated with XLPE of natural colour. Identification of cores shall be by colour, as per provision of clause 13.1 of IS: 7098 (Part 2) - 1985. The insulation (XLPE) screening shall be provided consisting of extruded semi-conducting cross link material in combination with a metallic layer of copper tapes. Three such screened cores shall be laid up together with fillers and/or binder tapes where necessary and provided with extruded inner sheathing of heat resistant PVC conforming to type ST-2 of IS: 5831- 1984. Maximum continuous operating temperature shall be 90 deg C under normal operation and 250 deg C under short circuit condition Armouring shall be provided consisting of single galvanized round steel wires (In case of Single core cable armouring shall be of Non-magnetic material) conforming to IS:3975 - 1988 (amended upto date) and over the armouring a tough outer sheath of PVC compound shall be extruded. The PVC compound for the outer sheath shall conform to type ST-2 of IS: 5831 - 1984 (amended upto date). The colour of the outer sheath shall be black. The cable shall be manufactured strictly conforming to IS:7098 (Part 2) – 1985 amended upto date and shall bear ISI mark.

10.3.4. Sequential marking of length of cable

Non-erasable Sequential Marking of length shall be provided by embossing on outer sheath of the cable for each meter length. The quality of insulation should be good and insulation should not be deteriorated when exposed to the climatic conditions.

10.3.5. Discharge free construction:

Inner conductor shielding, XLPE insulation and outer core shielding shall be extruded in one operation by special process (viz. Triple Extrusion Process) to ensure that the insulation is free from contamination and voids and perfect bonding of inner and outer shielding with insulation is achieved.

10.3.6. Continuous A.C. Current carrying capacity:

Continuous a.c. current capacity shall be as per Table given below.

Conductor sizes in sq.mm.	Continuous a.c. current capacity in Amps. at maximum conductor temp. of 90 deg .C.	
	When laid direct in the ground 30 deg. C	When laid in air 40 deg. C
70 sq mm	160	165
95 sq mm	190	200
120 sq mm	215	230

Conductor sizes in sq.mm.	Continuous a.c. current capacity in Amps. at maximum conductor temp. of 90 deg .C.	
	When laid direct in the ground 30 deg. C	When laid in air 40 deg. C
150 sq mm	240	265
185 sq mm	270	310
240 sq mm	315	345
300 sq mm	355	396
400 sq mm	405	460
500 sq mm	450	590

10.3.7. Short circuit current

Short circuit current of 11 kV XLPE cable shall be as per Table given below.

Duration of Short Circuit in sec	Area of Al. Conductor	Short circuit current in kA
t	A	I=0.094 x A/sq.rt (t)
1	70 sq.mm	6.58
1	95 sq.mm	8.93
1	120 sq.mm	11.28
1	150 sq.mm	14.10
1	185 sq.mm	17.39
1	240 sq.mm	22.56
1	300 sq.mm.	28.20
1	400 sq.mm.	37.60
1	500 sq.mm	47.00
1	630 sq.mm	59.20

10.3.8. Routine tests

All the Routine tests as per IS: 7098 (Part 2) - 1985 amended upto date shall be carried out on each delivery length of cable. The result should be given in test report. Partial discharge test must be carried out in a fully screened test cell. It is, therefore, essential that the manufacturer should have the appropriate type of facility to conduct this test, which is routine test.

10.3.9. Acceptance tests

All Acceptance tests as per IS: 7098 (Part 2) - 1985 as modified upto date including the optional test as per clause no 18.4 and Flammability Test shall be carried out on sample taken from the delivery lot.

10.3.10. Packing and marking:

- **Identification marks on cable**:

The following particulars shall be properly legible embossed on the cable sheath at the intervals of not exceeding one meter throughout the length of the cable. The cables with poor and illegible embossing shall be liable for rejection.

a) Manufactures name and/or Trade name.
b) Voltage grade.
c) Year of manufacture.
d) Successive Length.
e) Size of cable
f) ISI mark

The cable shall be supplied in continuous standard length of 250 running meters with plus or minus 5% tolerance wound on non-returnable wooden drum of good quality and non-standard lengths not less than 100 meters upto 5% of the ordered quantity shall be accepted. Alternately, cable can be supplied wound on non-returnable steel drum without any extra cost to the purchaser. Packing and marking shall be as per Clause No. 21 of IS: 7098 (Part 2) - 1985 amended up to date.

10.4. Transformers

10.4.1. Applicable standards

The power and auxiliary transformers shall conform to the latest applicable standards specified below. In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decision of Project Engineer and Executing Agency in such case shall be final and binding on the Concessionaire.

IS : 2026	Power Transformer
IS : 3639	Fittings and Accessories
IS : 1180	Auxiliary Transformer
IS : 6600	Loading of oil immersed transformer
IS : 335	Insulating oil
IS : 2099	Bushings for > 1000 V, AC
IS : 7421	Bushings for $\leq$ 1000 V, AC
IS : 13947 (Part I)	Degree of Protection
IS : 1271	Electrical insulation classified by thermal stability

10.4.2. Features of construction

(a) The transformer shall be designed for adequate capacity with 100% stand by transformer.

(b) The transformer tank shall be made from high-grade plate steel, suitably reinforced by means of stiffeners made of structural steel sections. All seams, flanges, lifting lugs, braces and other parts attached to the tank shall be welded. The interior of the tank shall be cleaned by shot blasting and painted with two coats of heat resistant and oil insoluble paint. Adequately sized manholes shall be provided for easy inspection and maintenance. All joints which may have to be opened from time to time in the course of operation shall be of a design to permit them to be made easily oil tight in reassembly. Steel bolts and nuts exposed to atmosphere, shall be galvanised. The tank cover shall be suitably sloped so that it does not retain rainwater.

(c) Lifting lugs and eyebolts shall be so located that a safe clearance is obtained between sling and transformer bushings, without the use of a spreader.

(d) Transformer of rating above 500 KVA shall be equipped with detachable or separately mounted radiator banks. Transformers of rating 500 KVA and below shall be provided with fixed type radiators.

(e) When transformers are provided with separately mounted radiators, flexible joints shall be provided on the main oil pipes connecting the transformer tank to the radiator banks to reduce vibration and facilitate erection and dismantling. The interconnecting pipes shall be provided with drain plug and air release vents.

(f) The transformer tank, radiators and conservator shall be designed taking into account the loss of thickness due to shot blasting.

(g) The transformer core shall be constructed from high grade, non-ageing, cold rolled, grain oriented, silicon steel laminations coated with insulation varnish. The steel laminations shall be of "core" type.

(h) Each lamination shall be coated with insulation, which is unaffected by the temperature attained by the transformer during service.

(i) Core lamination shall be annealed and burrs removed after cutting. Cut edges shall be insulated.

(j) The frame work and clamping arrangements of core and coil shall be securely earthed inside the tank by copper strap connection to the tank.

(k) Windings shall be of suitably insulated copper wire or copper strip. The windings shall be fully shrunk under vacuum before assembly.

(l) High voltage end windings shall be suitably braced to withstand short circuit stresses and stresses set up by surges.

(m) All taps shall be provided on the HV winding.

(n) The core and coil assembly shall be dried out and impregnated under vacuum.

(o) Cable boxes shall have sufficient space for segregating the cable cores and to give adequate clearance in air between bare conductors at the terminals. Cable boxes shall be complete with necessary cable lugs and armour grips.

(p) All auxiliary wiring from current transformers, winding temperature indicators, etc., shall be marshalled to a separate weatherproof and vermin proof marshalling box with an independent access cover.

(q) The marshalling box shall be complete with necessary cable glands and cable lugs. The marshalling box and components shall comply with the requirements specified for control cabinets indicated elsewhere in this specification.

10.4.3. Performance requirements:

(a) Transformers shall operate without injurious heating at the rated KVA at any voltage within $\pm$ 10 percent of the rated voltage of that particular tap.

(b) Transformers shall be capable of delivering the rated current at a voltage equal to 105 percent of the rated voltage without exceeding the limiting temperature rise.

(c) Transformer for two or more limits of voltage or frequency or both shall deliver its rated KVA under all the rated conditions of voltage or frequency or both; provided an increase in voltage is not accompanied by a decrease in frequency.

(d) Transformers shall operate below the knee of the saturation curve at 110 percent voltage to preclude ferro-resonance and non-linear oscillations.

(e) Transformers shall be capable of operation continuously, in accordance with the applicable standard loading guide at their rated KVA and at any of the specified voltage ratios. Under these conditions, no limitations by terminal bushings, on-load tap changers or other auxiliary equipment shall apply.

(f) The neutral terminal of windings with star connection shall be designed for the highest over current that can flow through this winding.

(g) The transformers shall be designed with particular attention to the suppression of harmonic voltage, especially the third and fifth, so as to eliminate wave form distortion and any possibility of high frequency disturbances reaching a magnitude as to cause interference with communication circuits.

(h) The Project Engineer's Representative reserves the right to reject the transformer if the same does not meet the specification requirement subject to tolerances as per IS: 2062. The rejected transformers shall be replaced by transformers complying with the requirements to this specification at the Concessionaire's cost.

(i) If the commissioning of the project is likely to be delayed by the rejection of a transformer, as mentioned under h) above, the Project Engineer and Executing Agency's Representative reserves the right to accept the rejected transformer until the replacement transformer is made available. Transporting the rejected and replacement transformers as well as installation and commissioning of both the transformers shall be at Concessionaire's cost.

10.4.4. On Load Tap Changing Gear for transformer:

(a) The OLTC gear shall be designed to complete successfully tap changes for the maximum current to which transformer can be loaded, i.e. 150% of the rated current. Devices shall be incorporated to prevent tap change when the through current is in excess of the safe current that the tap changer can handle. The OLTC gear shall withstand through fault currents without injury.

(b) When a tap change has been commenced it shall be completed independently of the operation of the control relays and switches. Necessary safeguard shall be provided to allow for failure of auxiliary power supply or any other contingency, which may result in the tap changer movement not being completed once it is commenced.

(c) Oil in compartments, which contain the making and breaking contacts of the OLTC shall not mix with oil in other compartments of the OLTC or with transformer oil. Gases released from these compartments shall be conveyed by a pipe to a separate oil conservator or to a segregated compartment within the main transformer conservator. A

Buchholz relay shall be installed in the above pipe. The conservator shall be provided with a prismatic oil level gauge.

(d) Oil, in compartments of OLTC which do not contain the make and break contracts, shall be maintained under conservator head by valved pipe connections. Any gas leaving these compartments shall pass through the Buchholz relay before entering the conservator.

(e) Oil filled compartments shall be provided with filling plug, drain valve with plug, air release vent, oil sampling device, inspection opening with gasketed and bolted cover with lifting handles.

(f) OLTC driving mechanism and its associated control equipment (Local) shall be mounted in an outdoor, weatherproof cabinet with IP 55 protection, which shall include:

- Driving motor (415V, 3-phase, 50 Hz, AC squirrel cage).
- Motor starting contactor with thermal overload relays, isolating switch and HRC fuses.
- Control switch: Raise / off / lower (spring return to normal type).
- Remote / local selector switch (maintained contact type).
- Mechanical tap position indicator showing rated tap voltage against each position and resettable maximum and minimum indicators.
- Limit switches to prevent motor over-travel in either direction and final mechanical stops.
- Brake or clutch to permit only one tap change at a time on manual operation.
- Emergency manual operating device (hand crank or head wheel).
- A five-digit operation counter.
- Electricity interlocked reversing contactors (preferably also mechanically interlocked).
- 240V, 50 Hz, AC space heater with switch and HRC fuses.
- Interior lighting fixture with lamp door switch and HRC fuses.
- Gasketted and hinged door with locking arrangement.
- Terminal blocks, internal wiring, earthing terminals and cable glands for power and control cables.
- Necessary relays, contactors, current transformers etc.

(g) Control Requirements for OLTC:

The following electrical control features shall be provided:

- Positive completion of load current transfer, once a tap change has been initiated, without stopping on any intermediate position, even in case of failure of external power supply.

- Only one tap change from each tap change impulse even if the control switches or push button is maintained in the operated position.
- Cut-off of electrical control when manual control is resorted to cut-off of a counter impulse for a reverse tap change until the mechanism comes to rest and resets the circuits for a fresh operation.
- Cut-off of electrical control when it tends to operate the tap beyond its extreme position.

(h) Automatic Control of OLTC:

Automatic OLTC control shall include the following items:

- Voltage setting device
- Voltage sensing and voltage regulating devices
- Line drop compensator with adjustable R and X elements
- Timer 5-25 seconds for delaying the operation of the tap changer in the first step for every tap change operation
- Adjustable dead band for voltage variation

(i) OLTC panel:

The OLTC remote control equipment shall be suitable for 24 V DC supply and shall be housed in an indoor sheet steel cubicle to be located in a remote control room. The OLTC control panel shall comprise of rigid welded structural frames made of structural steel section or of pressed and formed cold rolled steel and frame enclosures, doors and partitions shall be of cold rolled steel of thickness 2 mm. Stiffeners shall be provided wherever necessary. All doors, removable covers and plate shall be gasketed all around with neoprene gaskets. Panel shall be dust, weather and vermin proof providing degree of protection of IP 54, colour of finish shade for interior and exterior shall be glassy white and light grey semi glossy shade 631 of IS-5 respectively. Earthing bus shall be of 25 x 6 mm copper.

The panel shall consist of:

(i) Control Switch (spring return to normal type) : Raise / Off / Lower

(ii) Auto / manual selector switch (maintained contact type)

(iii) Tap position indicator

(iv) Facia type alarm annunciators with "accept" and "lamp test" facilities
- Supply failure
- Drive motor auto tripped
- Tap change delayed

(v) Necessary auxiliary relays

(vi) Lamp indications for:
- Tap change in progress
- Lower limit reached
- Upper limit reached

(vii) Cable glands for power and control cables

(viii) 240 V rated panel space heater with ON-OFF switch

(ix) Fluorescent type interior lighting fixture with lamp and door switch

(x) HRC fuses

(xi) Terminal blocks

(xii) Internal wiring

(xiii) Earthing terminal

10.4.5. Fittings and accessories:

The following fittings and accessories shall be provided with transformer:

(a) Inspection manhole in the cover

(b) Lifting lugs for both the transformer and the core

(c) Two earthing terminals on opposite ends of the transformer tank

(d) Name plate, rating plate and diagram plate

(e) Detachable radiator banks, complete with top and bottom shut-off valves, air release plug, drain valve and lifting lugs, suitably located thermometer pockets for measuring inlet and outlet oil temperature and one grounding terminal for connection of grounding conductor. Fins of the radiators shall not have sharp edges but shall be rounded shape.

(f) Conservator, complete with filling plug, sump and drain valve, and a shut-off valve on the pipe connection between transformer tank and conservator, to permit removal of the conservator. The conservator shall be designed to maintain an oil seal through a temperature range of 100 degree C.

(g) Oil level indicator with minimum marking.

(h) Weather proof dehydrating breather with activated alumina or silicagel as the dehydrating agent.

(i) Magnetic type oil level gauge with low oil level alarm contact, mounted on the conservators with waterproof and dustproof terminal box.

(j) Gas detector relays with separate alarm and trip contacts complete with shut-off valves.

(k) Separate drain valve, oil sampling valve with plug and top filter valve shall be provided on the tank.

(l) Explosion vent with diaphragm for relieving pressure inside the transformer. The device shall be rain proof after operation. For transformers of 500 KVA and above an equaliser pipe connecting the pressure relief device to the conservator shall be supplied.

(m) Separately mounted, water proof and dustproof marshalling box housing the oil temperature indicator and winding temperature indicator with alarm and trip contacts and marshalling facilities for electrical devices mounted on transformer.

(n) For transformers rated 500 KVA and above, adequate number of air vents for reliving trapped air during oil filling and during maintenance.

(o) Thermometer pockets and sensing element mounted on the transformer tank cover for measuring top oil temperature.

(p) Four jacking pads for lifting the transformer with jacks.

(q) Pulling eyes and skids for the movement of the transformers.

(r) Bi-directional wheels for movement of the transformers.

(s) Accessories for clamping the wheel mounted transformer to the foundation in order to withstand earthquake forces with a seismic acceleration of 0.2 g.

(t) Noise level of transformers shall be less than 80 dB.

(u) Transformer shall be supplied complete with insulating oil required for first filling plus 10% excess oil.

10.4.6. Drawings and data

The following drawings shall be submitted for the Executing Agency's approval:

(a) General outline drawing with binding dimensions and weights shall be submitted during design and detailed engineering stage.

(b) General outline drawings showing plan, front elevation, and side elevation, with all fittings and accessories, locating dimensions of cable entries, earthing terminals, foundation / floor fixing details, jacking pads and weights of the following. :

- OLTC (Local and Remote) cabinets
- Marshalling box
- Cable boxes
- Disconnecting chambers

(c) Cable junction box details, mounting details, make and type number, current and voltage rating, creep age distances and principal characteristics.

(d) Rating and diagram plates

(e) OLTC cabinets: schematic circuit diagram and actual detailed wiring diagram giving terminal numbers within 5 months of award of Contract.

(f) Marshalling box terminal connections wiring diagram.

10.4.7. Guaranteed Technical particulars for Transformer

Sl. No.	Description	Owner's requirement	Offered parameter / value (to be filled in by the Concessionaire during Design and Detailed Engineering stage)
1	Make		
2	Service	Outdoor	
3	Rating	As per requirement of individual facility in KVA	
4	**Rated Voltage**		
a	HV winding	11,000 V	
b	LV winding	433 V	
5	Number of Phases	3 phase	
6	Rated Frequency	50 Hz	
7	Vector group	DYn 11	
8	Type of cooling	ONAN	
9	**Tapings :**	**on 11 kV side**	
a	Range	+ 5%, to – 15%	
b	Number of steps	8 steps 9 position	
c	Losses at 75° C & Principal tapping	As per IS 1180	
10	No load loss at rate voltage and frequency	As per IS 1180	
11	Load losses at rated current	As per IS 1180	
12	Total loss at maximum rated power	As per IS 1180	
13	**Impedance voltage at 75° C**		
A	At principle tapping		
B	At Maximum tapping		
C	At minimum tapping		
14	Hottest spot temperature in winding limit		
15	**Efficiency at 75° C and 0.9 PF**		
A	At full load	As per IS 1180	
B	At 75 % load	As per IS 1180	
C	At 50 % load	As per IS 1180	
16	Maximum efficiency	As per IS 1180	
17	**Maximum current density at rated power**		
A	HV winding		

Sl. No.	Description	Owner's requirement	Offered parameter / value (to be filled in by the Concessionaire during Design and Detailed Engineering stage)
B	LV winding		
18	**Maximum flux density in iron at rated voltage & Frequency**		
A	At 100 % rated voltage		
B	At 110 % rated voltage		
19	**Maximum clearances in air**		
A	Between phases (HV / LV)		
B	Between phases & earth		
20	**Insulation level**		
A	Impulse		
B	HV		
C	LV		
21	**Power frequency**		
A	HV		
B	LV		
22	**Winding type**		
A	HV winding		
B	LV winding		
23	**Details of core**		
A	Core lamination material		
B	Insulation of lamination		
C	Thickness of lamination		
D	Type		
E	Specific loss of core steel at 1.5 tesla		
24	**Details of tank**		
A	Material		
B	Thickness of side		
C	Thickness of bottom		
D	Thickness of cover		
E	Thickness of tube		
F	Maximum internal pressure withstanding capacity of the tank		
G	Details of Radiator		

Sl. No.	Description	Owner's requirement	Offered parameter / value (to be filled in by the Concessionaire during Design and Detailed Engineering stage)
H	No. of Radiator tanks		
I	Thickness of radiator plate		
J	Weight of each radiator tank		
K	Cooling surface area		
L	Volume of conservator		
M	Total oil required		
N	Whether first filling of oil with 10% excess furnished	Required	
25	**Details of bushing**		
A	Type		
b	Voltage class		
c	Creep age distance		
d	Weight of bushing		
e	Current rating		
f	Insulation level		
g	Impulse		
h	Power frequency dry KV		
i	Power frequency wet		
j	Length of insulator		
k	loss angle at working voltage		
26	**Explosion vent material**		
A	Thickness		
B	Maximum rupturing pressure of the diaphragm		
27	**Tank pressure test**		
A	Pressure		
B	Duration		
C	Tank vacuum test		
D	Pressure		
E	Duration		
28	Maximum noise level		
29	**Overall dimensions including coolers & fittings**		
A	Height		

Sl. No.	Description	Owner's requirement	Offered parameter / value (to be filled in by the Concessionaire during Design and Detailed Engineering stage)
B	Breadth		
C	Length		
C	Crane lift for dismantling core and coil assembly		
D	Weight of core & winding		
E	Tank & Fittings weight		
F	Oil weight		
G	Total weight including radiator, OLTC, and oil		

10.5. MV Panel Board / Switch Board construction

All MV and LV panel boards / switch boards, unless and mentioned otherwise, shall meet the following requirements.

Type	:	Floor mounting, free standing, single front, fully compartmentalized, totally enclosed, dust & vermin proof, modular in construction & fully extensible on either sides
Conforming to	:	IEC 60439
Construction	:	➢ 2.00 mm thick for frames and other load bearing members ➢ 1.6 mm thick for doors and partitions ➢ 3.0 mm for gland plates & of non-metallic construction for termination of single core armoured cables
Form of separation	:	Form 3 B
Bus bar configuration, MOC, busbar supports, busbar insulation, busbar compartments, cable alley and feeder compartments	:	➢ TPN bus bars with 50% neutral for all applications not involving harmonic loads and with 100 % neutral for loads with harmonics. ➢ Risers (vertical busbars) shall have a continuous current rating at least 125% of combined feeder ratings of the particular vertical section. ➢ Completely enclosed busbar compartment running horizontally at the top / bottom as per actual panel configuration ➢ Completely enclosed compartments for vertical busbars. ➢ Individual feeder modules in multi-tier modular formation. ➢ Vertical cable alleys with removable gland plates at the bottom/ top ➢ Busbar supports- Non-hygroscopic / SMC/ DMC supports with anti-

		tracking design and strength to withstand the dynamic forces during short circuit current of appropriate value ➢ Busbar insulation – 1.1 kV grade Heat shrinkable colour coded ➢ Busbar connections- by using cadmium plated high tensile hardware
Bus bar MOC and sizing	:	➢ MOC – High conductivity, high strength Aluminium alloy complying to requirements of Grade E 91E of IS 5082 (or) E.C grade copper ➢ All bus bars to be dimensioned considering the maximum permissible rise in temperature of 50 Degrees over ambient temperature under normal operating conditions.
Earth bus	:	➢ Continuous Aluminium strip of adequate cross section to carry the fault current to be run inside each shipping section. ➢ All compartment doors to be provided with insulated earth continuity conductors / jumper wires
Panel height, door and shipping sections		➢ Panel height shall generally not exceed 2100 mm including the bottom mounting channel. ➢ The operating handle of the switchgear at the top most tier shall be not more than 1800 mm from FFL. ➢ The operating handle of the switchgear at the lower most tier shall be not less than 300 mm from FFL ➢ Panel doors (Front) – Hinged ➢ Panel doors (rear) – Bolted ➢ Bus bar chamber and cable chamber doors – Bolted ➢ Gaskets – Continuous type of neoprene ➢ Locks – Each compartment shall be with interlock to ensure that the doors do not open with switch ON. Interlock defeat also required to be provided ➢ All switchgear compartments to be suitable for LOTO arrangement. ➢ The panel shall generally be made in sections not exceeding 2.50 mtrs long for ease of handling and movement inside panel rooms.
Degree of protection		➢ IP 42 for indoor panels ➢ IP 54 for panels meant for use in dusty and humid operating environment ➢ IP 65 for outdoor panels
Finish		➢ Powder coat finished as per IS 3618.
Cable termination		➢ From top / bottom as per data sheet. ➢ Shall be suitable for terminating the number of cable runs and the type of cable as per SLD / data sheet.
Wiring		➢ All control wiring (Other than CT circuit) to be done using 1.5 Sq.mm PVC insulated wires

		➢ All CT wiring shall be not less than 2.5 Sq.mm PVC insulated wires
Meters		➢ All MFMs / Ammeters / Voltmeters and other meters as called for in the SLD shall be suitable for flush mounting type on panel compartment doors and shall be digital versions with RS 485 communication feature.
Relays		➢ Shall be as per SLD /data sheet
Control Supply		➢ Shall be derived using 415 / 110 V AC control transformer and with MCB protection on both primary and secondary side of the control transformer.
Space Heaters		➢ All bus bar compartments shall be provided with space heater to prevent moisture condensation and maintain cubicle temperature 5 degree C above the ambient. The space heaters shall be located suitably and shall be controlled through thermostats with suitable setting with MCB.
Indication lamps		➢ LED cluster type. The lamps shall have red, green, amber, Blue and white caps as applicable made out of temperature resistant prismatic glass. The lamp holders and caps shall be guaranteed for continuous operation of lamps without any damage.
Control switches / Push button actuators		➢ Control and instrument selector switches shall be rotary type provided with escutcheon plates clearly marked to show operating position and suitable for semi-flush mounting with only the switch joint plate and operating handle projecting out. The connection shall be from the back.
Legend plates / name plates / warning boards		➢ Each compartment of the PANEL / MDB / PDB / MCC/ PMCC shall be provided with a nameplate engraved with its designation. The nameplates shall be rear engraved perspex with white letters on black background. The name plate shall also indicate the rating of the switchgear, the equipment fed and its rated power (in kw or hp) ➢ Metallic nameplate shall be provided on any one side of the panel / switch board duly indicating as a minimum the name of the panel vendor, the P.O No. & date, the month & year of installation, ➢ Warning stickers with danger signage & text in trilingual (English / Hindi and Local language) red letters on white background shall be provided at appropriate locations.
Mimic display		➢ The panel front facia shall be provided with mimic key SLD (either red painted or with red sticker)

10.5.1. Control and switchgear specifications

- All control gear and switchgear shall be ROHS compliant

- All control and switchgear, unless and mentioned otherwise, shall meet the following requirements.

ACB	:	EDO type
Pole configuration	:	As per equipment requirement
Breaking Capacity	:	As per system requirements
Protection type	:	O/L, S/C and E/F
Accessories	:	UV, Earth Fault and Shunt release (two of the accessories as per data sheet)
Auxiliary contacts	:	2 NO and 2 NC minimum

MCCB	:	Panel internal mounted with door mounted rotary handle operated type
Pole configuration	:	As per equipment requirement
Breaking Capacity	:	As per system requirements
Protection type	:	Thermal magnetic up to 250 Amps Microprocessor based for ratings 250 Amps and above
Cable termination	:	All MCCBs for terminating cables above 35 Sq.mm shall be with spreader links
Accessories	:	UV, Earth Fault & Shunt release (two of the accessories as per data sheet)
Auxiliary contacts	:	2 NO and 2 NC minimum

MCB	:	DIN rail mounted with dolly handle operated type
Pole configuration	:	As per requirement at individual facility
Breaking Capacity	:	As per requirement at individual facility
Protection	:	O/L & S/C
Cable termination	:	All MCBs for terminating cables above 16 Sq.mm shall be with spreader links
Fault Level	:	10 kA for MCBs rated more than 25 Amps

Motor Starter component rating	:	Based on Type -2 co-ordination charts
Motor starter type	:	Upto and including 10 HP– DOL Above 10 HP and upto and including 30 HP – Star Delta starting Above 30 HP and upto and including 50 HP – Soft start Above 50 HP – VFD
Additional protection	:	Current sensing type single phase and phase reversal protection
Metering and CT	:	For motors upto 10 HP CT shall be provided in the centre phase complete with ammeter. For motors above 10 HP CT shall be provided

		in all three phases complete with ammeter and ammeter selector switch
Cable termination	:	All terminations for cables above 16 Sq.mm shall be with spreader links

Note: Apart from the above guidelines, the concessionaire shall consider VFD for various applications irrespective of their rating wherever the process / application warrants provision of such variable speed requirements.

10.5.2. Soft starters for LV motors

The soft starters shall comply with the requirements of IEC 60034, 60947 and IS 325 including those standards referred to therein.

Constructional and performance features

Motor soft starters shall be switched or electronic type.

Soft starter panel shall be indoor, metal clad with separate metal enclosed compartments for

a) control, metering and current transformers for differential protection, if specified
b) shorting (bypass) arrangement
c) bus bars
d) power cable terminations
e) push buttons with indicating lamps.

Soft starter shall achieve smooth starting by torque control for gradual acceleration of the drive thus preventing jerks and extending the life of equipment.

Starting current shall be limited to 2.5 to 3 times the rated current of the motor. The soft starter manufacturer shall co-ordinate with motor manufacturer for this purpose.

Separate removable gland plates shall be provided for power and control cables.

Each cubicle shall be fitted with a label in the front and rear of the cubicle, indicating the panel designation, rating and duty. Each relay, instrument, switch, fuse and other devices shall be provided with separate labels.

Necessary wiring diagram shall be provided considering starting interlock, trip circuit, starting and running mode signal.

It shall be possible to manually start the motor locally from the starter panel or in Auto mode through PLC.

10.5.3. Variable Frequency Drives (VFD)

AC induction motor in clear water pumping station for rural distribution shall be coupled with a Frequency drive of rating commensurate with the rated motor.

The Frequency drives shall be of Current Source Inverter Pulse Width Modulated (CSIPWM) with GTO/IGBT/IGCT/SGCT/DTC technologies or later version, which performs precise speed and torque control of standard squirrel cage motors with optimum efficiency. Each drive must have a soft starting feature and a by pass arrangement for DOL starting of motors. All frequency dives shall be suitable for data connectivity with PLC/SCADA system and shall have Ethernet TCP/IPsuitable communication 99 port and protocol. The drives must be easily programmable. The drives shall be provided with surge protection, programmable lockable code. The Frequency drive shall have following characteristics:

- Accurate open loop torque control
- Torque step rise time typically less than 5 ms
- Speed control inaccuracy typically 0.1% to 0.5% of nominal speed
- 150% overload capacity for 60 second
- Total Harmonic distortion shall comply with the provisions of IEEE 519. Necessary metering, self-diagnostic arrangement (including display and alarm facilities) shall be provided for local/ remote monitoring.

❖ Technical Parameters

- Main connection
  - Voltage : 3 phase, 415 +/- 10 % permitted tolerance
  - Frequency : 45 to 65 Hz, maximum rate of change 17%/s
  - Imbalance : Max. +/- 3% of nominal phase to phase input voltage
  - Fundamental Power factor : 0.97 (at nominal load)
- Motor connection
  - Voltage : 3 phase, from 0 to applied incoming supply voltage, 3-phase
  - symmetrical
  - Output Frequency : 0 to 250 Hz
  - Frequency Resolution : 0.01 Hz
- Continuous Current : 1.0 * I2N(normal use)
- Short Term Overload
- Capacity (1min./10min)
- : I2max = 1.1 * I2N
- Field Weakening point : 8 to 300 Hz

- Acceleration Time : 0 to 1800 sec
- Deceleration Time : 0 to 1800 sec
- Efficiency : Min. 97% at nominal power level
- Environment limits
- Ambient temperature : 0 to 45 deg. Cent.
- General Standard Control Connections or as per Process Requirement
- 3 programmable differential analogue inputs (1 voltage signal, 2 current signals)
- 7 programmable digital inputs
- 2 programmables analogues outputs (current signal)
- 3 programmable digital outputs (from C relays)
- Power Torque Speed value must be configurable to the etherrnet tcp/ip port for their remote data acquisition in PLC/ SCADA. Optional analogue and digital extension modules can be added as well as a wide range of field bus adapters.
- Protection
    - Over current
    - Short circuit at start-up
    - Input phase loss
    - Output phase loss
    - Motor overload
    - Earth fault
    - Overvoltage
    - Undervoltage
    - Over temperature
    - Motor stall

- Application macros

  The features a selection of built-in, pre-programmed application macros for configuration of inputs, outputs, signal processing and other parameters. It shall have interfacing facilities to communicate data to SCADA system. These include:

    - FACTORY SETTING for basic industrial applications
    - HAND/AUTO CONTROL for local and remote operation
    - PID CONTROL for closed loop processes
    - TORQUE CONTROL for process where torque control is required.
    - SEQUENTIAL CONTROL for processes where torque control is required.
    - USER MACRO 1 and 2 for user's own parameter setting
    - Comprehensive testing and diagnostic function

- Tests

- Each unit of Variable frequency drive shall be tested at the manufacturer's work with the motor they have been assigned to work for at the STP(s)/FSTP(s)
- Test result must satisfy the efficiencies on various loads and at different frequency levels against their quoted values.

Contactor	:	Air break
Pole configuration	:	Three pole / Four Pole as per data sheet
Auxiliary contacts	:	2 NO + 2 NC
Utilisation category	:	As per data sheet

CT	:	Cast resin type
Ratio, class & Burden	:	As per SLD / Data sheet
Insulation class	:	1.1 kV

Control Transformer	:	Cast resin type
Voltage Ration	:	415 / 110 V AC
Insulation class	:	1.1 kV
Rating	:	1000 VA

Capacitor		
Type	:	Dry type, Mixed Di-electric versions with self-healing capacity conforming to IS 13340.
Voltage	:	220 Volts to 575 Volts based on application

Push button Actuators		
Type	:	Panel door mounted – shrouded type for START and Mushroom type for STOP / RESET
Contact ratings	:	6 Amps

10.6. 1.1 kV XLPE cable

10.6.1. Scope

This part of the specification covers the requirements of design, manufacture, inspection, testing and supply at site of 1.1 kV grade XLPE power and control cables.

10.6.2. Standards

The 1.1 kV grade Power & Control Cables conform to the requirements of the latest Indian Standard Specifications including but not limited to the following:

IS 7098	:	Cross-linked polyethylene insulated PVC sheathed cables
IS 3975	:	Mild steel wires, strips and tapes for armouring of cables
IS 10418: 1982	:	Drums for electric cables.
IS 10810	:	Methods of test for cables
IS 1554 (Part I)	:	PVC Cables for voltage up to and including 1100 volts
IS 8130	:	Conductors for insulated electric cables
IS 5831	:	PVC insulation and sheath of electric cables
IS 3975	:	Mild steel wires, strips and tapes for armouring of cables

10.6.3. General construction

The cables shall be suitable for laying in trays, trenches, ducts, conduits and buried underground installation with uncontrolled backfill and possibility of flooding by water. These shall have following constructional features.

All power and control cables for use on low voltage system shall be heavy of 1100 V grade with aluminium / copper conductor, XLPE insulated, PVC inner sheathed, armoured and overall PVC sheathed.

The construction of the conductors shall be SOLID for aluminium conductor cables up to 10 mm sq. and for copper conductor cables up to 2.5 mm sq. For cables above 10 mm sq. and for copper cables above 2.5 mm sq. the conductor shall be STRANDED. Conductors of nominal cross sectional area less than 10 sq.mm shall be circular only. Conductors of nominal cross section area 16 sq.mm and above may be circular or sector shaped.

The core insulation shall be with XLPE applied over the conductor by extrusion and shall conform to the IS 7098. Control cables having 6 cores & above shall be identified with prominent & indelible numerals on the outer surface of the insulation. Colour of the numbers shall be white with a spacing of maximum 500 mm between two consecutive numbers.

The inner sheath shall be applied over the laid-up cores by extrusion and shall be of PVC conforming to the requirements of type ST2 PVC compound per IS 5831. The extruded inner sheath shall be of uniform thickness of size not less than 0.5 mm up to 16 sq.mm, 0.8 mm from 25 sq.mm upto 120 sq.mm and 1.0 mm above 120 sq.mm conductor size. Taped inner sheath shall also be acceptable.

For multi core cables, the armouring shall be by single round galvanized steel wires where the calculated diameter below armouring does not exceed 13 mm and galvanized steel strips where

this dimension is greater than 13 mm. Requirement and methods of tests for armour material and uniformity of galvanization shall be as per IS 3975 and IS 2611.

The outer sheath for the cables shall be applied by extrusion and shall be of PVC compound and conforming to the requirements of type ST 2 compound per IS 5831. To protect the cables against rodent and termite attack, suitable chemicals shall be added into the PVC compound of the outer sheath.

The dimensions of the insulation, armour and outer sheath materials shall be governed by values given in IS 1554 (Part I).

10.6.4. Packing

The cables shall be supplied in standard drum lengths duly wound on non-returnable wooden drums.

Vendor shall ensure that the bending radii of cables are not less than 12 times their overall diameters when wound on drums. Both ends of the cables shall be sealed.

Following information shall be printed on the flange of each cable drum.

a) Type
b) Size
c) Voltage grade
d) Length in meters
e) ISI Mark
f) Gross weight
g) Direction of rolling

10.7. Specification for power / lighting distribution boards

10.7.1. Scope

This part of the specification covers the requirements of design, manufacture, assembly, inspection, testing and delivery at site of Power/ Lighting Distribution Boards / Panels.

10.7.2. Standards

The Power / Lighting Distribution Boards shall conform to the requirements of the latest Indian Standard Specifications including but not limited to the following:

IS 13947	:	Low Voltage Switchgear and Control gear
IS 11353	:	Guide for Uniform System of marking and identification of conductors and apparatus
IS 2705	:	Current Transformers
IS 8623	:	Low voltage switchgear and control gear assemblies
IS 4237	:	General requirements for switchgear and Control gear for voltages not exceeding 1000 V
IS 13032	:	Miniature air-break circuit breakers for voltages not exceeding 1000 V
IS 13947	:	Switches, disconnectors, air break Switch (Part 3) disconnectors and fuse combination units
IS 13703	:	LV Fuses for voltages not exceeding 1000 V ac or 1500 V dc Part 1 General requirements
IS 1248	:	Direct acting electrical instruments
IS 722	:	AC Electricity Meters

10.7.3. Construction & component specification

The boards shall be sheet steel enclosed on all sides and shall be dust and vermin proof, providing a degree of protection equivalent to IP 54. The sheet steel used shall be 14/16 Gauge CRCA.

The distribution boards shall be provided with hinged doors for access to components. Doors shall be provided with gasket all around with neoprene gaskets.

The Power Distribution Boards (PDBs) / Lighting DB, shall be suitable for wall mounting. Cable entries to these boards for incoming as well as outgoing cables shall be from the Top The bus bars of Power Distribution Boards (PDBs) / Lighting DB shall be of electrical grade Copper of adequate size. These shall be supported on SMC/ DMC/ Epoxy non-hygroscopic supports at suitable intervals to withstand the thermal and dynamic stresses developed due to short circuit current of 10KA for Power DBs & Lighting DB.

Internal Earth bus of adequate size of copper flat shall be provided extending through the entire length of the boards

10.7.4. Earth Leakage Circuit Breakers (ELCBs)

The ELCBs shall be designed to operate within 30 milliseconds to provide effective protection against electrocution risks and fires caused by earth leakage faults of 30 mA and above. All parts of the switching mechanism shall be of non-corroding self-lubricating material thus providing consistent and trouble free services. These shall have short circuit withstand capacity of 10 KA.

10.7.5. Miniature Circuit Breakers

These shall be hand operated type. The miniature circuit breaker shall incorporate thermal overload and magnetic short circuit tripping devices. These shall have short circuit withstand capacity of 10 KA.

Provide positive 'ON' locking devices for miniature circuit breakers supplying power to corridor lights, night lights and other circuits requiring continuous supply.

Provide a neatly typed directory on each panel, listing the locations of devices and equipment served by each circuit, mounted on the inside of the front cover in a frame with hard transparent shield.

10.7.6. Internal wiring

The boards/ panels shall be supplied completely wired, ready for the external connections at the terminal blocks. Wiring shall be carried out with 1100V grade PVC insulated, stranded copper conductor of adequate size (min. 2.5 mm sq.) Identification ferrules shall be provided to correspond with wiring diagrams. All wiring shall be terminated on terminal block. Terminals of Power Distribution Boards / Lighting DB shall covered terminals.

10.7.7. Painting

Sheet metal work of the Boards / Panels shall undergo a thorough surface treatment comprising rust removal, degreasing, pickling and phosphating prior to painting. The pre-treated boards/ panels shall be painted / Powder coated with two coats of suitable primer and finished with two coats of Power coated of approved shade as per IS-5.

10.8. Specification for cable carrier / cable containment system and accessories

10.8.1. Scope

This part of the specification covers the requirements of design, manufacture, assembly, inspection, testing and delivery at site of cable carrier / cable containment system with accessories.

10.8.2. Standards

The Cable carrier system with accessories shall conform to the requirements of the latest Indian Standard Specifications including but not limited to the following:

IS 513	:	Cold rolled low carbon steel and strips
IS 1079	:	Hot rolled carbon steel and strips.
IS 2629	:	Recommended practice for hot dip galvanizing
IS 2611	:	Methods for testing uniformity of coating of Zinc coated articles
IS 1367	:	Technical supply conditions for threaded steel fasteners.
IS 1663	:	Method for tensile testing of steel sheet & strip of thickness 0.5 mm to 3 mm

10.8.3. Construction

Cable carries, fittings and accessories shall be fabricated out of rolled Mild Sheel sheets free from flaws such as laminations, rolling marks, pitting etc. conforming relevant codes.

Minimum thickness of Mild Steel sheets used for fabrication of cable carries and fittings shall be 1.60 mm up to 450 mm wide trays and 2.0 mm above 450 mm wide trays. The thickness of side coupler plates shall be minimum 3 mm.

All accessories like bends, reducers, tees, crosses coupler plates, etc., shall be pre-fabricated and not fabricated at site.

Structural supports shall be made out of Mild steel with hot dip galvanized of adequate size and load carrying capacity.

Structural supports shall be located appropriately and the distance between any two supports shall not be more than 1500 mm.

In RCC trenches, the cable carriers shall be of cantilever construction and erected with anchor fasteners / insert plate with adequate load carrying capacity. Fittings like bends, reducers, tees, crosses, etc. accessories like side coupler plates etc. and hardware GI bolts, nuts, springs, washers as may be required shall be treated as part of the supply item.

In masonry brick work the cable carrier support shall be grouted adequately with appropriate supports using cement mortar.

In vertical sections the cable carriers shall be of ladder / perforated construction with one or multi tiers complete with matching fittings like bends, reducers, tees, crosses etc., accessories like side coupler plat etc. and hardware GI bolts, nuts, springs, washers, etc. as may be required.

The standard length of each size and type of cable tray / ladder shall be not more than 2.5 metre.

10.8.4. Support system for cable carriers

The support system shall be fabricated from standard structural steel members. The cable carriers and support system shall be hot dip galvanised

10.8.5. Galvanizing

Galvanising of steel components and accessories shall conform to relevant code The galvanising shall be uniform, clean, smooth, continuous and free from spots. Should the galvanizing of the samples be found defective, the entire batch steel shall have to be re-galvanised at Concessionaire's cost after pickling.

The amount of zinc deposit over threaded portion of bolts, nuts, screws a washers shall be as per relevant codes. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads have the required zinc coating on them.

The hot dip galvanized thickness shall not be less than 80 micron thickness.

Section – G5.2
Technical specification for Diesel generator set

Section G5.2: Technical specification for Diesel generator set

1. General

1.1 Scope of work

This specification covers the technical requirements and essential particulars for the Design, manufacture, supply, inspection, testing and commissioning of adequate size of Diesel Generator systems as covered in the specification documents and drawings. The Concessionaire shall demonstrate that the DG set satisfies the requirements of the specification and applicable codes

2. Diesel Generator

2.1 Applicable codes and standards

2.1.1 The DG set shall conform to the latest editions of the codes and standards listed under Clause 2.1.2 below & other applicable standards. Nothing in this specification shall be construed to relieve the Concessionaire of this responsibility.

2.1.2 The applicable Indian standards and codes shall be followed wherever applicable for the DG set. In all cases, the latest revision of the standards shall be referred to. In the event of conflict between any of these Specifications and the Codes referred, such specifications shall be defined, prepared by the Concessionaire and submitted to the Project Engineer for approval. The decis ion of Project Engineer in such case shall be final and binding on the Concessionaire. The following standards, unless otherwise specified herein, shall be referred to.

IEC 34	Rotating electrical machines
BS 5000	Part 3 Reciprocating IC engines: Performance
IS 10002	Performance requirements of Diesel Engines
IS 10000 (OR) Equivalent BS code	Method of tests for IC engines
BS 5514 / (ISP 3046)	Reciprocating internal combustion engines performance standard reference conditions, declarations of power, fuel and lubricating oil consumptions and test methods
IS : 2147	Degree of protection provided by enclosure for low voltage switchgear and control gear
IS : 4722	Rotating Electrical Machines
IS : 3043	Code of practice for earthing
IS 8623	Low voltage switchgear & control gear assemblies
IS 5578	Marking of insulated conductors

IS 11353	Uniform system of marking & identification of conductors and apparatus
IS 2705	Current Transformers
IS 7098	Cross linked polyethylene insulated (XLPE) PVC sheathed cables, Part 1: For working voltage up to and including 1100 V
IS 3156	Voltage transformers
IS 5082	Material data for aluminium bus bar
IS 1248	Direct acting electrical indicating instruments
IS 9224	Fuses with high breaking capacity
IS 13947	Low voltage switchgear & control gear
IS 13364	Specification for ac generators driven by Part 2, reciprocating internal combustion engine rated above 20 kVA and up to 1250 kVA
IS 3231	Specification for electrical relays for power system protection
IS 8686	Specification for static protective relays
IS/ IEC 60947	Low-voltage switchgear and control gear

3. Construction & component specification

3.1 Diesel Engine

3.1.1 The diesel engines shall be approved make, suitable for Prime power rating, direct injection, four stroke, multi cylinder, water cooled through base mounted radiator, turbo charged, water cooled type operating, acoustic enclosure & capable of developing requisite BHP rating to drive the Alternator

3.1.2 The engine shall be designed to operate at 50° C ambient temperature without any de-rating factor

3.1.3 The engine & the governing system shall conform to class-A1 governing as per BS 5514 and shall be suitable for Prime power rating generating application. The unit shall be suitable for operation on High Speed Diesel Oil without any modifications.

3.1.4 The governing system of the engine shall be of the microprocessor based electronic type suitable to control frequency variation within +/-4% for a sudden load change up to 70% The governor shall ensure that the speed of the set is regulated within 1% of the nominal speed under normal operating conditions

3.1.5 The engine shall be electric start and shall be suitable for battery assisted manual / auto / SCADA system starting. The design shall ensure that the starter will be automatically released when the engine picks up speed beyond 60% of the rated speed.

3.1.6 All moving parts of the engine and other associated equipment shall be provided with guards to prevent accidental contact. The guard shall be designed to facilitate easy removal and reinstallation

3.1.7 The engine fitments shall include but not be limited to the following:-

i) Flexible coupling and flywheel with guard
ii) Air inlet system with Dry type air filter with clogged condition indicator & turbo charger
iii) Fuel system complete with Fuel Pump, flexible hoses, primary & secondary fuel filters with service indicator and manual priming pump.
iv) Exhaust system with dry manifold and residential silencer.
v) Lube oil system with gear type oil pump, oil cooler, filter and crank case heater.
vi) Cooling system with engine coolant belt, fan, guard, radiator & low coolant level switch.
vii) 24V D.C. Starter and battery charging alternator with auto cut off.
viii) Acoustic enclosure suitable for outdoor operation

4. Alternator

4.1 The Alternator shall be industrial type, 1500 RPM, 415V, 3 Phase, neutral, 50Hz, adequate size of DG set in KVA, 0.8PF, star connected, IP-23, horizontal foot mounted, continuous duty suitable for prime power alternator, double bearing, self-excited, self-regulated, brushless excitation machine with exciter and automatic voltage regulator (AVR). The exciter shall be rotating diode type and Class 'H' insulated. The exciter shall be capable of forcing the field for 3 seconds (or duration as specified in the data sheet) in the event of short circuit fault at generator terminal. The exciter should be capable of building up voltage from residual magnetism, protection against low speed operation & high motor starting capability. The rectifier shall have in built protection for over voltage and rate of rise of voltage. The generator shall have on line greasing facility with grease nipple & relief device. All other parameters shall be as specified in the data sheet and conforming to codes and standards specified in the data sheet or relevant standards.

4.2 Continuous damper winding fitted on each pole.

4.3 Thermistor for Hot spot detection with control unit for mounting in the control panel.

4.4 Terminal box with separately mounted adopter box having bus bars and flexible wiring between Alternator terminals and adopter box drawn in PVC covered metallic flexible conduit. The adopter box shall be suitable for terminating adequate size of 2 runs x 3½ core XLPE armoured Aluminium cable.

4.5 The Alternator shall further meet the following specification.

4.6 The alternator shall conform to IS 4722 / BS standards.

4.7 The alternator shall be suitable for 20% over speed for two minutes.

4.8 The alternator terminal voltage for any load variation should be maintained within +/- 2%.

4.9 The transient and steady state frequency variation should be limited to +/-4% for sudden load variation upto 70%. The generator TVD for sudden load variation of 100% shall not be more than 15%.

4.10 Both ends of each phase winding shall be brought to the terminal box.

4.11 The alternator shall be capable of carrying 50% overload for a duration of one minute and 10% overload for one hour in 12 hours operation.

4.12 The alternator shall withstand a 3 phase short circuit at the terminals for a period of 3 seconds

4.13 The total harmonic distortion shall not exceed 3% and the design shall permit up to 30% unbalance between phases while in operation

4.14 The efficiency shall preferably not be less than 93% in the normal operating range of 50% to 100% loading

Driven equipment	-	adequate size as required
Output	-	adequate size as required
Terminal voltage	-	415 volts under full load conditions
Frequency	-	50 Hz
No. of Phases	-	Three
Power Factor	-	0.8 lag
Stator Connection	-	Star

Excitation	-	Brushless
Coupling	-	Direct
Operating duty	-	Continuous
Place of Installation	-	Outdoor
Class of Insulation	-	Class 'F'
Impedance	-	Confirming to IS
Voltage Regulation	-	+ / - 2.5% voltage regulation for a load variation of full load to no load at 0.80 lag power factor with AVR
Over Speed	-	All rotating part of alternator suitable for 120% over speed for two minutes
Excitation	-	AC Brushless static exciter of suitable voltage and of adequate capacity to meet the excitation current of the alternator at full load at 0.80 power factor

5. Acoustic enclosure

5.1 The acoustic enclosure shall be of free standing, floor-mounting type integral with the DG set.

5.2 The enclosure shall be provided with rugged heavy-duty structural steel base frame with chequered plate flooring on which the DG set is to be mounted. The enclosure shall be prefabricated factory-built and modular in construction.

5.3 The enclosure shall consist of acoustically treated panels housed in rugged steel frames, which shall be bolted together to from the body of the enclosure.

5.4 Hinged doors shall be provided, on either side, which shall also be acoustically treated, thereby providing easy access to the DG set while minimizing the operating space requirements.

5.5 The construction of the acoustic enclosure shall be such that with both the acoustic doors open on the either side, full access is available to the engine and alternator.

5.6 Fresh air inlet into the system a parallel baffle air inlet silencer shall be provided. Additionally, to augment the fresh air inlet requirements, a forced air ventilation duct with associated silencer shall be provided above the alternator.

5.7 For hot air discharge, an acoustic discharge plenum shall be provided in front of the engine radiator, for discharge of hot air into the surroundings through a parallel baffle

air outlet silencer. The enclosure shall have suitable openings in the roof module for exhaust piping.

5.8 The acoustic panels shall be filled with a special grade high-density mineral wool retained on the inside by perforated GI sheets specially designed for optimum sound attenuation.

5.9 The outer surface of the Acoustic Panels shall be fabricated of performed 16 G corrugated CRCA sheet steel.

5.10 All structural members such as angles / channels used in the construction of the enclosure frame.

5.11 All materials used for Acoustic Enclosure shall be fire resistant / fire retardant grade.

5.12 The sheet steel treatment shall consist of degreasing, de-rusting and phosphating followed by two coats of zinc chromate primer, followed by two coats of Zinpholite surface for superior corrosion resistance and two coats of finish paint.

5.13 For effective Acoustic sealing, necessary gasket material shall be provided.

5.14 All hardware and fittings used shall be passivated with zinc.

5.15 With the above Enclosure, the sound pressure levels when measured at a distance of 1 meter outside the Acoustic Enclosure shall be confirming to the CPCB / Tamilnadu state Pollution control Board regulation.

5.16 It shall be ensured that at least 1000 mm (min.) clear space is available all around the Acoustic Enclosure to ensure free airflow for the Gen-set as required and to facilitate accessibility for generator operation and routine maintenance.

5.17 The enclosure shall be provided with suction fans to ensure that the adequate cooling and combustion air is made available to the engine and the temperature within the enclosure is limited to 5° C above ambient.

5.18 The fan shall be designed with sufficient static to draw the requisite quality of air from the duct provided for this purpose. Calculations shall be furnished to prove the adequacy of the ventilation system offered. The suction fans shall start automatically when the temperature in the enclosure reaches 40°C and shall continue to run for 5 to 10 minutes after the load is disconnected. A temperature controller shall be provided for this purpose housed in sheet steel enclosure.

5.19 Two light points controlled by a switch complete with 36W fluorescent Luminaries and lamps shall be provided. Provision shall also be made for fixing a heat detector inside the acoustic enclosure, which will be connected to the central fire alarm panel.

5.20 Necessary openings shall be made for the entry of power cable and control cables, fuel piping, exhaust piping, air inlet pipe etc.

5.21 With the installation of the acoustic enclosure, there shall not be any de-rating of the DG set. The maximum temperature of oil and water shall not exceed the limits prescribed by the manufacturer of the engine. The DG set shall give rated output continuously.

5.22 The ventilation system shall be designed to provide an adequate air volume whenever the DG set is in operation.

5.23 The ventilation fan shall be of the axial flow type designed to handle the static pressure estimated based on the inlet air duct size and length.

6. Instrument / Control Panel

6.1 Instrument / Control Panel shall have the Equipment's / Instruments but not limited to the following

a) Auto Start / Stop control
b) Local / Remote / SCADA control
c) MCCB / ACB for power control
d) MCB for Control wiring
e) Lube oil pressure
f) Coolant temperature
g) Low Coolant Level
h) High Coolant Temperature
i) Over Speed
j) Engine start / stop key switch.
k) D.C Voltage.
l) Engine RPM
m) Operating Hours Meter
n) Over / Under Voltage
o) Over Current
p) Safety cutouts for low lube oil pressure high coolant temperature, over speed, emergency stop, low coolant level and fail to start

q) Indications for the above safety cutouts
r) Alternator Voltage and Amperage of all 3 phases
s) Wiring harness using temperature resistant insulation and flexible copper conductor wires. The wiring should be clamped at regular intervals and terminated using lugs.
t) Stainless steel flexible for engine exhaust
u) Stop solenoid.
v) Panel illuminating lights
w) Emergency stop
x) DG set controller with RS 485 Communication / Equivalent port to communicate to SCADA system (supplied by others) to control / monitor critical and essential system.

7. Accessories

7.1 The following accessories shall be supplied with the DG set

a) Common base frame for the Engine and Alternator
b) Anti-vibration mounts of reputed make in requisite quantity
c) Protective guards for all rotating parts
d) 18 G galvanized sheet steel trays beneath the engine, day tank and overflow collection tank to collect the oil leakage

8. Batteries

8.1 The batteries shall be of heavy duty, high performance & rated for continuous duty.

8.2 Each battery shall be rated 24 V. The number and AH capacity shall be selected to suit the engine requirements.

8.3 Battery shall be suitable for six successive starting attempts each of 10 seconds duration with a gap of 5 seconds between successive starts.

8.4 The battery shall be supplied complete with electrolyte and accessories. The accessories shall include battery stand, battery leads with terminal ends, acrylic top cover and inter battery connectors. First charging of the batteries shall be included.

9. Control cabling

9.1 The cables shall comply with all currently applicable Indian Standards & IEC standards and the following specific standards and codes:

9.2 Copper/Aluminium control cables - PVC / XLPE insulated, PVC sheathed 650/1100V

grade as per IS: 1554-I & IS: 7098 - I. Overall shielding if required with Aluminium Mylar tape with 100% coverage & 25% overlap on laid up cores for static noise reduction.

9.3 Flexible, chord cables and wiring cables - PVC insulated & sheathed upto 1100V as per IS: 694, single and multi core.

9.4 Coaxial cables - RG and UR series as specified and as per MIL-C-17 / Bs: 2316 / IS 5068/ Is 11967 and suitable for 50/75/100/125 ohms

9.5 Signal cables as per BS:5308, DIN VDE 0815 & 816, IS: 1554, IEC: 189

9.6 Conductor shall be stranded / solid, circular / shaped - electrical grade aluminium / copper as per IS: 8130 and IEC: 60228 / BS: 6360.

9.7 Cable Insulation as per IS: 5831 / IS: 7098 and BS: 6746 / BS: 5467 / IEC: 60502

9.8 Inner sheath & outer sheath shall be PVC / HR PVC / PVC FRLS / PVC FR as per ST 1 / ST 2 / IEC 754 Part1 / IEC 60332 Part I & III / IEEE-383 / ASTM 2843 & 2863, EIL Specs etc.

9.9 Armouring shall be G.S round wire / Flat strip or Aluminium wire / Flat strip over the inner sheath as per IS 3975

10. Receipt of material at site

All material loading, unloading, transportation, (shifting and storage, safe keeping) etc., is under the scope of DG vendor.

11. Testing, commissioning, training and approvals

Testing and commissioning shall be carried out based on the specifications, data sheets, BOQ and the latest requirements of the various statutory authorities.

After installation as per the final approved drawing, the site testing shall be carried out by the vendor as specified before commissioning the DG set system. After testing the entire system to the satisfaction of the Executing Agency and their represents.

A thorough training of the operation and maintenance procedures etc as required or necessary shall be given by the vendor to the Executing Agency's representatives with appropriate write-

ups and manuals / catalogues as reference for a minimum period of three months after handing over.

The documents / drawings required for obtaining the approval / sanction from the Electrical inspector, State Electricity board, State regulatory authority, Factory inspector, Pollution control board, Regulatory authority, and any other statutory agency appointed for the purpose by the state / central / municipal / local bodies shall be prepared by the DG set supplier.

12. Guarantee

The performance figures specified shall be guaranteed within the tolerance specified or as permitted by relevant standards. In case of failure of equipment to meet the guaranteed performance, the Executing Agency reserves the right to reject the equipment. However, the Executing Agency also reserves the right to use the rejected equipment until new equipment meeting the guaranteed performance requirements is supplied by the vendor at no extra cost. If any equipment supplied by the vendor fails at site during erection, commissioning or service (within guarantee period), the vendor shall repair and put back into successful operation the failed equipment within the time frame and procedure of repair agreed with the Executing Agency depending on nature of failure at no extra cost to the purchaser. The guarantee period shall be as specified in the commercial terms and conditions.

13. Bar chart / Network

The Concessionaire to indicate following schedules:

- Manufacturing, Inspection & Testing at works
- Shipping
- Pre - commissioning / testing
- Commissioning
- Service kits with all filters and other consumables
- List of recommended spares for three years satisfactory operation.

14. Documentation and drawing requirements:

The following documents, drawings etc shall be submitted by the Concessioanire:

Data sheet / Compliance and guaranteed particulars statement.

DG layout plan showing all dimensions, including operational and maintenance clearances with sections as required. The plan should also indicate ventilation requirement, civil foundations, loading data, wall openings, etc. & generator earthing requirement

Schematic diagram of control panel with accessories like AVR, AMF, and auxiliary power distribution details etc., along with cable schedule.

Terminal box drawing, literature, write-ups, description of DG set excitation system, voltage regulator, governor, & other auxiliaries, catalogues / brochures etc.

Component list with rating & ranges of all items

Single line diagram for the whole system - control and power

Technical specification sheet with brochures / catalogues and operational details for:

- DG sets
- Acoustic enclosure or Room sound proofing
- Detailed specification sheet for all auxiliary components giving material specifications, make/model, capacity, ratings etc.

15. Testing

The following tests shall be carried out at the manufacturer's works and the test results submitted to the Executing Agency. The Executing Agency reserves the right to inspect the above tests or waive the inspection.

- **Tests on engine**
    - Engine starting time
    - 4 hour running at full load followed by 1 hour running at 110 % of load
    - Fuel consumption test:
    - One hour running at 100% load
    - One hour running at 75% load
    - One hour running at 50% load

- **Testing arrangement**
    - Arrangement for loading DG by: Vendor
    - Fuel charges for site testing by: Vendor

- **Shop tests**

  - All the tests required by the manufactures practice or by applicable standard during the manufacture stage.
  - Performance tests on the assembled diesel generator set. (With Voltage regulator)
  - Check of fuel consumption at different loads.
  - Measurement of Generator Winding Temperature after stabilized condition at 10 % overload.
  - Measurement of cooling water temperature of engine at 10% overload as above
  - Measurement of vibration
  - Measurement of sound level at 1 Meter Level and 10 Meter distance
  - Functional tests on fuel transfer pump.
  - Dielectric and insulation tests
  - Routine test on voltage regulator
  - Hydrostatic Pressure test on both fuel tanks (at 2 Bars)
  - Simulation of all protection
  - Simulation of mains failure and mains return
  - **Load tests at 0.8 Power Factor**
    - 2 Hour at 100 % rated load
    - 1 Hour at 110 % rated load
    - 1 Hour at 75 % rated load.
    - 1 Hour at 50 % rated load.
  - Starting tests to show time of starting and load acceptance

16. Inspection, operation, maintenance Manuals

The supplier shall submit along with the delivery and/or on commissioning - as applicable, the Type & Routine test certificates / Guarantee certificates, etc.

17. Make of DG set

The concessionaire to decide and get approval from the Executing Agency

18. Guaranteed technical particulars for DG SET

Sl. No.	Description	Requirement	Vendor's confirmation
1	**DG Sets**		
	Rating of sets	adequate size as required	
	Manufacturer:		Vendor to specify

Sl. No.	Description	Requirement	Vendor's confirmation
	Model No. & Type:		Vendor to specify
	Quantity	1 Nos.	
	Application:	Standby power generation - suitable for continuous full / part load operation	
	Anti-vibration mounting	Required	Vendor to specify
	Sound proofing	**Acoustic enclosure**	
	Total static weight with enclosure		Vendor to specify
	Total Dynamic weight with enclosure		Vendor to specify
	Exhaust line with silencer & chimney	Required	Vendor to specify
2	**Engine**		
	Make		
	Model no.:		Vendor to specify
	Name plate rating:		Vendor to specify
	BHP:		Vendor to specify
	Engine speed:		Vendor to specify
	Method of starting:	Electric	
	Aspiration:	Water cooled Turbo charged	Vendor to specify
	Emission:	EURO III air emission norms or CPCB norms.	Vendor to specify
	Lube oil heater:	Required	
	Lube oil consumption:		Vendor to specify
	Cylinder jacket heating (cooling water heating) with thermostat:	Required	
	Lube oil priming facility:	Required	
	Lube oil pump:	Engine driven only	
	Engine noise level	Specify in db	
	Minimum operating time without cooling water at full load	Specify in minutes	Vendor to specify
	Combustion air flow	Meter cube / hour:	Vendor to specify
	De rating under site conditions:	Specify - if any	Vendor to specify
	No. of cylinders:	Specify	Vendor to specify
	Turbo charger	Inter / after	Vendor to specify
	Maximum time to start from cold & attain rated speed & ready to take load	Specify in seconds	
	Short time overload capacity	110% for 1 hr in 24 hrs of	Vendor to specify

Sl. No.	Description	Requirement	Vendor's confirmation
		operation	
3	**Cooling system**		
	Method of Jacket cooling:		Vendor to specify
	Heat Removal:		Vendor to specify
	Radiator fan:	Engine driven	
	Total radiated heat:		Vendor to specify
4	**Fuel oil system:**		
	Fuel oil:	High speed Diesel	
	Fuel tank level indication	Required	
	Fuel tank gauge glass	Required	
	Fuel flow meter	Specify	
	Fuel transfer pump drive	If required: Engine driven	
	Fuel consumption at		
	a) Full load:	Specify in Litres/kWh	Vendor to specify
	b) 75% load:	Specify in Litres/kWh	Vendor to specify
	c) 50% load:	Specify in Litres/kWh	Vendor to specify
	d) 25% load:	Specify in Litres/kWh	Vendor to specify
5	**Exhaust**		
	Exhaust silencer type	Heavy duty Residential / hospital type	Vendor to specify
	Exhaust noise level (with silencer)	Confirming to CPCB / TNPCB norms	Vendor to specify
	Heat rejection to exhaust system	Specify in deg C over ambient	Vendor to specify
	Max. Permissible back pressure	Specify in exhaust in kg /cm sq:	Vendor to specify
	Exhaust gas flow:		Vendor to specify
	Exhaust gas temperature:		Vendor to specify
	Chimney height	Specify as required, building height is around 4.50 M	
	Emission Limits (g/KW-hr)		
	NOX + HC	Confirming to CPCB / TNPCB norms	
	CO	Confirming to CPCB / TNPCB norms	

Sl. No.	Description	Requirement	Vendor's confirmation
	IPM	Confirming to CPCB / TNPCB norms	
	Smoke Limit absorption coefficient, WI (at full load)		
6	**Governor data:**		
	Make:	Specify	Vendor to specify
	Model No:	Specify	Vendor to specify
	Type:	Electronic only, give details	
	Adjustable droop provided:	Required	
	Speed raise / lower from panel	Required	
7	**Alternator:**		
	Make:		Vendor to specify
	Model No:		Vendor to specify
	No. of phases:	3 phase and neutral	
	Enclosure:	IP 23	
	Terminal voltage & freq.:	415 V AC & 50 Hz	
	Time permitted to build up rated voltage	3 seconds max.	Vendor to specify
	Permissible voltage dip	10% for sudden loading of 50 %	
	Rating of biggest motor that can be started on DOL with permissible voltage dip of 10% when the generator is		
	a) unloaded:		Vendor to specify
	b) 80 % loaded:		Vendor to specify
	c) 50 % loaded:		Vendor to specify
	Power transfer:	Cable adopter box	
	Rating:	adequate size of DG set as required at 0.8 P.F	
	Insulation class-Armature:		Vendor to specify
	Field:		Vendor to specify
	Inertia time constant:	Specify kW-Sec / kVA	
	Bearing type:		Vendor to specify
	RFI suppression	Required	
	Short circuit withstand time:	Specify	
	Overload withstand capacity	Min. 150% for 15 Sec.	

Sl. No.	Description	Requirement	Vendor's confirmation
	Neutral earthing:	Solidly Earthed	
	Type of Cooling:		
	Efficiency of Alternator		
	a) At 100% MCR & rated p.f.:		Vendor to specify
	b) At 75 % MCR & rated p.f.:		Vendor to specify
	c) At 50 % MCR & rated p.f.:		Vendor to specify
	Max continuous & momentary unbalanced load capacity:		
	Asymmetrical short circuit withstand capability & duration:	Specify	Vendor to specify
	Open circuit transient time constant:	Specify	Vendor to specify
	Short circuit ratio:	Specify	Vendor to specify
8	**Exciter**		
	Type of excitation	Brushless	
	Capacity		Vendor to specify
	Operating voltage & current:		Vendor to specify
	Duration of field forcing:		Vendor to specify
	Class of insulation:		Vendor to specify
9	**AVR**		
	Type of A V R:	Self-regulated	
	Mounting of AVR:		Vendor to specify
	Dead band: %		Vendor to specify
	Response time:		Vendor to specify
	Voltage of operation:		Vendor to specify
	Line drop compensator provided to maintain bus voltage constant:	Required	
	Range of voltage adjustment:	Specify	Vendor to specify
	Fine tuning adjustment:	Specify	Vendor to specify
10	**Set mounted panel**		
	The following analogue type indicators with 4 -20 mA output ports to be provided:		
	Lube oil Temperature indicator:	Required	
	Make:	Specify	Vendor to specify

Sl. No.	Description	Requirement	Vendor's confirmation
	Type:	Specify	Vendor to specify
	Accuracy:	Specify	Vendor to specify
	Fuel oil Pressure Indicator:		
	Make:	Required	
	Type:	Specify	Vendor to specify
	Accuracy:	Specify	Vendor to specify
	Lube oil Pressure Indicator:	Required	
	Make:	Specify	Vendor to specify
	Type:	Specify	Vendor to specify
	Accuracy:	Specify	Vendor to specify
	Engine Speed Indicator:	Required	
	Make:	Specify	Vendor to specify
	Type:	Specify	Vendor to specify
	Accuracy:	Specify	Vendor to specify
	Any other indicator required for the engine protection to be recommended by the vendor.	Specify	Vendor to specify
11	**Painting:**		
	Surface Pre-treatment:	Sand blasting / Chemical cleaning	
	Primer:	Two coats of primer	
	Final Paint Shade:	Siemens grey as per IS 5 or as approved	
	Minimum Paint Thickness:	100 microns	
12	**Acoustic enclosure**	-	
	Make:		Vendor to specify
	Model No:		Vendor to specify
	Type:		Vendor to specify
	Application	Outdoor / IP54 rating	
	Sound Level	Confirming to CPCB / TNPCB norms	
13	**Control & power panel**	-	
	Cabinet Construction:	Mounted inside the enclosure	
	Degree of protection:	IP54	
	Access:	Front / Back	

Sl. No.	Description	Requirement	Vendor's confirmation
	Cable entry:	TOP / BOTTOM and as per site requirements	
	Controller:	Integrated Microprocessor:	
	Make:		Vendor to specify
	Model No:		Vendor to specify
	Type:		Vendor to specify
	No. of starting commands in single attempt in Auto position: min.	3 minimum	
	Time gap between commands:	Specify in seconds	
	Auto stop on resumption of main supply:	Required with inbuilt time delay.	
	Note		
	DG control & On, Off status to be communication port with SCADA system		
14	**Miscellaneous**		
	Guaranteed output in KWH unit generated per litre of HSD		
	Alternator to care of 3^{RD}, 5^{TH}, 7^{TH} Harmonic distortion.		

19. Earthing and lightning protection

19.1 General

The metallic body / enclosure of all electrical equipment shall be earthed with a minimum of 2 distinct earth connections of adequate size earth conductors.

Earthing shall be in conformation with IS 3043

19.2 Earth station

- **Pipe electrode earthing**

  Earth electrode shall be of minimum 40 mm dia class "B" GI Pipe 3.0 m long with tapered bottom and with 12 mm dia holes at 75 mm c/c on all sides for bottom 2.0 m with top watering arrangement.
- **Plate electrode**

600 x 600 x 6 mm GI plates with 25 mm dia watering pipe with funnel buried at a depth of 2.5 m forms earth electrode. Earthing strip is directly brought to chamber/disconnecting link in protective pipe.

Earth electrode shall be back filled with alternate layers of charcoal and salt are provided through out height of electrode with overall 300 mm cover

19.3 Inspection chamber

Brick masonry chamber of size 450 x 450 x 450 mm with heavy duty cast iron cover and frame with top at ground level are provided for watering arrangement.

19.4 Soil treatment

In case of rocky soil or hard murrum, soil resistance is very high. Hence, for getting lower resistivity values, the Concessionaire shall carryout artificial soil treatment to achieve the required level of lower resistance as per IS.

The earth resistance shall not exceed 1.0 ohms in any case. The Concessionaire shall provide additional earth pits to get the desired earth resistance value of 1.0 ohm.

19.5 Lightning protection

Lightning protection shall be in confirmation with IS/IEC : 62305.

The lightning protection to the buildings shall be effected by use of conventional vertical lightning air termination or horizontal faraday cage or by a combination of both. G.I tapes / strips or aluminium circular conductor shall be laid on all parapet walls and as down conductors.

Conventional spike type lightening arrestor shall be mounted at the highest point of the building and a supporting pole shall be used to achieve the desired height and angle of coverage.

The down conductors shall be brought down from parapet / terrace level to ground level duly ensuring that adequate side flashing distance is maintained between the down conductor and other metallic pipes, if any, running parallel from terrace to ground.

A Test and disconnecting link box shall be provided at a height of 1.0 mtr from G and the down conductor shall be terminated onto this link. Beyond this link 25 x 6 mm GI strip shall be run up to earth station.

Earth station for lightning protection system shall of 600 x 600 x 6 mm GI plate earthing.

19.6 Inspection and testing

The consultant and the representative of the Owner shall have free access to vendor's works to inspect, expedite and witness shop tests. Any materials or works found to be defective or which does not meet the requirements of this specification will be rejected and shall be replaced at supplier's cost. Purchaser reserves the right to carryout stage wise inspection.

All routine tests shall be carried out on the electrical equipment as per relevant Indian Standard Specifications. The delivery of the electrical equipment / electrical items shall be accompanied with copies of such routine test certificates clearly mentioning reference to the P.O No., Line item No. of P.O, quantity as per P.O, quantity inspected and passed, Governing IS for testing, test results and details of test equipment with their calibration details.

Section - G5.3
Erection, testing and commissioning

Section G5.3: Erection, testing and commissioning

1. Equipment installation, testing and commissioning

1.1 Installation of equipment

a) In accordance with the specific installation instructions, as shown in the Concessionaire's drawings or as directed by the Executing Agency, the Concessionaire shall unload, erect, install, wire, test and place into use of all electrical equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented.

b) The Concessionaire shall furnish all supervision, labour, tools, equipment, rigging materials and incidental materials such as bolts, wedges, anchors, concrete inserts etc. required to completely install, test and adjust the equipment.

c) Drawings, instructions and recommendations shall be correctly followed in handling, settling, testing and commissioning of all equipment and care shall be exercised in handling to avoid distortion to stationary structures, the marring of finish, or damaging of delicate instruments or other electrical parts.

d) The Concessionaire shall erect and commission the equipment as per the instructions of the Executing Agency and shall extend all co-operation to him.

e) In case of any doubt / query as to correct interpretation of drawings or instructions, necessary clarification shall be obtained from the Executing Agency. The Concessionaire shall be held responsible for any damage to the equipment consequent to not following instructions correctly.

f) The Concessionaire shall move all equipment into the respective buildings through regular doors or floors openings provided specifically for the equipment. The Concessionaire shall make his own arrangement for lifting of equipment.

g) Where assemblies are supplied in more than one section, the Concessionaire shall make all necessary mechanical and electrical connections between sections including the connections between bus bars / wires. The Concessionaire shall also carry out the adjustments/alignments necessary for proper operation of the circuit breakers. All insulators and bushings shall be protected against damage during installation. Insulators or business chipped, cracked or damaged due to negligence or carelessness shall be replaced by the Concessionaire at his own expenses.

h) The Concessionaire shall take utmost care in handling instruments, relays and other delicate mechanisms. Wherever the instruments or relays are supplied separately, they shall be mounted only after the associated control panels have been erected and aligned. The blocking material/mechanism employed for the safe transit of the instruments and relays shall be removed after ensuring that the panels have been completely installed and no further movement of the same would be necessary. Any damage to relays and instruments shall be immediately reported to the Executing Agency.

i) Care shall be taken during handling on insulating oil to prevent ingress of moisture or foreign matter. In the testing, circulation, filtering, or otherwise handling of oil, rubber hose shall not be used. Circulation and filtering of oil, the heating of oil by regulated short-circuit current during drying runs and sampling and testing of oil shall be in accordance with the latest Code of Practice IS:10028 (Part II) shall be carried out.

j) Inspection, storage, installation, testing and commissioning of transformers shall be in accordance with the latest Indian Standard Code of Practice IS:10028. All commissioning tests as applicable, vide Appendix B of IS:10028 (Part II) shall be carried out.

k) Switchgear, relay and control panels shall be installed in accordance with the latest Indian Standard Code of Practice IS:10118. The switchgear panels shall be installed on finished surface or concrete or steel sills. The Concessionaire shall be required to install and align any channel sills which form part of the foundations. Tape or compound shall be applied where called for. The base of outdoor type units shall be sealed in approved manner to prevent ingress of moisture.

l) After installation of all power and control wiring, the Concessionaire shall perform operating tests on all switchgear and panels to verify the proper operation of switchgear/panels and the correctness of the interconnections between various items of equipment. This shall be done by applying normal AC or DC voltage to the circuits and operating the equipment. Megger tests for insulation, polarity installation tests shall be carried out by the Concessionaire who shall also make all necessary for proper functioning of the equipment.

m) Installation and testing of the battery and battery chargers shall be done in strict compliance with the applicable standards. Each cell shall be inspected for breakage and condition of cover seals as soon as received at site. The battery shall be set up on racks as soon as possible after receipt, utilizing lifting devices. The cells shall not be lifted by terminals. Contact surface of the battery terminals and inter cell connectors shall be cleaned, coated with protective grease and assembled. Each connection shall be properly tightened. Each cell shall be tested with an hydrometer and thermometer and the results logged. A freshening charge, if required, shall be added. When handed over to the Executing Agency,

the battery shall be fully charged and the electrolyte shall be at the full level of the specified specific gravity.

n) Equipment furnished with finished coats of paint shall be touched up by the Concessionaire if their surface is spoiled or marred while handling.

o) Foundation work and grouting-in of fixing bolts or channels for all transformer, switchgear, motors and control panels will be carried out by the Concessionaire.

1.1.1 Installation work for earthing and lightning protection system.

- The Concessionaire shall install aluminium / copper / steel conductors, braids, etc. required for the system and individual equipment earthing. All work such as cutting, bending, supporting, painting/coating, drilling, brazing/soldering/welding, clamping, bolting and connecting onto structures, equipment frames, terminals, rails or other devices shall be in the Concessionaire's scope of work. All incidental hardware and consumables such as fixing cleats/clamps, anchor fasteners, lugs, bolts, nuts, washing, bituminous.

- The quantities, sizes, materials of earthing conductors and electrodes to be installed as per requirement. Routes of the conductors and locations of electrodes shall be as shown on the project drawings.

- The work of embedment of earthing conductor in RCC floors / walls along with provision of earth plate inserts / pads / earth risers shall be done by the Concessionaire when the floors are cast or during construction of walls.The Concessionaire's scope of installation shall include laying the conductors in position with 50 mm concrete cover, making welded connections to inserts/pad/risers above the floor near the equipment. The embedded conductors shall be connected to reinforcing rods wherever necessary.

- If the tap connections (earthing leads) from the floor embedded main earthing grid to the equipment are more than 500 mm long then the same shall be embedded in floor by the Concessionaire where required, together with associated civil work such as excavation / chasing, concreting and surfacing, if not already done in the civil work. The concrete cover over the conductor shall not be less than 50 mm.

- Installation of earth conductors in outdoor areas, buried in ground, shall include excavation of earth upto 600 mm deep 450 mm wide, laying of conductors at 600 mm depth, brazing / welding as required, of main grid conductor joints as well as risers of length 500 mm above ground at required locations and then backfiring material to be placed over buried conductor shall be free from stones and other harmful mixtures. Backfill shall be placed in layers of 150 mm, uniformly spread along the ditch and tampered utilizing pneumatic

tampers or other approved means. If the excavated soil is found unsuitable for backfilling, the Concessionaire shall arrange for suitable material from outside.

- Installation of earth connection leads to equipment and risers on steel structures / walls shall include laying the conductors, welding / cleating at specified intervals, welding / brazing to the main earth grid risers, bolting at equipment terminals and coating welded / brazed joints by bitumen paint. Galvanized conductors shall be touched up with zinc rich paint where holes are drilled at site for bolting to equipment / structure.

- Electrodes shall be installed (a) directly in earth, or (b) in constructed earth pits and connected to main buried earth grid. The scope of work shall include excavation, construction of the earth pits including all materials required for construction of earth pits, placing the rod and fixing test links on those pipe / rod / plate electrodes in test pits and connecting to main earth conductors.

- Installation of lightning conductors on the roofs of buildings shall include laying, anchoring, fastening and cleating of horizontal conductors, grouting of vertical rods wherever necessary, laying fastening / cleating / welding of the down comers on the walls / columns of the building and connection to the test links to be provided above ground level.

- Installation of the test links shall include mounting of the same at specified height on wall / column by suitable brackets and connections of the test link to the earth electrode.

- Whenever main earthing conductor crosses cable trenches, they shall be buried below the trench floor.

- Suitable earth risers shall be provided above finished floor/ground level. If the equipment is not available at the time of laying of the main earth conductors, the minimum length of such riser inside the building shall be 200 mm and outdoors shall be 500 mm above ground level. The risers to be provided will be marked in project drawings.

- Earth leads and risers between equipment earthing terminal and the earthing grid shall follow as direct and short a path as possible.

- Wherever earthing conductors passes through walls galvanized iron sleeves shall be provided for the passage of earthing conductor. The pipe ends shall be sealed by the Concessionaire by suitable water proof compound.

1.1.2 Earthing connections

- All connections in the main earth conductors buried in earth/concrete and connection between main earthing conductor and earth leads shall be of welded type.
- Connection between earth leads and earthing terminal provided on the equipment shall be bolted type.
- All bimetallic connections shall be treated with suitable compound to prevent moisture ingression.
- Metallic conduits and pipes shall be connected to the earthing system.
- Lightning protection system down conductors shall not be connected to other earthing conductors above ground level. Also no intermediate earthing connection shall be made to lightning arrestor and transformer earthing leads which shall be directly connected to plate electrode.

1.1.3 Earth electrodes

- Electrodes shall as far practicable, be embedded below permanent moisture level.
- Test pits with concrete covers shall be provided for periodic testing of earth resistance. Installation of plate electrodes in test pits shall be suitable for watering. The necessary materials required for installation work shall also include civil work such as excavation and connection to main earth grid.
- Earth pits shall be treated with salt and charcoal.
- Soil, salt and charcoal placed around the electrode shall be finely graded, free from stones and other harmful mixtures. Backfill shall be placed in layers of 250 mm thick uniformly spread and compacted. If excavated soil is found unsuitable for backfilling, the Concessionaire shall arrange for a suitable soil from outside.

1.1.4 Lightning protection system

- The lightning protection of air termination rods and/or horizontal air termination conductors shall be fixed in such a way that they remain in their installed position even during severe weather conditions. The necessary accessories such as cleats, clamps, welding materials, bolts, nuts shall be supplied by the Concessionaire.
- Air termination system shall be connected to earthing system by down conductors. The down conductors shall follow a direct path to earth. There shall not be any sharp bends, turns and kinks in the down conductors.
- All joints in the down conductors shall be of welded type. All metallic structures within 2 metres of down conductors shall be bonded to lightening protection system.
- Every down conductor shall be provided with a ‘test link’ at about 1000 mm above ground level housed in a suitable G.I. enclosure made of adequate thickness steel sheet and hot-dip galvanised. The test joint shall be directly connected to the earthing system electrode.
- The lightning protection system shall not be in direct contact with underground metallic service ducts, cables, cable conduits and metal enclosures of electrical equipment.

However, all metal projections, railings, vents, tanks, etc. above the roof shall be bonded together to form a part of roof grid.

1.2 Installation of cable racks and trays

a) Lines and grade for trays may be measured from building steel and finished floor elevations. Changes in line or grade, or the addition of offsets by means of cutting standard tray sections and inserting additional tray fittings to match with the existing arrangement shall be considered as a normal part of the work.

b) Where embedded steel inserts in concrete floors/walls for welding the supports for cable racks/trays are not available, Concessionaire shall provide suitable anchor fasteners at no extra cost.

c) Cable shall be clamped to the cable trays at regular intervals.

d) Flexible metallic conduits shall be used for termination of connection to equipment such as motors, limit switches and other apparatus.

1.3 Installation of cables

a) The Concessionaire shall install, test and commission the cables specified in the specification in accordance with drawings & instructions issued by the Executing Agency representative. Cables shall be laid directly buried in earth, on cable racks, in built-up trenches, on cable trays and supports, in conduits and ducts or bare on walls, ceiling etc. as per drawings. Concessionaire's scope of work includes unloading, laying, fixing, jointing, bending and termination of the cables. The Concessionaire shall also supply the necessary materials and equipment required for jointing and termination of the cables.

b) All apparatus, connections and cable work shall be designed and arranged to minimise risk of fire and any damage which might be caused in the event of fire. Wherever cables pass through floor or wall openings or other partitions, suitable bushes of an approved type shall be supplied and put into position by the Concessionaire.

c) Standard cable grips and reels shall be utilised for cable pulling. If unduly difficult pulling occurs, the Concessionaire shall check the pull required and suspend pulling until further procedure has been approved by the Executing Agency. The maximum pull tension shall not exceed the recommended value for the cable measured by the tension dynamometer. In general, any lubricant that does not injure the overall covering and

does not set up undesirable conditions of electrostatic stress or electrostatic charge may be used to assist in the pulling of insulated cables in conduits and ducts.

d) After pulling the cable, the Concessionaire shall record cable identification with date pulled neatly with waterproof ink in linen tags. Identification tags shall be attached securely to each end of cable with non-corrosive wire. The said wire must be non-ferrous material on single conductor power cable. Tags shall further be attached at intervals on long runs of cables on cable trays and in pull boxes. Cables and joint markers and RCC warning covers shall be provided wherever required. All cables shall be allocated a unique number which shall be fixed to each end of the cable using corrosion resistant label. Cable of different categories shall be tagged with the following subscripts and three digit number.

- HV power HV-P _____
- LV power P _____
- Control C _____
- Instrumentation I _____
- Protection PR_____
- Telecommunication T_____

e) Sharp bending and kinking of cables shall be avoided. The bending radii for various types of cables shall not be less than those specified below :

- KV XLPE multicore armoured cables: 15 times the overall dia of the cable
- 650 / 1100 V PVC insulated armoured cables: 12 times the overall dia of the cable

If shorter radius appears necessary, no bend shall be made until clearance and instructions have been received from the Executing Agency.

f) Power, control and instrumentation cables shall be laid in separate cable racks / rays.

g) Where groups of HV, LV and control cables are to be laid along the same route, suitable barriers to segregate them physically shall be provided.

h) Cables of different categories shall be installed so as to maintain satisfactory clearances for safety and in order to reduce the possibility of electrical interference. The following table gives the distances in mm that shall be maintained between the different categories / voltage grade of cable.

Cable category	**HV Power**	**LV Power**	**C&I Protection**	**Telecommunication / data network**

HV Power	-	275	550	550
LV Power	275	-	275	275
C&I Protection	550	275	-	275
Telecommunication	550	275	275	-

i) Where cables cross roads and water, oil, gas or sewage pipes, the cables shall be laid in reinforced spun concrete or steel pipes. For road crossings the pipe for the cables shall be buried at not less than one metre depth.

j) Cables laid in ground shall be laid on a 50 mm riddled earth bed. The cables shall then be covered on top and at their sides with riddled earth of depth of about 150 mm. This is then gently filled up to a depth of about 100 mm above the top of uppermost cable to provide bedding for the protective cable covers which are placed centrally over the cables. The protective cable covers for LV cables may be of earthenware and for HV cables of reinforced concrete. The RCC covers shall have one hole at each end, to tie them to each other with GI wires to prevent displacement. The trench is then backfilled with the excavated soil and well rammed in successive layer of not more than 300 mm depth, with the trenches being watered to improve consolidation wherever necessary. To allow for subsidence, it is advisable to allow a crown of earth not less than 50 mm in the centre and tapering towards the sides of the trench.

k) In each cable run some extra length shall be kept at a suitable point to enable one or two straight through joints to be made, should the cable develop a fault at a latter date.

l) Cables on cable racks, on cable trays and conduits shall be formed to avoid bearing against edges of trays, racks, conduits or their supports upon entering or leaving trays, racks or conduits. Cables shall be racked or laid directly into cantilevered cable trays where practicable, but in some cases it may be necessary that cables are pulled or threaded into trays. To facilitate visual tracing, cables in tray shall be laid only in single layers and unnecessary crossing of cables shall be avoided. Cables on trays shall finally be clamped in an approved manner.

m) Cable splices will not be permitted except where permitted by the Executing Agency. Splices shall be made by Concessionaire for each type of wire or cable in accordance with the instructions issued by cable manufacturer's and the Executing Agency. Before splicing, insulated cables shall have conductor insulation stepped and bound or pencilled for recommended distance back from splices to provide a long leakage path. After splicing, insulation equal to that on the spliced conductors shall be applied at each splice.

n) Jointing of cables shall be in accordance with relevant Indian Standard Code of Practice. Materials and tools required for cable jointing work, including cold setting bituminous compound shall be supplied by the Concessionaire. Cables shall be firmly clamped on either side of a straight through joint at a distance of not more than 300 mm away from the joints. Identification tags shall be provided at each joint at all cable terminations.

o) At cable terminal points where the conductor and cable insulation will be terminated, termination shall be made in neat, workmanlike and approved manner by men specialised in this class of work.

p) Control cable termination shall be made in accordance with wiring diagrams, using colour codes established by the Executing Agency for the various control circuit, by code marked wiring diagram.

q) When control cables are to be fanned out and cabled together with cord, the Concessionaire shall make connections to terminal blocks, and test the equipment for proper operation before cables are corded together. If there is any question as to the proper connection, the Concessionaire shall make a temporary connection with sufficient length of cables so that the cable can be switched to another terminal without splicing. After correct connections are established through operating the equipment, cables shall be cut to their correct lengths, connected to terminals in the specified manner, and corded together where necessary to hold them in place in a workmanlike manner.

r) Cable seals shall be examined to ascertain if they are intact and that cable ends are not damaged. If the seals are found to be broken the cable ends shall not be jointed until after due examination and testing by the Executing Agency. Before jointing is commenced, insulation resistance of both sections of cables to be jointed shall be checked by megger.

s) After installation and alignment of motors, the Concessionaire shall complete the conduit installation, including a section of flexible conduit between motor terminal box and trench/tray. The Concessionaire shall install and connect the power, control and heater supply cables as per equipment manufacturer's drawings, if any.

t) For directly buried underground cables, Concessionaire shall install galvanised cast iron cable markers over ground, at all bends, loops, joints, crossing points and at every 25 meters interval on straight runs. The cable markers shall be anchored in the ground to a depth of minimum 500 mm. The cable markers for L.T. cables & HT cables shall be distinctly different in shape and marked as L.T. Cables and HT Cables as the case may be by 30 mm size letters.

1.4 Lighting system installation

This covers the requirements of installation of the following :-

a) Lighting fixtures complete with lamps and accessories
b) Main Lighting distribution board
c) Lighting panels
d) Receptacles and lighting control switches
e) Point wiring
f) Street lighting poles and flood light towers
g) Multicore cables for street and boundary lighting
h) Maintaining equipment/materials during storage and being responsible for the equipment/material until they are handed over to the Executing Agency.
i) Installation, testing and commissioning shall be carried out in accordance with the drawings and as stipulated in this specification.

1.4.1 Applicable standards

Electrical wiring installations (system voltage exceeding 650 V)	:	IS:732
Code of practice for interior illumination (Part-1)	:	IS:3646/BS:8206
Code of practice for street lighting installation	:	IS:1944
Code of practice for industrial lighting	:	IS:6666
Code of practice for fire safety of building	:	IS:1646
Boxes for enclosure of electrical accessories	:	IS:5133 (Part I)
Guide for safety procedures and practices in electrical work	:	IS:5216
Ceiling roses	:	IS:371

1.4.2 Lighting fixtures

a) The installation of lighting fixtures shall be based on the mounting arrangement shown in the drawings enclosed. Installation shall include all materials required to mount the fixtures

in the manner as shown in the drawings. Installation of lighting fixtures shall include installation of control gear box wherever applicable.

b) Installation of receptacles and switches shall be carried out suitably as per the lighting layout drawings prepared by Concessionaire and approved by Executing Agency. Switch shall be mounted in flush with the front cover plate. Supply and installation of necessary hardware shall be included in the scope for installation of receptacles/switches.

c) Lighting distribution boards shall be installed at the location indicated in the layout drawings prepared by Concessionaire and approved by Executing Agency. Installation rates quoted for installation of lighting distribution boards shall include supply and installation of base channels, foundation bolts, etc.

d) Outdoor lighting distribution boards shall be installed on a concrete plinth. The top of plinth shall be 100 mm (min.) above the ground level. Construction of concrete plinth shall be included in the installation of outdoor lighting distribution board. Installation cost of lighting distribution board shall include installation of earthing conductor from LDB to the nearest earthing grid.

1.4.3 Point wiring

➢ **Supply and installation of conduit point wiring**

- The point wiring shall include supply of necessary materials for the conduit wiring such as galvanised rigid steel conduit, galvanised M.S. fixing saddles with spacer plates, nylon/fibre plugs, galvanised M.S. fixing screws, 12 SWG galvanised steel earthing wire, PVC insulated copper or aluminium conductor wires, control switches and pulling, termination of the earthing/PVC insulated wires as required, installation of control switches, drilling holes in brick walls/RCC roof slabs for taking the wiring conduits and refinishing any other works/material necessary for making point wiring complete in all respects.

- Wires used for conduit point wiring of lighting fixtures/ceiling fans and receptacles shall be 1100 V grade, PVC insulated, single core, stranded copper conductor wires of sizes not less than 1.5 sq.mm and 2.5 sq.mm respectively. Wires shall conform to IS:694 and shall bear the ISI mark.

- Concessionaire shall take into consideration necessary galvanised MS fixing clamps when the wiring conduits are to be supported from steel roof truss/structural members.

➢ **Point wiring shall also include/hold good for the following:**

- Supply and installation of lighting control switches and switchboxes complete with fixing accessories.

- Drilling holes in brick/RCC wall & roof for taking cable or conduit, sealing and refinishing with cement plaster.

- Testing, commissioning and handing over the lighting system in commercial working condition.

➢ **Outdoor Lighting (Street and Flood Lighting)**

The following shall be deemed to be included as part of the installation work for outdoor lighting point wiring.

- Installation of multicore/single core cables between LDB and junction box mounted on street light pole/flood lighting tower, from junction box to metal enclosed control gear box.

- Supply and installation of crimping type cable lugs, double compression type cable glands at each junction box and fixture, termination and testing and commissioning of cables.

- Concessionaire's scope shall also include excavation and preparation for buried cables. Supply and installation of route markers, supply and installation of HDPE pipes for road crossing shall also be included.

- Supply and installation of necessary cleating arrangement for cabling on flood light poles.

- Concessionaire shall provide necessary foundation for erecting street light pole/flood light tower and install the same. Concessionaire shall prepare foundation drawings with necessary details to Executing Agency for approval.

- Concessionaire shall plan and cut the cables in such a way that there is no wastage and no cable jointing is required in any run. However, should any joint become necessary, the same shall be provided by the Concessionaire and joint marker shall also be provided at no extra cost.

- Earthing of street light pole/flood light tower, lighting fixtures, control gear boxes, junction boxes, etc. are also included in the scope of installation. Concessionaire shall earth street light pole/flood light poles and junction box with 25 x 3 mm G.S. flat tap off from the 25 x 3 mm M.S. flat earthing grid along the street lighting included in the scope. The Concessionaire shall interconnect earthing grid to plant main earthing grid at first and last pole of each feeder circuit and at one intermediate pole.

➢ **Installation of lighting poles & towers for outdoor lighting (Street and flood lighting)**

- Work includes supply and installation of street light poles and flood light towers including associated junction boxes with fuses, links and terminals for junction boxes and junction boxes near each flood light fixtures.

- All street light poles and towers shall be painted with two coats of red oxide oil primer followed by two coats of aluminium alkyd paint.

➢ **Installation of Lighting Distribution Board, Lighting Panels (AC & DC), 240 V, AC 1-Phase Distribution Boards**

Installation of above items shall include necessary foundation channels, bolts/nuts, etc. for grouting lighting distribution boards, iron brackets/grouting brackets, bolts/nuts for wall/column mounted panels and associated civil works.

1.5 Point wiring

1.5.1 Wiring

a) Wiring shall be carried out strictly as per project drawings and technical specification. All exposed conduit wiring shall have provision for easy inspection. Exposed wiring when run along wall shall be as near the ceiling as possible. Where cable wiring is specified cable shall be cleated on to the wall as close to the ceiling as possible. In all types of wiring due consideration shall be given for neatness and appearance.

b) Wherever DC emergency lighting is provided, emergency lighting wires shall run in a separate conduit. Colour of the wires used shall be as follows; white for positive, black for negative.

c) Wherever lighting system has three phase distribution, separate conduits shall be used for different phases. For easy identification of phases and neutral wires, the following colour wires shall be used.

(i)	R - Phase	-	Red
(ii)	Y - Phase	-	Yellow
(iii)	B - Phase	-	Blue
(iv)	Neutral	-	Black

d) There shall be a circuit breaker or a linked switch on each live conductor of supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in neutral wire in the form of switch or fuse unit.

e) Conductors not arranged for connection to the same system or supply different phases of the same supply, shall be kept apart throughout their entire run.

f) Receptacles and lighting fittings in general shall be fed from different circuits. Five amps receptacles for toilet or small rooms can be fed from the lighting circuit with proper isolating arrangement.

g) Each final sub-circuit from a lighting panel shall be controlled by a single pole switch connected to the live conductor.

h) For long conduit wiring runs, inspection/pull boxes shall be provided at intervals not exceeding 10 m. Such facilities shall also be provided at conduit bends.

1.5.2 General practices

a) All receptacles and switches to be installed in offices and control rooms shall be flush mounted within the wall and those in other areas shall be wall or column mounted.

b) Ceiling roses shall not embody fuse terminals as an integral part. For voltages exceeding 250 volts, a ceiling rose or any similar attachment shall not be used.

c) A socket outlet shall not embody fuse terminals as an integral part of it. The switch controlling the socket outlet shall be on the live side of the line.

d) All exposed metal parts of the plug, when the plug is in complete engagement with the socket outlet, shall be in effective electrical connection with the earthing pin.

1.5.3 Earthing

a) Exposed conduits and fittings shall be earthed by 12 SWG GI wires run along the length of the conduit and secured by means of suitable clamps efficiently fastened to conduit tip. To

achieve perfect electrical continuity, the conduits shall be bonded effectively on either end of a coupling and other joints. In case of concealed wiring 1.5 / 2.5 sq.mm PVC insulated wire inside the conduit shall be used for earthing.

b) Conduits shall be earthed at the ends adjacent to switch boards at which they originate or otherwise at the earth clip, clamp or gland, in effective electrical contact with the conduit.

c) For outdoor lighting poles the earthing conductor shall be terminated upto the junction box on the pole and 12 SWG wire shall be taken up to the pole fitting.

1.6 Pre-Commissioning checks and commissioning

All checks and tests shall be as per the Manufacturer's drawing manuals, relevant codes of installation and commissioning check lists as given below :-

a) Among other commissioning tests, the following shall be carried out at site after completion of installation. Concessionaire shall ensure to use calibrated test equipment having valid calibration test certificates from standard laboratories traceable to National Standards / International Standards. All tests to be carried out in the presence of Executing Agency.

(i) For Transformers

Dielectric strength of transformer oil. Operation of all protective equipment, voltage/turns ratio at all taps, winding resistance at all taps, vector group test, phase sequence test, buchholz relay operation (alarm and trip), OLTC control indicating and alarm circuits, lightning arrestor installation, test the bushing oil for dielectric strength.

(ii) For Switchgear

Power frequency high voltage test, operation tests.

(iii) For Relays

Check internal wiring, relay settings.

Satisfactory operation over their whole operating range by secondary injection. Check the minimum pick up voltage of D.C. coils, megger all terminals to body and AC to DC terminals.

(iv) Relay and Control Panel

Switch development, check on relays, check on metres, functional checking of all control circuit, e.g. closing, tripping, control, interlock, supervision, and alarm circuits including proper functioning of the component equipment.

(v) Circuit breakers

Manual operation of breakers, power closing/opening operation manually and electrically, breaker closing and tripping time, trip free and anti pumping operation, control wiring for correctness of connections, continuity and IR value, electrical and mechanical interlocks, all functional checks on CTS, checks on spring charging motor.

(vi) Battery

Special gravity test, cell voltage check, capacity test as per IS, Initial charging cycle.

(vii) Battery charger & D.C. Distribution Board

Functional check of auxiliary devices such as alarms, indicating etc., measurement of voltage regulation.

(viii) Voltage transformers

Polarity test, ratio test on all cores, oil level and leakages, 'Insulation resistance test', earthing connection.

(ix) Current Transformer

Megger between windings and winding terminal to body, polarity test, capacitance and tan delta test.

(x) Cables

- All new cables shall be tested for its insulation strength before terminating / jointing. After terminating / jointing is completed of all L.V. (i.e. 650/1100V) cable shall be tested by 1000V megger. All H.T. Cables (i.e. 11 KV) shall be tested by 2500 V motor operated megger.

- Cable core shall be tested for

- Continuity
- Absence of cross phasing
- Insulation resistance to earth
- Insulation resistance between conductors

(xi) Earthing and Lightning Protection System

The Concessionaire shall ensure the continuity of all conductors and joints. The Executing Agency may ask for earth continuity tests earth resistance measurements and other tests which in his opinion are necessary to prove that the system is in accordance with design, specification, code of practice and electricity rules. Earth resistance value should be not greater than one (1) ohm,

(xii) Lighting System

Before putting complete system into service, commissioning tests stipulated in applicable standards and code of practice shall be carried out by the Concessionaire in the presence of the Executing Agency covering all lighting system equipment.

(xiii) The Concessionaire shall carry out insulation resistance tests by megger of following rating:

- Control circuits upto 220 V : 500 V megger
- Power circuits upto 1.1 KV : 1000 V megger

1.7 Safety procedure and practice

Following safety procedure and practice should be provided by concessionaire in switchgear room/sub-station as per latest edition of I.S. 5216.

a) Rubber matting

(i) In front of 11 KV switchgear.
(ii) In front of 415 V switchgear and other panel in switchgear room.

b) Shock treatment charts

(i) One chart near 11 KV switchgear room
(ii) One chart near 415 V switchgear room

c) Caution/Danger Board

(i) 11 KV switchgear
(ii) 11 KV capacitor panel
(iii) 415 V switchgear
(iv) Transformer near H.T. cable box
(v) All power Distribution Board

d) Fire Safety

The requirement of hand appliance in switchgear room, electrical equipment room shall be provided as per Clause 4.0 of Fire Protection Manual by Regional Traffic Committee, 10th edition 1988.

Section - G5.4
Instrumentation Works

Section G5.4: Instrumentation Works

1. General

The Concessionaire is required to adopt the **latest technology with compatible automation system having fully automatic process control**, The "Plant Control Configuration" to be provided by the Concessionaire as part of Basic engineering package. ON LINE to monitor and control the plant from a single location. The data collected through online monitoring shall be made available via the internet to authorities & officials in Executing agency, {NATIONAL/STATE LEVEL AGENCY IF ANY}[2], CPCB, SPCB, ULB and Project Engineer.

2. General requirements

This part covers the general requirements for the design, supply, installation, inspection and testing of the instrumentation and automation solution proposed for flow measurement, monitoring of water quality and control of plant.

3. Reference Standards

Unless otherwise approved, instrumentation shall comply with relevant quality standards test procedures and codes of practice collectively referred to as Reference Standards including those listed below in accordance with the requirements detailed elsewhere in this specification. IEC 60381-1:1982 Analogue signals for process control systems.

4. Specification for direct current signals:

- IEC 60947-4-1:2000 Specification for low-voltage switchgear and Control Gear. Contactors and motor-starters. Electromechanical contactors and motor-starters.
- IS 15953 : 2011
- ISA-5.1-2009
- IEC 62443
- IEC 61346
- IEC 60870-6- all parts
- IEC 61131-3 industrial control programming standard advancements
- IEC 61850 all parts ranging from 1 - 10
- IEC 61850-10:2012 - Conformance testing 118
- IEC TR 61850-90-3:2016 - Using IEC 61850 for condition monitoring diagnosis and analysis + IEC TR 61850-90 all parts

[2] Contents in the flower parenthesis may be deleted if not applicable.

- IEC 60947-4-2:1999 Specification for low-voltage switchgear and Control Gear. Contactors and motor-starters. A.C. semiconductor motor controllers and starters.
- IEC 60947-4-3:1999 Specification for low-voltage switchgear and Control Gear. Contactors and motor-starters. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads.
- IEC 60770-1:1999 Transmitters for use in industrial-process control systems. Methods for performance evaluation.
- BS ISO 1217:1996 Displacement compressors. Acceptance tests.
- ISO 2112:1990 Specification for aminoplastic moulding materials.
- ISO 6817:1997 Measurement of conductive liquid flow in closed conduits. Method using electromagnetic flow meters.
- BS EN 837-1:1998 Pressure gauges. Bourdon tube pressure gauges. Dimensions, metrology, requirements and testing.
- BS EN 1057:1996 Copper and copper alloys. Seamless, round copper tubes for water and gas in sanitary and heating applications.
- BS EN 1092-1:2002 Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Steel flanges.
- BS EN 1563:1997 Founding. Spheroidal graphite cast iron.
- BS EN 60529:1992 Specification for degrees of protection provided by enclosures (IP code).
- BS EN 60534-1:1993 Industrial-process control valves. Industrial-process control valves. Control valve terminology and general considerations.
- BS EN 60546-1:1993 Controllers with analogue signals for use in industrial-process control systems. Controllers with analogue signals for use in industrial-process control systems.

5. Methods for evaluating performance

- BS EN 60584-2:1993 Thermocouples.

6. Tolerances

- BS EN 60654:1998 Operating conditions for industrial-process measurement and control equipment. All relevant parts.
- BS EN 60751:1996 Industrial platinum resistance thermometer sensors.
- BS EN 60873:1993 Methods of evaluating the performance of electrical and pneumatic analogue chart recorders for use in industrial-process control systems.
- BS EN 61000-6:2001 Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments.
- BS 89:1990 Direct acting indicating analogue electrical measuring instruments and their accessories. All parts.
- BS 90:1975 Specification for direct-acting electrical recording instruments and their accessories.

- BS 476 Fire tests on building materials and structures. All parts.
- BS 1042-1.4:1992 Measurement of fluid flow in closed conduits. Pressure differential devices. Guide to the use of devices specified in Sections 1.1 and 1.2.
- BS 1041-2.1:1985 Code for temperature measurement. Expansion thermometers. Guide to selection and use of liquid-in-glass thermometers.
- BS 1041-2.2:1989 Code for temperature measurement. Expansion thermometers. Guide to 119 selection and use of dial-type expansion thermometers.
- BS 1041-3:1989 Temperature measurement. Guide to selection and use of industrial resistance thermometers.
- BS 1041-4:1992 Temperature measurement. Guide to the selection and use of thermocouples
- BS 1042-1.4:1992 Measurement of fluid flow in closed conduits. Pressure differential devices. Guide to the use of devices specified in Sections 1.1 and 1.2.
- BS 1123-1:1987 Safety valves, gauges and fusible plugs for compressed air or inert gas installations. Code of practice for installation.
- BS 1203:2001 Hot-setting phenolic and aminoplastic wood adhesives. Classification and test method.
- BS 1553-1:1977 Specification for graphical symbols for general engineering. Piping systems and plant.
- BS 1571-2:1975 Specification for testing of positive displacement compressors and exhausters. Methods for simplified acceptance testing for air compressors and exhausters.
- BS 1646-1:1979 Symbolic representation for process measurement control functions and instrumentation.

7. Basic requirements

- BS 1646-2:1983 Symbolic representation for process measurement control functions and instrumentation. Specification for additional basic requirements.
- BS 1646-3:1984 Symbolic representation for process measurement control functions and instrumentation. Specification for detailed symbols for instrument interconnection diagrams.
- BS 1646-4:1984 Symbolic representation for process measurement control functions and instrumentation. Specification for basic symbols for process computer, interface and shared display/control functions.
- BS 1794:1952 Specification for chart ranges for temperature recording instruments.
- BS 2765:1969 Specification for dimensions of temperature detecting elements and corresponding pockets.
- BS 3680 Measurement of liquid flow in open channels. All relevant parts.
- BS 3693:1992 Recommendations for design of scales and indexes on analogue indicating instruments.
- BS 4675-2:1978 Mechanical vibration in rotating machinery. Requirements for instruments for measuring vibration severity.

- BS 4999-142:1987 General requirements for rotating electrical machines. Specification for mechanical performance: vibration.
- BS 5169:1992 Specification for fusion welded steel air receivers.
- BS 5728-3:1997 Measurement of flow of cold potable water in closed conduits. Methods for determining principal characteristics of single mechanical water meters (including test equipment).
- BS 6004:2000 Electric cables. PVC insulated, non-armoured cables for voltages up to and including 450/750 V, for electric power, lighting and internal wiring.
- BS 6739:1986 Code of practice for instrumentation in process control systems: installation design and practice.
- BS 7671:2001 Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition. Instrument Society of American Standards and Recommended Practices:
- S 5.1 Instrumentation symbols and identification
- S 5.4 Instrument loop diagrams
- S 7.3 Quality standard for instrument air
- RP 16.1 Terminology, dimensions and safety practices for indicating variable 2, 3 area meters
- RP 16.4 Nomenclature and terminology for extension-type variable-area meters (rotameters)
- RP 16.5 Installation, operation, maintenance instructions for glass tube variable area meters (rotameters)
- RP 16.6 Methods and equipment for calibration of variable area meters (rotameters)
- RP 18.1 Specifications and guides for the use of general purpose enunciators
- S 26 Dynamic response testing of process control instrumentation
- RP 31.1 Specification, installation and calibration of turbine flow meters
- S 37.1 Electrical transducer nomenclature and terminology
- S 37.3 Specifications and tests for strain gauge pressure transducers
- S 50.1 Compatibility of analog signals for electronic industrial process instruments
- S 51.1 Process instrumentation terminology
- RP 60.08 Electrical Guide for Control Centers
- Installation works shall comply with all relevant local Indian Regulations including the Code of Practice for Electrical Wiring Installations – IS 732.

8. Basic Features

Each instrumentation system shall be designed, manufactured and installed to achieve the following basic requirements:

- To maintain the highest standards of availability, reliability and accuracy and to give clear warnings of any deterioration in performance
- To suit the abilities of the staff who will:
  (i) Use the systems
  (ii) Service the systems

- To measure, indicate, process, store and control the relevant parameters, as specified
- To give clear warnings of dangerous and other abnormal conditions and to initiate plant safety procedures, shutdowns and corrective measures as specified to assure the safety of 'operations and maintenance' personnel and that of the plant and to store and collate the data, as required
- To derive, present and utilize, as required, such additional data to facilitate:
  (i) The most efficient operation of the plant
  (ii) The routine maintenance of the plant

9. Design requirements for instrumentation and control systems (I&C)

The instrumentation, control and automation installations shall fully comply with design standards, regulations and the material and workmanship requirements of the Specification. The instrumentation control and automation systems shall comply with the relevant Indian Standards being practiced as per the industry norms. All consumable items and spare parts shall be readily available within India.

All equipment and materials incorporated in the system shall be selected, designed and rated to operate under the defined performance duties and specified site conditions and to maintain a high level of operational reliability. The instrumentation control and monitoring system equipment and materials shall have an operational life of not less than 15 years.

Unless otherwise specified, all functions shall be transmitted electrically and all analogue signal transmission systems shall be in accordance with IEC 60381-1:1982 or equivalent and shall use a signal of 4mA to 20mA dc. Where possible, measuring systems shall be designed so that any necessary power supply is taken from the appropriate instrument panel. Transmitting devices shall have integral indicators to monitor the output signal or connections suitable for use with a portable test meter, and shall be capable of meeting the requirements specified in the appropriate part of IEC 60770-1:1999 or equivalent. Equipment mounted in enclosures shall be suitable for continuous operation at the maximum internal temperature possible in service, due account being taken of internally-generated heat and heat dissipated by other plant. All components shall be rated adequately and circuits shall be designed so that change of component characteristics within the manufacturers' tolerances shall not affect the performance of plant. All equipment shall be designed to operate without forced (or fan) cooling.

All measuring instruments shall have zero and span adjustment. Instruments not mounted in panels shall be supplied complete with all brackets, stands, supporting steelwork and weatherproof enclosures (separate from the instrument cases) necessary for securing them in their working positions and affording complete protection at all times including periods of servicing, adjustment, calibration and maintenance. The installation arrangements for meters measuring conductivity, pH, dissolved oxygen, chlorine residual and ionic concentration shall include a

sample bench and other facilities for operating portable test meters. Each installation shall incorporate a valve and pipework for obtaining a sample representative of the fluid at the position of the permanent meter, tundish and drain. If the measuring and sampling points are remote from each other, the test and sample facilities shall be provided at both points. Sample transport times shall be minimized by provision of a bypass and drain with control and isolating valves and a local flow meter to enable the correct sample flow to be adjusted. An automatic portable sampler shall be provided for collecting and transporting the samples from the sampling locations to the laboratory.

10. Instrument Design Criteria

The design criteria to be applied to instrumentation system shall be as follows:

- Instrumentation & Control (I&C) systems shall be selected, designed, manufactured, installed, tested and rated to operate under the defined performance duties and specified site conditions and to maintain a high level of operational reliability. Instruments mounted in field and on panels shall be suitable for continuous real time operation. All electronic components shall be adequately rated and circuits shall be designed so that change of component characteristics shall not affect the plant operation. All I&C equipment shall be new, of proven design, reputed make and have data logging facility. Unless otherwise specified, all instruments shall be tropicalized. The outdoor equipment shall be designed to withstand tropical rain and shall be suitable for the worst environmental operating conditions. Wherever necessary space heaters, heat dissipaters, dust and weather proof cabinets shall be provided. Instruments offered shall be complete with all the necessary mounting accessories & safety features.
- No custom made hybrid type integrated circuits shall be used in any circuit in instrumentation and control equipment.
- Instruments and loggers provided shall be able to carry out continuous real time monitoring and logging of selected water quality parameters.
- All instrumentation shall be suitable for continuous real time operation and be powered through the UPS.
- The signal/data from all field mounted instruments and skid mounted instruments shall be transmitted to the PLC through hardwired 4-20 mA / 0-10V DC linear having two/four wire system in the respective STP/FSTP/pumping stations/LS for local monitoring, control and automation.
- The signal/data transmission from RTUs to central control room shall be GPRS/GSM based and preferably supported with alternate land based fibre communication link. After a power failure, when power supply resumes, the instruments and associated equipment shall start working automatically.
- Unless otherwise specified, the normal working range of all indicating instruments shall be between 25% and 80% of the full scale range.

- The field instruments i.e. the instruments mounted outside the control panel shall be mounted at a convenient height of approximately 1.2 m above grade platform.
- Unless otherwise stated, field mounted electrical and electronic instruments shall be weatherproof to IP-65 or better.
- The instruments shall be designed to work at the ambient conditions of temperature, humidity, and contamination that may prevail at site. The instruments shall be given enough protection against corrosion. All wetted parts of instrument sensors shall be non – corrosive and suitable for use within sewerage environment.
- The performance of all instruments shall be unaffected for the ±10% variation in supply voltage and ±5% variation in frequency simultaneously.
- Unless otherwise specified, double compression glands shall be used for glanding the cable in field instruments and instrument control panel.
- All digital outputs shall be volt free.
- All probe type analyzers should be IP68 rated.
- All displays shall be of the digital type with no moving parts and should utilize back lit liquid crystal diode LCD/ LED technology.
- Instrumentation shall utilize solid state electronic technology and avoid the use where practical of any moving parts.
- Minimum maintenance requirements. The instruments selected shall be rugged and not require any consumables / filling solutions. Systems should be able to work with minimum power requirements.
- Lockable enclosure shall be provided for all the field mounted instruments.
- All the instruments and cabinets shall have tag plates / name plates permanently attached to them.
- All instruments to be used or installed within a corrosive sewerage environment shall be explosion proof and intrinsically safe.
- The data obtained from the online quality monitoring system shall be conveyed back via suitable communications protocol, to web servers hosted by a service provider. The service provider shall have the data storage capacity for next 15 years.
- Unless otherwise specified, all continuous online monitoring instruments shall be plug and play type.
- Instrumentation system shall be provided to monitor the following parameters ***as required***
    - Online Continuous Dissolved Oxygen Measuring System
    - Ultrasonic Level Measurement
    - Ultrasonic Differential Level Measurement
    - Flow Measurement Instrument at Parshall Flume
    - Gas Flowmeter (Thermal Mass Flow Measurement System)
    - Pressure Transmitter
    - Continuous Online Total Suspended Solids Analyzer
    - Continuous Online pH Measuring System
    - Online Residual Chlorine Measuring System

- Conductivity Meter
- Ammonia Analyzer
- Alkalinity Analyzer
- Indicative BOD Analyzer
- Indicative COD Analyzer
- Indicative TOC Analyzer
- Measurement of CO_2, CH_4 and H_2S Gas Concentration
- Electro-Magnetic Flow Meter
- Online Gas Calorific Value Measurement
- Total Phosphorus
- Nitrate Analyzer
- Total Nitrogen Analyzer

11. Online Instruments

The online measurement at Inlet and outlet for continuous monitoring of the raw and treated sewage/faecal sludge/septage characteristics are specified below. However Concessionaire shall provide additional instruments to support their design.

- At the Inlet Point and the Outlet Point –
  - Electro-Magnetic Flow Meter/ Ultrasonic Open Channel Flow Measurement
  - Continuous Online pH Measuring System
  - Continuous Online Total Suspended Solids Analyzer
  - Indicative TOC Analyzer
  - Total Phosphorus
  - Total Nitrogen Analyzer
  - Online Residual Chlorine Measuring System

Online instrument system shall have the ranges in accordance with CPCB "Guidelines for continuous monitoring for Effluents" and CPHEEO.

12. Laboratory – Laboratory instruments and sampling system

The laboratory shall be housed within the administrative building and shall be equipped with instruments, equipment, chemicals and other infrastructure that is necessary to perform the routine analysis for the parameters as detailed in "Table 2". The equipment shall be supplied with all the accessories that are necessary to make the equipment functional for analyzing parameters and generating daily reports. In addition to these, Concessionaire shall also provide necessary

chemicals, glassware and reagents required for sample testing in the laboratory along with calibration standards / solutions for calibrating the instruments.

The quality of the sewage/faecal sludge/septage entering, passing and leaving the treatment plant shall be monitored via online monitoring equipment as well as manual sampling systems and tested daily, at least from the following parameters:

Table 2 – Parameters to be monitored

Sl. No	Parameter
1	BOD
2	pH
3	SS
4	Temp.
5	COD
6	TOC
9	Acidity, Alkalinity
12	MLSS/MLVSS
13	Dissolved Oxygen
14	SVI
15	Total Hardness, Calcium Hardness
16	Gas Analysis
17	Calorific Value Monitoring
18	Volatile Suspended Solids
19	Total Solids
20	Specific Gravity
21	Moisture Content
22	Total Coliform
23	Faecal Coliform
24	Total Dissolved Solids
25	Bacteria, Escherichia Coli

Two portable samplers shall be provided to collect composite samples for monitoring from Inlet chamber for raw sewage/faecal sludge/septage and at outlet of STP(s)/FSTP(s).

The laboratory shall have the equipment, storage space and chemicals for all the chemical and bacteriological routine analyses. The area of laboratory shall be sufficient with sufficient length of working platforms and adequate no. of sinks. Area of laboratory shall be defined by Concessionaire as per the requirement of the Concession Agreement. At least the following equipment and all required laboratory chemicals / reagents given in Table 3 are to be provided by

the Concessionaire within the scope of work and have to be replenished by him till the end of the O&M Period.

All lab based test instruments results shall be stored automatically and transferred to the PLC as well as web servers on real time basis for control and report applications.

Table 3: Lab Instruments

Sl. No.	Parameter
1	Comparator test set for residual chlorine or chloroscope
2	Single / Multi parameter meter for pH, Conductivity, DO, Ammonia
3	Mains operated pH meter completed with one calomel electrode and glass electrode
4	Turbidity meter - Bench Model
5	Turbidity meter - Hand held (Portable)
6	UV / VIS Spectrophotometer
7	Water bath with 6 to 8 concentric holes and discs, electrically heated
8	Hot plates – 25cm
9	Ultrapure Water Plant
10	Conductivity with TDS meter
11	Refrigerator (280 litres capacity) double door / cooling cabinet for sample preservation
12	Muffle furnace
13	Electronic Burettes and Dispensers
14	Magnetic stirrer
15	Analytical balance (Electronic) with weight box – Resolution up to 4 decimal places
16	Jar-Test apparatus – 6 Stirrers
17	Centrifuge
18	Flame photometer with gas cylinder
19	Fume cupboard
20	Field Test kit for cations and anions
21	Depth Sampler
22	Total Organic Carbon Analyser
23	Sieve shaker with standard sieves and two pan balance weighing up to 200gm samples
24	Hot Air Oven
25	Autoclave
26	Binocular microscope
27	Automatic Portable Sampler
28	Pipette Box (Stainless Steel)
29	Wooden Racks/Aluminium Racks
30	Wire Baskets
31	Cotton/ Aluminium Foils

Sl. No.	Parameter
32	Burners (Bunsen) With Pilot Lamp
33	Suction Flask (1 Litre Cap)
34	Suction Pump
35	Sampling Bottles
36	Measuring Cylinders (1000 Ml, 500 Ml, 200 Ml, 100 Ml, 50 Ml, 25 Ml)
37	Vacuum pump
38	Soxhlet extraction unit
39	Kjeldhal digestion unit
40	Weighing Balance (max 10kg)
41	Laminar Air Flow chamber
42	M. Endo Broth (dehydrated)
43	Lactose or Lauryl Tryptose broth
44	Mac Conkey broth
45	Brilliant Green Bile Lactose Broth
46	Total Plate Count Agar
47	Peptone / Triyptone Water
48	BOD Analysis: Incubator, Reagents, etc
50	COD Analysis: COD Reactor – 15 Vials, Reagents, etc
51	Filtration assembly for suspended solids
52	Incubator 44°C (Water/Air-Jacketed)

13. Online Instruments Specifications

13.1. Flow measuring system

A. Electromagnetic flowmeter

Flow meters shall operate on the electromagnetic induction principle and shall consist of a measuring sensor and measuring transmitter complying with ISO 6817:1997. Measuring sensors shall have a full bore stainless steel metering tube and non-conductive, abrasion-resistant lining to suit the fluid being metered. The lining of material can be of polyurethane. No rubber lining will be allowed. The flow meter shall have flanged connection. Measuring sensors shall have factory sealed power and signal cables. Unless otherwise specified, the cable lengths shall be sufficient to permit termination external to the chamber, either at a junction box or at the measuring transmitter. Remote flow indicator cum integrator shall be provided on the control panel.

Measuring sensors installed within a chamber shall be suitable for indefinite submersion under a head of water equal to the chamber depth or 3 meters whichever is the greater.

Measuring sensors shall be installed on a steel cradle or concrete plinth with upstream and downstream straight pipe lengths not less than those recommended by the manufacturer. When fitted in lined non-metallic or internally-coated pipe work, measuring sensors shall have an earthing electrode or corrosion resistant earthing rings. To ensure full electromagnetic compatibility the flow tube flanges and transmitter housing shall be connected earth.

Measuring sensors shall be bonded by tinned copper braid links at each end to the adjacent pipe work to ensure a good connection between the body and the metered liquid. Measuring sensors installed in a catholic protected pipeline shall have isolation and bonding in accordance with the recommendations of the manufacturer. The measuring transmitter shall provide a precise current input to the field winding of the measuring sensor and shall convert the resultant signal from the electrodes to analogue and pulse outputs in accordance with IEC 60381-1:1982. The signal processing facilities of the converter shall ensure that the output signals are unaffected by interfering voltages, stratified flow, changes in fluid electrical conductivity within the limit stated, non-homogeneity of the fluid and the presence of ferrous particles. The zero and output signals shall be unaffected by partly-fouled electrodes.

The following measuring transmitter features shall be provided as a minimum:

- Measuring transmitter features:

    - Pulsed D.C. field excitation
    - Scaled pulse output for integration counter drive
    - Capability of bi-directional measurement with differing forward and reverse ranges and with local and remote indication of flow reversal
    - Contact operation at a programmable measured value
    - Integral display of flow and integrated quantity
    - Galvanic isolation between each output circuit and between the electrode circuit and output circuit
    - Output circuit isolation from earth within the instrument but suitable for earthing at any point in the external circuit
    - Key entry for basic parameters
    - Commissioning and re-scaling to require no special programming knowledge
    - Adjustable low flow cut-off

- Self-diagnosis
    - Continuously adjustable velocity and flow range settings
    - Terminals accommodated in a compartment separate from electronic components

- Outputs including: analogue - 4-20mA
- Pulse - two programmable outputs
- Alarms - two outputs programmable for high/low
- Flow, polarity, forward/reverse, instrument fault, liquid sensing fault condition including partially empty pipe

❖ **Technical specifications**

- Measuring Principal : Electromagnetic
- Type : Pulsed DC
- Application : H2S laden atmosphere and other poisonous gases,
- Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Metering Tube : SS 304
- Sensor Housing : SS 304 fully welded
- Connection / Junction Box : SS 304
- Lining Material : PTFE/Polyurethane
- Range : As per site requirement
- Accuracy : ± 0.5% of flow rate at maximum mean velocity of 1.5 to 3.0 m/sec
- Electrode Type : Flush or bullet nose as recommended by the manufacturer
- Earthing Ring/Electrode Material: Type 316 stainless steel
- Protection Category
  a.) Sensor : IP-68
  b.) Transmitter / Controller : IP-65
- Transmitter / Controller Type : Microprocessor Based
- Display : Indicating and totalizing
  a.) Indicator : Digital 16-character display
  b.) Totalizer : Digital 16-character display
- Mounting : Pipe, wall, panel
- Diagnostic : Inbuilt
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA / 0-10VDC output based on the flow rate
- Zero & Span : Field Adjustable
- Turndown Ratio : Minimum of 10 to 1 when flow velocity at minimum flow is at least 0.3 metres per second
- Zero Stability Feature : Required to eliminate the need to stop flow to check zero alignment
- Pressure Loss : Very Low
- Removable Electrodes : Required
- Flange Material : Carbon steel, Epoxy Coated

- Empty Pipe Detection : Inbuilt
- Operating Temperature : 0 to 50°C 129
- Temperature Compensation: Inbuilt temperature sensors for automatic compensation for changes in air temperature
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.

13.2. Level measuring system

13.2.1. Ultrasonic level meters

Ultrasonic level measuring devices applied for liquid level measurement shall comprise of level sensor / transducer, level transmitter, digital level indicator / remote indicator, control unit and any other items required to complete the level measuring system.

The transducer shall be suitable for flange or bracket mounting as required. To reduce the effect of sewage/faecal sludge/septage turbulence in wet wells / tanks, averaging facility should be provided in the transmitter unit for providing steady readings.

The design and application of the ultrasonic level measuring system shall take into account the vessel / sump / wet well / channel construction, the material, size, shape, environment, process fluid or material, the presence of foam, granules, size etc.

In case of ultrasonic level sensor, the installation shall avoid any degradation of instrument performance due to spurious reflections, absorption, sound velocity variations, sensor detection area, temperature fluctuations, specific gravity changes and condensation. For applications where spurious reflections are unavoidable the control unit shall be provided with facilities for spurious reflection rejection. If turbulence exists, shielding, stilling tubes or other measures shall be provided to avoid effects on the measurement.

❖ **Technical specifications**

- Measuring Principal : Ultrasonic
- Application : H_2S laden atmosphere and other poisonous gases, corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : As required at site
- Accuracy : ± 0.25% of measured value or better
- Resolution : 2mm or 0.2 percent of range, whichever is greater
- Blanking Distance : As short as 0.3 meters
- Beam Angle : 12 degrees or less
- Temperature compensation : Integral

- Mounting
  a.) Sensor : Flange or bracket
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-68
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting 130
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 3 SPDT contacts
- Zero & Span : Field Adjustable
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.2.2. Ultrasonic differential level measurement

The ultrasonic type differential level measuring system shall consist of ultrasonic type level sensors on upstream and downstream of screens, differential level computer / transmitter and indicator. The flow computer / transmitter shall be microprocessor based and shall have facility for programming (i.e. adjustment of set points) while the sensor shall be capable of adjustable datum setting facilities.

The differential level control shall be done by two ultrasonic sensors, one before and one after the screen to sense the differential level through the screen and give a signal to the control to start the screens operation as soon as a preset differential level is reached. After receiving the level signal the control shall start and operate the screen as long as the preset level difference appears.

❖ **Technical specifications**

- Measuring Principal : Ultrasonic
- Application : H2S laden atmosphere and other poisonous gases,
- Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : As required at site
- Accuracy : ± 0.25% of measured value or better

- Resolution : 2mm or 0.2 percent of range, whichever is greater
- Blanking Distance : As short as 0.3 meters
- Beam Angle : 12 degrees or less
- Temperature compensation : Inbuilt
- Mounting
  a.) Sensor : Flange or bracket
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-68
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 3 SPDT contacts
- Zero & Span : Field Adjustable
- Operating Temperature : 0 to 50°C 131
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.3. Pressure measuring system – pressure transmitter

Pressure measuring system shall measure pressure and transmit signal proportional to pressure.

The system shall consist of a combined pressure transducer and transmitter, digital panel indicator, connecting pipe work, diaphragm seal and valves. Pressure measuring system shall be rugged in construction and shall be capable for with standing surge pressures likely to occur in the monitored system. Pressure transmitters shall have over range protection up to 1.5 times the maximum line pressure and shall be capable of withstanding full line pressure on any side with the other side vented to atmosphere without damage or effect on the calibration. No plastic material shall be used in their construction. Internal parts shall be of stainless steel, bronze or approved corrosion-resistant material. Where necessary, a special diaphragm shall be used to segregate the corrosive fluid media. In ammonia applications, the diaphragm shall be in stainless steel. In chlorine applications, the diaphragm shall be in silver or tantalum. In Sulphur dioxide applications, the diaphragm shall be in tantalum.

The zero and span of a pressure transmitter shall not change by more than ±0.1% of the span per °C change in ambient temperature. After application for 10 minutes of pressure at 130% of maximum pressure, the change in zero and span shall not exceed ±0.1% of the span. Pressure

transmitters shall be protected to BS EN 60529:1992, IP 65 standard or higher. For transmitters installed in locations liable to flooding or underwater applications, they shall be to IP 68 standard and shall operate up to a maximum submergence of 20 meters of water.

Note: Explosion proof and intrinsically safe transmitters/instruments are required only for instruments/sensor/limit switches/solenoid valves located in the hazardous areas and not for instruments/sensor/limit switches/solenoid valves located in Safe Areas.

Instruments in hazardous area installation shall be intrinsically safe and in case of instruments where intrinsically safe option is unavailable, explosion proof shall be provided

❖ **Technical specifications**

- Parts : Transmitter and communicator
- Type : Electronic variable capacitance; two-wire transmitter
- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : As required at site
- Accuracy : ± 0.25% of span or better
- Humidity : 0 to 100% relative humidity
- Damping : Fluid or electronic type with adjustment
- Indicator : LCD with LED backlighting
- Materials : Wetted parts including process flanges and drain / vent valves, Type 316 stainless steel otherwise specified
- Wetted O-Rings : Glass filled TFE, graphite filled PTFE, or Viton, unless otherwise specified
- Fill Fluid : Silicone
- Output : 4 – 20mA DC output proportional to the pressure range
- Mounting : Pipe or wall as specified. Provide stainless steel brackets with stainless steel bolts
- Housing : Modular with separate compartments for
- electronics and field wiring termination. Epoxy coated aluminium, unless otherwise specified
- Power Supply : 230 V AC ± 10%, 50 Hz
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.

13.4. Dissolved oxygen measuring system - DO analyzer

DO analyzers shall be installed to continually record the dissolved oxygen level at every grid within each aeration basin. The primary sensing device used for the dissolved oxygen level measurement, shall be a sensing probe mounted within the aeration basin and connected to a controller for displaying and transmitting the results

❖ **Technical specifications**

- Measuring Principal : Optical
- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 to 20.0 ppm, 0 to 20.0 mg/L
- Accuracy : ± 0.5% or better
- Repeatability : ±0.5% of span
- Sensitivity : ±0.5% of span
- Pressure Limit : 4 - 6 bar
- Temperature Indication : Inbuilt
- Calibration Method : Air Calibration: One point, 100% water saturated air;
- Sample Calibration: Comparison to standard instrument, or comparison to Winkler Titration method
- Cleaning : Air Blast Unit. Probe should be able to function with cleaning unit attached to it
- Mounting
  a.) Sensor : Inside aeration basin at each grid
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-68 for Sensor
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts 133
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.5. Total Suspended Solids Measuring System - TSS Analyzer

❖ **Technical specifications**

- Measuring Principal : Optical
- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 50 mg/l, 0 - 1000 mg/l, 0 – 5000 mg/l
- Accuracy : <5% of reading or better
- Pressure Limit : 6 bar
- Flow Rate : Maximum 3m per second
- Temperature Indication : Inbuilt
- Calibration Method : Single point or two point
- Cleaning : Inbuilt
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-68 for Sensor
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement
- pH Measuring System – pH Analyzer

13.6. pH measuring system- pH Analyzer

❖ **Technical specifications**

- Measuring Principal : Combination / Differential Electrode
- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 - 12 pH
- Accuracy : ±0.02 pH or better

- Repeatability : ±0.05 pH
- Sensitivity : ±0.01 pH
- Pressure Limit : 4 - 6 bar
- Flow Rate : Maximum 3m per second
- Temperature Indication : Inbuilt
- Temperature Compensation : Inbuilt automatic temperature compensation
- Temperature Accuracy : ±0.5 °C
- Calibration Method : Two point automatic, one point automatic, two point manual, one point manual
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
- For Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.7. Residual Chlorine Measuring System – Residual Chlorine Analyzer

❖ **Technical specifications**

- Measuring Principal : Amperometric or DPD Colorimetric
- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 10 ppm
- Accuracy : ±3% of the reference test or better
- Resolution : 0.001 ppm
- Repeatability : 30 ppb or 3%, whichever is greater
- pH : Automatic
- Temperature Compensation : Inbuilt temperature sensor
- Temperature Indication : Inbuilt
- Pressure Limit : 0.5 bar

- Flow Rate : Maximum 50 L/hour
- Calibration Method : 1-point or 2-point calibration
- Mounting : Wall, Panel
- Protection Category
  a.) Sensor : IP-65
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20 mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.8. Conductivity Measurement – Conductivity Analyzer

❖ **Technical specifications**

- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 - 1000 µS/cm
- Accuracy : ±0.5% or better
- Temperature Compensation : Inbuilt
- Temperature Indication : Inbuilt
- Pressure Limit : 6.9 bar
- Flow Rate : Maximum 3m per second
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
- For Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts

- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.9. Ammonia Measurement - Ammonia Analyzer

❖ **Technical specifications**

- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 5 mg/l, 0 - 50 mg/l
- Accuracy : 3% ±1mg/l or better
- Repeatability : 2% ±1mg/l or better
- Flow Rate : Maximum 20 L/h
- Cleaning : Automatic
- Mounting
  a.) Analyzer : Wall, Panel
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Analyzer : IP-55 or better
  b.) Transmitter / Controller : IP-66 or better
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Cable Length : As per site requirement

13.10. Alkalinity Measurement – Alkalinity Analyzer

❖ **Technical specifications**

- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 500 mg/l

- Accuracy : ±5% of reading or ±1.0 mg/L, whichever is greater
- Repeatability : ±3% of reading or ±0.6 mg/L, whichever is greater
- Pressure Limit : 2 bar
- Flow Rate : Maximum 2 L/m
- Mounting : Wall, Panel
- Protection Category : IP-66 (NEMA 4X)
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C 137
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.

13.11. Total Nitrogen Measurement – Total Nitrogen Analyzer

❖ **Technical specifications**

- Measuring Principle : UV Absorption
- Application : H_2S laden atmosphere and other poisonous gases, Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 30 mg/l, 0 - 80 mg/l
- Accuracy : ± 3% of mean + 0.5 mg/l
- Resolution : 0.1 mg/L
- Pressure Limit : 0.5 bar
- Cleaning : Automatic
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-68
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20 mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.12. BOD Measurement – Indicative BOD Analyzer

❖ **Technical specifications**

- Measuring Principle : UV Absorption
- Application : H_2S laden atmosphere and other poisonous gases,
- Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 50 mg/l, 0 - 500 mg/l
- Accuracy : ± 5% or better
- Compensation : 550 nm
- Sample pH : 4.5 to 9 pH
- Pressure Limit : 0.5 bar
- Cleaning : Automatic 138
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-68
  b.) Transmitter / Controller : IP-66 (NEMA 4X)
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.13. COD Measurement – Indicative COD Analyzer

❖ **Technical specifications**

- Measuring Principle : UV Absorption
- Application : H2S laden atmosphere and other poisonous gases,
- Corrosive Waste Water Environment

- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 – 250 mg/l, 0 - 1000 mg/l
- Accuracy : ± 5% or better
- Compensation : 550 nm
- Sample pH : 4.5 to 9 pH
- Pressure Limit : 0.5 bar
- Cleaning : Automatic
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category
  a.) Sensor : IP-55 or better
  b.) Transmitter / Controller : IP-55 or better
- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

13.14. TOC Measurement – Indicative TOC Analyzer

❖ **Technical specifications**

- Measuring Principle : UV Absorption / UV Pursulphate
- Application : H_2S laden atmosphere and other poisonous gases,
- Corrosive Waste Water Environment
- Safety : Explosion Proof or Intrinsically Safe
- Range : 0 - 1000 mg/l
- Accuracy : ± 5% or better
- Compensation : 550 nm
- Sample pH : 4.5 to 9 pH
- Pressure Limit : 0.5 bar
- Mounting
  a.) Sensor : Inside pipe / channel / tank
  b.) Transmitter / Controller : Wall, Panel, Pole
- Protection Category

a.) Sensor : IP-55 or better

b.) Transmitter / Controller : IP-55 or better

- Transmitter / Controller Type : Microprocessor Based
- Diagnostic : Inbuilt
- Display : LCD with LED backlighting
- Power Supply : 230 V AC ± 10%, 50 Hz
- Analog Output : Isolated 4 – 20mA
- Relay Contacts : Minimum of 2 SPDT contacts
- Operating Temperature : 0 to 50°C
- Communication Protocol : Open Protocol like MODBUS, PROFIBUS, etc.
- Sensor Cable : Integral to sensor
- Cable Length : As per site requirement

14. Surge Protection Devices

Surge protection devices (SPDs) shall be suitable for withstanding the surge arising out of high energy static discharge / lighting strikes and protect the instrument to which it is connected against damage. SPDs shall provide protection through the use of quick acting semiconductors like Tranzorb, zener diodes, varistors and an automatic disconnect and reset circuit. SPDs shall be passive and shall require negligible power for operation. During the occurrence of a surge it shall clamp on the allowable voltage and pass the excess voltage to the ground. The SPD shall be self resetting to minimize the down time of the measurement loop.

SPDs shall be provided to protect devices transmitting and receiving analogue and digital signals derived from field devices located outdoors.

The surge protection device shall be rated for surge rating of 10kA.

15. Cabinets for field instruments

Wall mounted cabinets shall be provided for enclosing transducer unit and associated accessories which are mounted outside the main control panel. The cabinet shall be of die-cast aluminium; field provided not less than IP-65 protection and shall be lockable. The cabinet shall have facilities for earthing. A steel plate shall be provided inside the cabinet for mounting instrument and accessories.

16. Panel Details

16.1. Cabinet / Enclosure for Instruments

Enclosures shall be any form of board, cabinet, panel, desk, box or case used to protect, contain or group instrumentation, telemetry or control equipment. Cabinets shall be fabricated from cold rolled steel with powder coating sheet of minimum 2 mm thick and shall be suitable for wall mounting or pedestal mounting as required. A steel plate/pipe, as per the requirement, shall be provided in the cabinet for mounting the instrument and accessories. The cabinet shall be properly painted from inside and outside and shall have built in locking facility. The cabinet shall also be earthed properly. All equipment in or on enclosures shall be arranged logically and, as far as possible, symmetrically, with projections kept to a minimum. Each enclosure shall be designed on ergonomic principles and shall permit in-situ and safe access for any normal adjustment, maintenance and servicing. The tops of plant-mounted enclosures shall be sloped downwards from front to rear.

The minimum degree of protection shall be IP 54 for indoor locations and enclosures for use outside buildings or in places where splashing may occur shall have a minimum rating of protection to BS EN 60529:1992, IP 65 and have tops which project sufficiently to protect the vertical faces of the enclosure and any component mounted thereon from splashing, inclement weather and direct sunlight. Also, when enclosures for use outside buildings are located where exposure to direct sunlight will give rise to high top-panel surface temperatures such that the internal temperature rises above the manufacturer's recommendation (normally 40°C), the enclosure shall include a sun shield fitted to the top of the enclosure and should have sufficient air ventilation for heat dissipation.
Fixing arrangements for surface-mounting enclosures shall be external to the enclosure and shall ensure that the rear face of the enclosure is not in contact with the surface to which it is fixed.

Enclosures shall have hinged access doors, fitted with recessed lockable handles. Doors shall be of rigid construction and provided with close-fitting flexible seals in recesses to prevent the ingress of liquids, moisture, dust and vermin. Hinges shall be of the lift-off pattern and one hinge shall engage before the other for ease of fitting. Wherever necessary, removable access covers secured by quick-release fasteners shall be provided to ensure ease of maintenance for all installed apparatus. Mounting plates, brackets and racks shall be provided for all other internal equipment which shall be hinged or otherwise arranged with quick-release fasteners or captive screws to give quick and easy access to equipment, securing screws, terminals and wiring.

Enclosures for two or more devices with electrical circuits shall have gland plates and terminal blocks as specified elsewhere. Each enclosure shall be designed for the safe testing and servicing of equipment with the power on. Each part which may be live under any circumstances shall be so covered or shielded as to prevent inadvertent contact.

16.2. Panel Design and Construction

Unless otherwise specified, all instrument panels, instrument cubicles, control panels, control consoles and desks, associated equipment and terminal racks, telemetry and electronic equipment racks and the like shall be free-standing, floor-mounted units and shall conform to the requirements of this part and will hereafter be referred to as panels. The design and dimensions of control consoles and desks shall be determined according to their intended function but shall be in accordance with the requirements of the Specification drawings. The height shall not exceed 1400mm above the finished floor level.

Unless otherwise specified as per the approved Design and Drawings, the height of panels shall be not greater than 2130mm overall (excluding lifting devices) above finished floor level. Front of-panel instruments and controls shall be mounted so that the height of their centers above the floor shall be generally between 1800mm and 900mm for indicators, 1400mm and 900mm for recorders and process controllers, 2000mm and 750mm for alarm facias and signal lamps and 1500mm and 750mm for manual controls. Controls, switches and push-buttons shall be positioned below or adjacent to any associated reading instrument. Panels for use in locations such as pumping stations and machinery rooms shall have anti-vibration mountings. The clearance between the extremities of apparatus mounted on the internal walls shall allow safe and unobstructed access to all terminals and to parts requiring maintenance. Panel layout drawings shall normally include a list of all instruments, accessories and components contained therein. If the drawings have insufficient space for the list, a separate schedule of instruments, accessories and components shall be provided and the panel drawing shall contain a cross reference to the contents list and an indication of the panel location of each item on the list.

16.3. Panels - major

Panels shall be constructed generally as specified in the preceding clause and as shown in the Specification drawings. Panel material shall be prime-quality, cold-rolled and annealed mild steel or zinc-coated mild steel sheet, suitably braced and stiffened as necessary with flat bar or angle to form a rigid structure.

Panel fronts shall be flat and free from bow or ripple. Exterior corners and edges shall be rounded or welded and ground to give a smooth overall appearance. Flanged edges shall be straight and smooth. Materials shall be chosen with due regard to the panel size, number of cut-outs, instrument weight and position of centre of gravity and method of fabrication, with the following:

- minimum thicknesses
    - Instrument bearing surfaces, gland plates and pneumatic distribution plates: 3mm
    - Internal mounting plates: 3mm
    - Doors, covers and filler panels: 2mm

No design involving the use of externally-visible assembly or fixing bolts and screws nor any design resulting in dust or water-collecting crevices will be accepted. Stiffeners and supporting frameworks shall be provided where necessary inside panels. Framework shall be hinged or fixed, suitable for the installation of instruments, components and internal equipment for which it is provided and located to give easy access to adjacent equipment.

When a panel is constructed in sections, the sections shall be designed for ease of assembly during installation and, in any case, shall not exceed 2 m in length. All necessary nuts, bolts, washers and the like shall be supplied and included in the same shipment as the relevant sections. Sections exceeding 1 m in length shall be provided with double doors. Unless otherwise shown in the Specification drawings, each panel shall be mounted on a self-draining base frame fabricated from 150 mm deep, steel channel section which shall be drilled or provided with clamps for bolting to the floor. The base frame shall be set back from the panel front face to give a toe space of not less than 25mm. The outside of the base frame shall be covered with an approved kicking strip.

Ceiling and other filler panels shall be fabricated from sheet steel and adequately stiffened. Each section shall have 50 mm returned edges along all four sides and shall be braced to the main steelwork of the panel. A chequered plate floor shall be provided inside and above the level of the base frame, having openings suitable for the bottom entry of cables when applicable. Sufficient removable undrilled gland plates, in sections convenient for handling, shall be fitted close to the appropriate terminal blocks and not less than 230 mm above the panel floor or not less than 230 mm below the panel top. The gland plates shall have removable side covers giving access to both sides of the gland plate and ensuring vermin-proof and dust-proof construction. Gland plates of a surface-mounted enclosure may form a part of the base or top. Panels containing pneumatic or other instruments using a fluid as the transmission medium shall have distribution plates with bulkhead unions for the termination of internal and external pipework.

All doors shall open outwards and all doors in one panel assembly shall use the same lock and key combination. Panel design shall ensure adequate ventilation and air circulation without permitting the entry of vermin or dust. Panels installed in control rooms or other clean condition areas shall have louvres to allow air circulation. Temporary closures shall be provided to prevent the entry of dust and vermin during transit and installation. After commissioning has been completed, all entries except air-circulation louvres shall be sealed.

No equipment other than front-of-panel items shall be mounted on panel wall surfaces. If electrical and non-electrical instruments are mounted in the same panel, the panel shall be subdivided internally to separate the electrical and non-electrical sections. All connections shall be arranged to ensure that no accidental damage to cabling or electrical components can occur in the event of failure of any non-electrical component or connection. Provision shall be made for

safe and easy handling during transit and installation. If lifting eyes are provided, they shall be reversible and panel tops shall be reinforced where necessary.

Where equipment is specified to be installed at a future date, space shall be allocated, and cutouts with removable masking plates, brackets, supports, wiring, terminals and piping and the like shall be provided. Panels shall be finish-coated at the place of manufacture before commencing the installation of apparatus and other fittings.

16.4. Panels - Minor

Panels for installation on the Plant which contain relatively few items of equipment, or where so specified elsewhere, shall be provided s minor panels and shall be constructed generally as specified in the preceding clause and comply with this Clause. Panels shall be fabricated from sheet steel or other approved material less than 2.5mm thick suitably braced to form a robust and rigid structure. Exterior corners and edges shall be rounded to give a smooth overall appearance and assembly bolts, screws or rivets shall not be visible on the front face.

The design shall be such as to ensure adequate ventilation and air circulation where required, without permitting the entry of vermin. Openings for cables shall be made vermin-proof. Doors shall be hinged and shall be provided with close-fitting flexible seals in recesses to prevent the ingress of liquids, moisture, dust and vermin. Unless otherwise specified, panels shall be suitable for floor mounting and shall not exceed 2130mm in height. Where surface mounted panels are provided, the fixing shall prevent the ingress of moisture and the rear of the enclosure shall be not less than 10mm from the wall.

Lifting eyebolts shall be removed and replaced with bolts after installation. Panels shall be extensible, and symmetrically arranged as far as possible with projections kept to a minimum. Where two or more panels are fitted together, they shall form a flush-fronted continuous panel of uniform height. Front door and top cover dimensions shall match. Instruments, relays, and control devices shall be mounted at a height not more than 2000mm and not less than 300mm from floor level.

The arrangement of equipment within each enclosure shall be such as to permit easy access for installation and maintenance. No instruments, relays or other components shall be mounted on rear access doors or removable covers.

16.5. Panels - composite

In situations where space limitations preclude the use of separate instrumentation, control and automation (ICA) and switchgear panels and with prior approval of the consultant ICA equipment may be combined within a single enclosure subject to the following conditions:

Enclosure

- The observance of all other clauses herein relating to enclosures, mounting boards and minor panels.
- The written assurance of each supplier of ICA equipment that the proximity of the switchgear will have no detrimental effect on the life or performance of any ICA component
- The total segregation of ICA equipment and switchgear including the glanding and termination facilities.
- The absence of any voltage exceeding 250V ac or 50V dc from any compartment containing ICA equipment.
- The use of the full height of the panel (excluding the busbar chamber and cable space) for any ICA equipment compartment.

16.6. Panels - Glass Reinforced Plastic (GRP)

Any panel required to be installed outside buildings shall be manufactured from double-skin, resin-bonded fibreglass, with a totally encapsulated infill of rigid weatherproof and 'boil proof' plywood to BS 1203:2001 between the two skins to provide a rigid and vandal-proof enclosure.

The environmental rating shall be IP 65 or better.

For any application in a non-temperate climate or where so specified elsewhere, the roof section shall be sloping and have a totally-encapsulated infill of end-grain balsa instead of plywood. Box section steel shall be encapsulated into door edges and door frames. Door locks, handles and hinges shall be of a high tensile strength, non-corroding alloy with stainless steel pins and through fixing bolts. Large plane surfaces shall have adequate reinforcing to ensure rigidity.

The doors shall be complete with latching handles and locks. All door catches and locks shall latch onto steel-reinforced surfaces. Threaded studs shall be incorporated into the design of the panel for the mounting of sub frames within the panel. Any panel drilled to provide fixings for internal equipment will not be accepted. Each cubicle shall be provided with a floor or deck with a removable gland plate for cable entry.

The laminate material shall have flame-retardant characteristics in compliance with BS 476 Class 2, and shall retain 'stability, integrity and insulation' for 30 minutes. Colour-impregnated gel coats backed by coloured resin shall be used to ensure maintenance free and 'colour-fast' finishes. The internal finish colour shall be white. The fronts of externally-visible instruments and windows shall be of glass. An air-gap of 100mm shall be provided between the top surface of the panel and its protective canopy. All internal equipment shall be mounted on supports built into the fiberglass structure. Fixing bolts through the skin will not be accepted.

16.7. Panel protection

Adequate facilities for isolation and protection by miniature circuit breaker or fuse for each instrumentation and control circuit and sub-circuit shall be provided and shall be so arranged that any interruption causes minimum disruption of plant, operates the appropriate alarm and cannot result in any unsafe operating condition. All fuses shall be of the cartridge pattern and main fuses shall be of the high rupturing capacity type. Fuse and solid-link carriers and bases shall be of plastic-moulded insulating material as per best industry practices. Ceramic materials will not be accepted. Live connections shall be efficiently shrouded and it shall be possible to change fuses with power on without danger of contact with live metal. The fuses shall be rated to give maximum protection to the equipment in circuit and the rating shall be permanently inscribed on the fuse label and on the fuse carrier.

Unless necessary for the protection of particular equipment, miniature circuit breakers used for individual circuits in a panel or control desk shall not trip on over-voltage or under-voltage. Bases for solid links shall not be interchangeable with those for fuses. Fuses and links in the same circuit shall be mounted opposite each other in separate adjacent rows and shall not alternate in the same row. At least 10% and not less than two unallocated miniature circuit breakers or fuses and links shall be provided in each panel distribution board. Miniature circuit breakers and fuses of similar size and rating shall be of the same make and type. At least 10%, and not less than two, spare fuses and links of each rating shall be provided and fitted in clips inside the panel.

Each instrument requiring a power supply shall be individually wired and protected so that, in the event of a failure in one circuit, the remainder is unaffected. Power supply circuits shall be of sufficient rating that any protective device may operate without reducing the voltage at the terminals of any other component to an unacceptable level. Remote alarms shall be operated on failure of the electrical supply to a panel or to any internal sub-circuit. Clearly identifiable, switched socket outlets of 15A minimum rating to comply with IS 4615, supplied at the main cabinet operating voltages shall be fitted within the panel at the rate of one for each operating voltage per meter of panel length; for a panel whose length is less than one meter, one switched socket outlet for each main operating voltage shall be provided. Suitable socket outlets for portable tools and hand lamps shall be provided as specified elsewhere.

16.8. Panel isolation

Clearly-labelled isolating circuit breakers shall be provided for each incoming power supply. Switches shall be of the quick make-and-break type with spring-loaded contacts that close fully without requiring full operation of the handle. The handle and cover shall be interlocked so that the handle cannot be operated when the cover is open and the cover cannot be opened unless the

switch is in the ‘off’ position. The ‘on’ and ‘off’ positions of each switch shall be indicated clearly.

Circuit breakers for panel power supplies shall be mounted near an access point and in positions where they may be operated easily from a standing position. Plug-in isolating links or devices of an approved type shall be provided in any circuit that may still be alive when the power supply isolators are in the ‘off’ position, as, for example, in circuits controlling equipment whose power supply is independent of the panel. Such links or devices shall be properly screened and, if not incorporated in or adjacent to their associated outgoing terminals, shall be labelled with suitable warning notices. Any item of panel equipment to which panel internal wiring is connected with a plug and socket instead of terminals shall be wired in flexible cable of adequate rating between the ‘free’ plug and a socket mounted adjacent to the device. The power supply connector shall be a socket.

16.9. Panel terminal blocks

External wiring for panel power supplies shall be terminated on the appropriate isolator. Signal cables from strain gauges, analyzers, resistance thermometers, re-transmitting slide wires and thermocouples may be terminated at their appropriate instruments. A terminal block shall be provided as the interface between the corresponding conductors of each internal and external wire and each internal and external connection except those listed above. The terminal blocks shall be mounted vertically where possible and not nearer than 230mm to the floor or less than 230mm from an incoming cable gland.

Terminal block rows shall be spaced apart by not less than 150mm and arranged to permit convenient access to wires and terminals and to enable ferrule numbers to be read without difficulty. Other circuits shall be grouped on the terminal blocks according to the classification given in the clause for ‘Panel internal wiring’ which shall be clearly marked along the corresponding section of each terminal board. Groups of different voltages on the same board shall be separated by insulated barriers.

All connections shall be made from the front of terminal blocks and no live metal shall be exposed at the back. All terminal blocks shall be of the type which clamps the wire securely and without damage between two plates by means of a captive screw and which permits removal of any terminal without disturbance to adjacent terminals. Pinch-screw type terminal blocks will not be accepted. Terminal mouldings shall be in melamine to ISO 2112:1990, polyamide or equivalent. Terminal rails shall be hot-dip galvanized. Current bars between the two connection points of each terminal block shall be of copper or brass with tin/lead alloy plating. All steel parts shall be zinc-plated and passivated with a yellow chromate layer.

Terminal blocks for input and output analogue signals and for circuits containing volt-free contacts internal or external to the cabinet shall be of the Klippon type SAKC or equivalent which permit the connection of a test millimeter or continuity meter without disconnecting any wiring.

Terminal blocks for power supplies for equipment external to the panel shall permit the isolation of the item of external equipment without affecting the operation of any other circuit within or outside the panel.

No more than one core of external cables or one internal wire shall be connected to any terminal. If terminal blocks are used as common points for two or more circuits, individual terminals with the appropriate number of permanent cross-connections shall be provided. The lengths of exposed cable cores shall be sufficient to reach any terminal in the appropriate row or rows. The cores shall be formed into a neat loom and a separate loom shall be provided for each cable.

Identification ferrules as specified in the clause for 'Panel wiring identification and termination' shall be fitted on each core of all external cables and on each internal wire. The size of the terminals shall be appropriate to the size and rating of the cable cores which will be connected to them but shall not be smaller than Klippon type SAK2.5 or equivalent.

Each row of terminal blocks shall contain at least 25% spare terminals over the number required for terminating all cores of external cables in that row. Unless otherwise specified or shown in the Specification drawings, each external cable shall contain at least 20% spare circuits, with a minimum of one spare circuit. Terminal blocks shall be numbered consecutively in a sequence different from that used for identifying wiring. The terminal numbers, voltage grouping and terminal board layout shall correspond precisely with wiring diagrams so that quick and accurate identification of wiring can be made. All the terminal boards shall be provided with covers of transparent insulating material that does not sustain combustion and shall be sectionalized where possible to give access to groups of terminals without uncovering all boards. Terminals which may be live when the panel is isolated from its main supplies shall be suitably labelled to minimize the risk of accidental contact.

16.10. Panel internal wiring

Panel circuits shall be segregated into the following categories:

- *Group 1: Power control and very-high-level signal wiring (above 50V):*
  - AC power supplies
  - DC power supplies
  - DC current signals above 50mA (such as CT circuits)
  - AC voltage and control signals above 50V (such as PT circuits)

- *Group 2: High-level signal wiring (6V to 50V dc):*
  - Signals from conventional electronic transmitters and controllers (such as 4mA to 20mA)
  - Circuits to alarm enunciators and other solid-state devices (excluding those in categories 2.1, 2.5, 3.1, 3.2 and 3.3)
  - Digital signals
  - Emergency shut-down and tripping circuits
  - On / Off control circuits
  - Intrinsically safe circuits
  - Speech-frequency circuits

- *Group 3: Low-level signal wiring (5V dc and below):*
  - Signals from thermocouples
  - Signals from resistance thermometers and re-transmitting slide-wires
  - Signals from analytical equipment and strain gauges

  For Group 3 wiring, internal connections to the instruments shall be made by one of the following methods:
  - The twisted, screened conductors of the external cable shall be led direct to their appropriate instruments via ducting systems installed for this purpose during construction of the panel.
  - The conductors of the external cables shall be terminated on terminals segregated from all other categories and the connections to the appropriate instruments shall be made using twisted pairs with individual screening installed for this purpose during construction of the panel.

Internal wiring for all circuits in Group 2 except those sharing a common connection shall be multi-stranded, twisted pair, 0.75mm² minimum copper conductors with HPDE or PVC insulated cable of adequate grade and rating in accordance with BS 6004:2000. Wiring for circuits in other Groups or sharing a common connection shall be run in stranded, 1.0mm² minimum copper conductors with 250V grade, PVC-insulated cable of adequate grade and rating. Wiring sheath colours shall be black for AC circuits, and grey for DC circuits (excluding thermocouple circuits) and blue for Group 2.6 circuits. Circuits supplied at 240V, between 240V and 110V dc shall also be physically segregated from each other and from other circuits. Access to wiring and components of circuits having voltages exceeding 240V shall not be possible unless and until the circuit has been isolated.

Separate ducts, trunking, cable looms, tray work and the like shall be provided within the panel for each category with at least 150mm between parallel paths of Group 1 and those of any other

Group. Intrinsically-safe circuits and their terminals shall be segregated from other circuits and terminals. All wiring shall be neatly and securely fixed by insulated cleats, bunched and secured by approved plastic strapping or run in approved insulated wiring trunking or non-corrodible flexible tubing. Not more than 75% of the capacity of trunking, ducts, looming, or tubing shall be used. Insulated earth wiring shall be so arranged that access to any equipment or connection point or the removal of any item of equipment is unimpeded. Wiring for future equipment shall be secured and terminated on terminal blocks. Lacing for wiring looms shall be of rot-proof cord or plastic strips. Inter-section wiring in multi-section cabinets shall be via a terminal block in each section.

16.11. Panel wiring identification and termination

Identification ferrules shall be fitted at both ends of each wire. The numbers or letters used shall correspond with the appropriate wiring diagram. The ferrules shall be of plastic insulating material with permanent black characters on a colour-coded background for numbers and on a white background for letters, unaffected by oil or water. They shall be so arranged that they can be read logically from left to right when viewed normally. The system of wire identification shall be such that wires in the same circuit on opposite sides of a terminal shall have the same reference, and this system shall be continued through all external cabling. Terminal ferrules (spade, tongue, crimped connections) shall be provided on each conductor.

16.12. Panel earthing

A continuous copper earth bar of not less than 25mm % 6mm cross section shall run the full length of each panel and shall be securely fixed and bonded electrically to the main frame. The cable gland-plates and the earth bar shall be provided with suitable brass terminals of not less than 6mm diameter for connecting the metal cladding or armouring of all incoming and outgoing cables to the station earthing system.

A second continuous copper earth bar of not less than 25mm % 6mm cross section, electrically isolated from the steelwork of the panel and metal cladding and armouring of cables, shall be provided for earthing the signal earth connection of each instrumentation and control device and the screen(s) of each instrument cable not earthed elsewhere to the station instrumentation earth plate. The earth bar shall have sufficient brass terminals as specified above for each instrumentation and control device and the screen of every shielded cable plus 25% spare terminals. In multi-section panels, each earth bar shall be electrically bonded to the corresponding bars in the adjacent section(s). Instrumentation and instrument cable screen earthing shall comply with BS 6739: 1986, Section 10, unless otherwise stated in this clause.

16.13. Panel Heating

Each panel shall have one or more thermostatically-controlled tubular or ribbed panel heaters to prevent condensation and assist ventilation and which shall be adequate for ambient temperatures down to 5°C. The heater rating shall not exceed 0.2W/Sq.mm and the surface temperature of any part which could be contacted accidentally shall not exceed 60°C. Heaters shall be so situated that no deterioration can be caused to any equipment or wiring in the panel. The heating circuits shall be switched and fused independently of the instrumentation and control equipment and manually controlled by an enclosed switch mounted in an accessible position within the panel. Thermostats shall be mounted remote from the heaters and other sources of heat and shall be fully adjustable over a range of not less than 0°C to 50°C. Thermostats shall cut out each heater when the internal temperature of the panel exceeds a preset value; differential thermostats shall be used to maintain the panel internal temperature at a pre-set value above the external ambient temperature. If the permanent power supply is not available at the time of installation of the panel and condensation is detected, a temporary power supply shall be connected to the panel of sufficient rating to operate the heaters.

16.14. Panel lighting

Each panel shall be adequately illuminated internally, as evenly and as free from dazzle as possible, by fixed fluorescent lighting controlled from totally-enclosed light switches and by totally-enclosed door-operated switches positioned so as not to interfere with access. There shall also be one installed inspection lamp per three meters of panel length or part thereof with adequate flexible connection cable to reach any point in the panel. The control switch for an inspection lamp shall form part of the lamp assembly. Lighting circuits shall be fused independently of any instrumentation and control circuit and designed to allow lamps to be replaced safely and shall be fed from a distribution board and circuit breaker connected on the live side of the main panel ac supply circuit breaker.

16.15. Panel ventilation

Each panel shall be provided with ventilation fans as required to ensure that equipment within the panel is maintained within manufacturer's recommendations, with due regard to the environment in which the panel will be mounted. Fans shall be controlled by a suitably labeled enclosed switch mounted internally in an accessible position. Fans shall be mounted with their axes horizontal and shall be arranged to draw clean air into the panel. Air entries shall have filters which can be renewed from outside the panel and shall be designed to prevent the entry of rain, spray, injurious fluids, sand or dust.

16.16. Panel piping and tubing

Panels containing equipment using a supply of compressed air shall have a common air pressure reducing station with duplicate pressure-reducing valves and filters. The pressure reducing station

shall also include isolating valves upstream and downstream of each filter/reducing-valve set, pressure-relief valve, pressure indicator and low-pressure alarm unit for the low-pressure header and a pressure indicator for the high-pressure pipework. The pressure-reducing station components shall be mounted in a clear space inside the panel, supported on a suitable framework between the lower horizontal row of instruments and the main low-pressure header. All piping, fittings and valves downstream of the pressure-reducing station shall be of brass, copper or plastic. PTFE tape shall not be used downstream of the main filters. The low-pressure header shall be brass and shall be near the panel floor with drain valves and tundishes piped to a drain. Branch air headers shall be of brass (15mm diameter minimum) and shall run vertically from the header to the instrument. The low pressure header and each branch shall have a 6mm minimum, non-ferrous shut-off valve for each instrument requiring an air supply and a compression coupling for each air-purge connection. At least 10% spare connections for possible future instruments shall be provided in each panel section. Any header dismantled before shipment shall have brass unions or flanges at each panel-section junction. Panel-mounted instruments shall be piped to bulkhead fittings on a gland plate during assembly at the manufacturer's works. Piping shall be colour-coded in accordance with Recommended Practice ISA−RP 7.2 issued by the Instrument Society of America and shall be segregated from wiring so that any leakage is harmless. Each panel-mounted pressure gauge shall have a stainless steel flush-mounted shut-off and fine-regulating valve mounted vertically below. A drip tray shall be provided below each row of gauges. Exhaust and de-pressurizing pipework shall be routed out of the panel.

16.17. Panel labels

Labels shall be provided for every panel to describe the duty or otherwise identify the panel and its sections and every instrument, component and item of equipment mounted internally and externally. Where applicable, front-of-panel labels shall be as shown in the Specification drawings. Each label shall be permanently secured to the surface near the item to which it refers. Externally-fitted labels shall be of perspex or other approved transparent plastic, with letters and numbers rear-engraved and filled with black. The rear surface of each perspex label shall be finished with a coat of paint of the same colour as the panel external finish. Instrument duty labels fitted externally shall be below the item to which they refer. Embossed tape or similar adhesive labels will not be approved.

Laminated materials or rear-engraved and filled plastic shall be used for internally-fitted labels, which shall be white with engraved black letters. Labels conforming to the requirements of the preceding paragraphs or other approved means shall be provided:

- Labels
  - To describe or identify circuits or circuit components
  - To identify DC polarity
  - To warn or remind about dangerous or potentially-dangerous circumstances

- Wherever elsewhere specified

Unless otherwise specified, all engraving shall be in plain block letters, 4mm high. The minimum practicable number of different sizes shall be used. Manufacturers' nameplates shall not be fitted on panel external surfaces.

16.18. Panel finish

For control and instrument panels, desks and cubicles a hard, smooth, durable finish, free of blemishes, shall be provided. Before painting, all external welds and any rough areas shall be smoothed, and all surfaces shall be thoroughly cleaned and free from scale, contaminates corrosion or grease. If rust-proof or Zintec steel has not been used in the construction, the panel shall be treated with a passivating agent such as phosphoric acid. All internal surfaces shall have a minimum of three coats of paint of which the first shall be an approved antirusting priming coat and the final coat shall be opaque gloss white enamel. All external surfaces shall have not less than five coats of paint of which the first shall be an approved etch priming coat, and the second and third suitable undercoats, all of which shall be rubbed smooth when dry before application of the next coat. The undercoats shall be easily distinguished in shade or colour from the priming and finishing coats. The two final coats shall be of stove enamel paint, gloss or semi-matt finish, to a colour and finish. Stoving shall be carried out in accordance with the recommendation of the paint manufacturer. The overall dry film thickness (DFT) shall be between 85 and 120 microns. Nuts, bolts, washers and other fixing devices which may have to be removed for transit or maintenance purposes shall be galvanized or otherwise finished to an approved standard. A 500ml tin of matching touch-up paint shall be provided and packed with each panel.

17. Electrical Indicators and Integrators

Indicators for use with analogue signal-transmission systems shall comply with BS 89:1990 or equivalent and have an accuracy class index of 1.0. Indicator movements shall be critically damped (dead-beat). Indicators for use on more than one circuit shall have rotary switches to select the circuit, with engraved plates to show the circuit selected. Indicators shall have circular scales or shall be of the vertical edgewise type and shall be designed to avoid parallax error.

Scales shall be clearly marked in SI units and shall comply with BS 3693:1992 or equivalent. All instruments mounted on one panel or board, or in adjacent groupings, shall have similar styles of figures and letters. Dials shall be white with black scales and lettering not subject to fading.

The material for scales shall be such that no peeling or discolouration will take place with age under any environmental conditions. Major scale marks and numerals shall be of the same size and thickness and shall be separated by not more than twenty-five minor marks. Pointers shall taper to the width of the scale marks. Integrators shall be of the multi-digit cyclometer type.

Integrators operating in conjunction with an electromagnetic or ultrasonic flow meter shall use the pulse output from the flow transmitter. Any integrator operating from a device without a pulse output shall have an integral or separate current-to-pulse converter with sufficient adjustment of the pulse rate to avoid the use of any multiplying factor except in integer power of 10. Each integrator shall incorporate an adjustable limiter whereby any input below a pre-set value is inoperative. Unless otherwise specified, integrators shall have a minimum of eight digits with a decimal point where applicable.

17.1. Alarm System

Alarms shall be initiated by the opening or closing of volt-free contacts which shall remain unchanged throughout the periods in which the alarm conditions exit. Alarm circuits shall be capable of conversion from open-healthy to open-alarm or vice versa by a simple modification after installation requiring no additional parts or special equipment.
Each alarm shall initiate the operation of both visual and audible devices. The sound intensity of each audible device shall be suitable for the maximum sound level of its environment.

Audible devices in the same room or area shall have distinguishable sounds and adjustable sound levels.

18. Matrix Type Alarm Annunciators

The alarm annunciator shall be microprocessor based, modular, split type unit with alarm windows mounted on the front door and electronic modules inside the panel. The weather protection class for alarm annunciator shall be IP-54 of IS 13947, Part-I. Each alarm shall initiate a visible and audible indication of the specified condition. Unless otherwise specified, alarm indicators shall be grouped together in annunciator units each having at least 20% spare ways. Alarm indicator lamps (Cluster LED type) shall have transparent screens engraved with appropriate legends as approved in the Designs and Drawings. The legend area of each indication shall not exceed 40mm high and 75mm wide. When any alarm condition occurs, a condition device common to an alarm annunciator system shall sound and the appropriate indicator shall flash on an off. The flashing rate shall not be less than 2 Hz and shall not exceed 5 Hz. On pressing an accept pushbutton, the audible device shall be silenced and the flashing light shall become steady. The alarm indicator shall remain illuminated until the alarm condition ceases and a reset pushbutton has been operated.

The operation or acceptance of one alarm shall not inhibit the operation of the audible device or the flashing of the appropriate alarm indicator if a further alarm condition occurs.

At unmanned locations alarms operated on two or more annunciators shall require acceptance at each annuciator. Alarms shall be accepted automatically and the appropriate audible device silenced after an adjustable period of 1 to 5 minutes.

An integral ‘test’ pushbutton shall be provided to illuminate each lamp in the appropriate group and to operate the audible device but shall not cause a spurious alarm condition on any other annunciator.

Alarm circuitry shall be arranged so that spurious or transient alarm states persisting for less than 0.5 seconds do not initiate any action.

Alarm annunciator / indicator legends or labels shall be arranged with three lines of text as follows:

- Top Line: Location; example: sludge blanket level
- Middle line: parameter; Level
- Bottom line: status. High

19. Push-Buttons and Indicator Lights

Push-buttons in control circuits shall have shrouds, guards or other suitable means for preventing inadvertent operation. Status-indicator lights shall be of the high-intensity LED type. Indicator lights shall be of a design which allows easy LED replacement from the front. Indicator lights shall be easily visible above the ambient light level when viewed from within an included angle of 120 degrees. LEDs shall be chosen to ensure clear discrimination between the energized and de-energized states and to ensure an average working life of not less than 3000 hours. A ‘lamp test’ push-button shall be provided for each group of indicator lights. The colours of push-buttons and indicator lights on instrument panels shall be as follows:

- INDICATOR LIGHTS ON INSTRUMENT PANELS
- Start or on (energize) - Green
- Stop or off (de-energize) - Red
- Open valve - Black*
- Close valve - Black*
- Accept - Black
- Lamp test - Black
- Reset - Black
- Motor running (energized) - Red
- Motor stopped (de-energized) - Green
- Valve open - Red
- Valve closed - Green

- Urgent alarm - Red
- Non-urgent alarm - Yellow
- Plant healthy or ready for use - White

*Panel-mounted push-buttons for valve operation shall be coloured black, or as per the approved Design and Drawings, with the duty clearly defined by legend on an associated label.

20. Analogue Signal Transmission

Unless otherwise specified, analogue signal-transmission systems shall be in accordance with BS EN 60546-1:1993 and shall use a signal of 4mA to 20mA DC. Transmitting devices shall have integral indicators to monitor the output signal or connections suitable for use with a portable test meter. Transmitters shall be capable of meeting the requirements laid down in the appropriate part of IEC 60770-1:1999.

21. Analogue Process Controllers

Analogue controllers shall use solid-state components and shall have outputs containing three terms with negligible interaction. The controller fascia shall have measured value, set value and output indication, manual set-value and output controls, auto/manual switch for control mode and remote-local transfer switch for set-value control. Manual control stations shall have measured value and set-value indication, local/remote switch and control available lamp indicator. Each controller shall have the means to restrict its output signal to a predetermined, fully adjustable band so that the regulating device is not moved to unsafe positions. The adjustment of these safe operating limits shall be by means of accessible, clearly marked, internal components. A continuously adjustable proportional band of not less than 5 to 500% shall be provided. Integral and derivative action times shall be adjustable over ranges which shall not be narrower than 6 seconds to 25 minutes and 0-to 10 minutes respectively. If the integral or derivative action times' adjustments are in steps, the ratio of successive steps shall not exceed 2. The controls used to set the P, I and D values may be at the front of the instrument or mounted internally in an accessible position.

Each controller shall be designed so that in the event of failure, it shall be possible to plug a portable manual station into the controller case and to control the regulating device manually.

Controller design shall ensure automatic procedure-less, bump less transfer whenever the instrument is switched from "auto" to "manual" or vice versa. Controller action shall be adjustable from direct to reverse and vice versa by the operation of an internal switch. Analogue process controllers shall be capable of meeting the requirements laid down in the appropriate part of BS EN 60546-1:1993.

Section G5.5
SCADA (Online Monitoring System)
forSTP(s)/FSTP(s) and LS/ PS

Section G5.5: SCADA (Online Monitoring System) for STP(s)/FSTP(s) and LS/ PS

1. General

One of the key requirements forming part of Operation and Maintenance requirement of STP(s)/FSTP(s), LS/PS, and I&D is REAL TIME ONLINE MONITORING of various data & details by authorities & officials in Executing agency, {NATIONAL/STATE LEVEL AGENCY IF ANY}, CPCB, SPCB, ULB and Project Engineer.

In order to facilitate this requirement, the concessionaire shall design and implement an SCADA concept based ONLINE MONITORING SYSTEM for real time monitoring of various parameters of the STP(s)/FSTP(s) and LS/ PS including mechanical equipment (pumps, motors, valves, etc.), process instruments and power network.

The SCADA based REAL TIME ON LINE MONITORING SYSTEM (hereinafter referred to as RTOLMS) should be such that it has feature as per generic requirements to enable transmission of real time data of all the monitored parameters over Internet networks, leased and phone lines, wireless communication etc., or a mix of these as appropriate and as feasible at the respective site(s). The indicative list of such parameters which are to be logged and monitored / communicated on line are given in the table below.

Typical parameter and relayed to control monitoring station

Parameters	Description of soft signal	Main pumping station		*[LOCATION]* STP/FSTP			I&D & distribution chamber	Bio gas generation	Septage handling system	Bio gas DG set
		Sump / collection well	Pumps	Sump / collection well	Pumps	Other equipment's				
Date & Time	Real time	✓	✓	✓	✓	✓	✓	✓	✓	✓
Liquid Level	High	✓		✓			✓			
	Low	✓		✓			✓			
Liquid flow	Inlet flow measureme			✓			✓		✓	

Parameters	Description of soft signal	Main pumping station		*[LOCATION]* STP/FSTP			I&D & distribution chamber	Bio gas generation	Septage handling system	Bio gas DG set
		Sump / collection well	Pumps	Sump / collection well	Pumps	Other equipment's				
	nt									
Sewage/Faecal Sludge/Septage quality	pH, TOC bases BOD and COD, TSS, TP, TN and residual chloride			✓						
Pump status for individual pumps	On, OFF, Trip		✓		✓	✓				
Flow rate in common header	Flow rate, head		✓		✓					
Electrical parameter for individual pumps & main switch board	Voltage, Current, KWH, PF, KVA		✓		✓	✓				
No of operating personnel			✓		✓	✓		✓		
Temperature - Ambient, liquid		✓	✓							
Bio gas monitoring	Online status for various							✓		

Parameters	Description of soft signal	Main pumping station		*[LOCATION]* STP/FSTP			I&D & distribution chamber	Bio gas generation	Septage handling system	Bio gas DG set
		Sump / collection well	Pumps	Sump / collection well	Pumps	Other equipment's				
	activity									
Gas generation	Cum / day, cumulative gas generation, gas quality							✓		
Septage handling monitoring	Online status for various activity								✓	
Septage treatment	Cum / day, cumulative septage received, quality								✓	
DG set running hours										✓
Electrical parameter for individual Bio gas-based engine generator, DG set pumps & main switch board	Voltage, Current, KWH, PF, KVA									✓

Note: For flow measurement at I&D, the Concessionaire is free adopt any available flow measuring instruments with compatibility for online monitoring

2. System architecture

The schematic representation of the required RTOLMS architecture to be provided by the Concessionaire as part of Basic engineering package to meet the KPI requirements as per schedule 1 and 11.

3. Scope of work

The scope of work, as a minimum shall include.

- Supply, installation, testing and commissioning of all necessary Hardware and Software for RTOLMS System including LAN switches, Modems, UPS, central work station, HMIs, data / fibre cabling between various sensing devices to the PLCs in the respective STP(s)/FSTP(s), and LS / PS
- Supply, installation, testing and commissioning at STP(s)/FSTP(s),and LS & PS of all necessary isolating and interface modules and RTUs, potential free auxiliary NO/NC contacts etc., required for making the existing / new Electrical power system components compatible for monitoring the voltage, current, PF, kVA, KWh, KVAh, pump ON/OFF status etc., besides interfacing of data on levels, pressure, flow rate and various other parameters of raw water and treated water.
- Supply, installation, testing and commissioning of al Networking Equipments (Router, firewall etc.) for the central unit atSTP(s)/FSTP(s).
- Interface / Integration of PLC & RTU ofSTP(s)/FSTP(s), and LS & PS with RTOLMS System.
- Integration of Field Instruments Hardware with RTOLMS System.
- Testing, Erection & Commissioning of supplied system.

4. Features Required in RTOLMS System

RTOLMS system will have many extra features and the proposed system should support multiple PLC/ RTU Protocol like Modbus, Profibus, DNP (Serial/TCPIP), OPC etc.

4.1. System components

The system shall consist of a modular controller (including control, I/O, and communications functions) and software modules that facilitate open systems connections.

The system shall include a full complement of modular supporting equipment (including mounting racks, power supplies, termination strips, equipment enclosures, prefabricated cables, furniture, etc.), all of which shall be designed to simplify construction.

4.2. Open Communications

The control system shall be open to enable easy integration with OPC (OLE for Process Control) [where OLE stands for Object Linking and Embedding (OLE)] server so as to collect the data from the remote housing station.

4.3. Reliability and redundancy

The system must be designed for maximum reliability and minimal downtime and work satisfactorily under harsh and dusty ambient conditions. This should be achieved through a fault-tolerant design with minimal common cause failures and state-of-the-art redundancy schemes. The main system should offer 100 % redundancy for both hardware and software. The offered system shall offer highest possible MTBF within the service period of 15 + years.

4.4. Hardware Details

❖ **SCADA CUM COMMUNICATION SERVER, WEB SERVER, ISR SERVER**

Qty	Hardware Component	Remarks
1	RTOLMS SCADA cum Communication Server	○ The interfaces for each server are connected to Ethernet networks to collect data from field.
1	WEB server	○ Interface with Internet to remote client
1	ISR server	○ Databases server with Oracle/SQL for Alarm and MIS Report

❖ **USER INTERFACE SUBSYSTEM**

Qty	Hardware Component	Remarks
2	Workstation Console	○ The console is provided with TFT Monitor ○ The interface is connected to the Ethernet networks.
1	Remote access terminal	○ LAPTOP connected through a serial link and a modem.

❖ **LOCAL AREA NETWORK SUBSYSTEM**

Qty	Hardware Component	Remarks
1	LAN Switch	Ethernet switch 14 ports (10/100 Base TX) + 2 Fibre Port
6	Remote Location LAN switch	Ethernet switch 14 ports (10/100 Base TX) + 2 Fibre Port
1	Router	Port 2 LAN+2 WAN, all are 10/100 with 2 V.35
2	Firewall	4LAN+2 WAN, all Wan are 10/100Mbps and LAN are

		10/100/1000 Mbps
Lot	12C Single armored cable Mode Fibre	For Connectivity

4.5. Peripheral Subsystem

- **PRINTERS**

Qty	Hardware Component	Remarks
1	Laser Printer(Colour)	Each laser printer is connected to Ethernet network.

- **UPS**

Qty	Hardware Component	Remarks
1	UPS of appropriate kVA rating for STP/FSTP	The UPS shall be with two hours battery autonomy.
2	UPS of appropriate kVA rating for LS & PS	The UPS shall be with 2 hours battery autonomy

Note : This UPS shall be independent of that to be provided for the PLC system at STP/FSTP, and LS/PS locations

4.6. Hardware Components Description

This section describes the common hardware components.

- **Communication cum SCADA Server, Web Server, ISR Server* Characteristics ***

Intel® Xeon® Quad-Core Processor E5606 2.13 GHz, 8MB L3 Cache	1
Integrated Two Broadcom dual-port Gigabit Ethernet with TOE enabled	1
8GB Memory (4x2GB), 1333MHz, DDR3 RAM	1
2nd Intel® Xeon® Quad-Core Processor E5606 2.13 GHz, 8MB L3 Cache	1
300GB 15K RPM,6Gbps SAS 3.5 Hot Plug Hard Drive " With RAID5	3
DVD+/-RW ROM, SATA, Internal for Ms 2008 R2	1
High Output Power Supply, Redundant, 460W	1
Power Cord, GType, 230V (Nepal, Sri Lanka, India)	2
2U Cable Management Arm	1
2U Sliding Rail	1
Windows Server	1

* The system (hardware, software, accessories, etc.) being provided during installation would be of latest configuration.

❖ **Workstation Console Monitor***

Motherboard	Intel® Xeon® Dual-Core Processor W3503 (2.40 GHz, 4 MB cache, 1066 MHz memory)
Video Card	ATI FirePro 2270 (512 MB)
RAM Memory	4GB (2x2GB) DDR3 SDRAM Memory, 1333MHz, ECC 1
HDD	500 GB SATA (7200 RPM) HDD
Input Power Supply	220 to 240 VAC (+/- 10%), 50 Hz (+/- 2 Hz)
Power Cord	Indian Style
CD Drive	16X DVD + /-RW Combo Drive
Keyboard	USB Entry Keyboard
Mouse	USB Optical Scroll Mouse (2 buttons) with Mouse Mat
LAN (Ethernet port)	Dual Broadcom RJ45 10/100/1000 BASE on board Ethernet NIC
I/O Cards	One serial RS-232 port, 4 USB port and one parallel port
Indicator & Switch	Power on/off x 1, HDD x 1. Power on/off x 1, System reset x 1

*The system (hardware, software, accessories, etc.) being provided during installation would be of latest configuration.

❖ **LAN Switch***

Specification		**Managed Industrial Ethernet switch**			
Ethernet Standards		IEEE 802.3 IEEE 802.3u for IEEE 802.3x for Flow Control	for 100BaseT(X)	and	10BaseT 100BaseFX
Design Standard		FCC Part 15, CISPR (EN55022) class A, Shock- IEC60068-2-27, Vibration-IEC60068-2-6, EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge), EN61000-4-6 (CS), EN61000-4-8, EN61000-4-11 standards			
Input Voltage		9.6-60 VDC			
Operating temperature:		0 to 60°C			
Ambient Humidity:	Relative	5% to 95% Non-condensing			
Overload Protection	Current	Present			
Mounting		DIN Rail Mounting			
No. of Ports		12 Nos. (10 CU + 2 FO)			
Interface					
Ethernet ports		10 no. RJ45 Ports with 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection			
Fiber Port		Two 10/ 100BaseFX port SC Type Single-Mode, 1310 nm Supports Ring,			

Specification	Managed Industrial Ethernet switch
	and Self-Healing

The system (hardware, software, accessories, etc.) being provided during installation would be of latest configuration.

- **Router ***

Memory	RISC @ 533 MHz
	Flash Memory:256M Bytes
	SDRAM: 256M Bytes
Interface	2 x 10/100/1000 Mbps Ethernet Port
	2 Serial Ports (V.35)
	2 X 10/100 Mbps WAN Interface
	1 Console port
	1 Auxiliary port
Performance	
Throughput	300 Kpps (64-byte packets)
Routing table size	30000 entries
Network Management	IMC - Intelligent Management Center; command-line interface; Web browser; SNMP Manager; Telnet; RMON1; FTP; IEEE 802.3 Ethernet MIB
Operating Temperature	0° to 40° C (32° to 104° F) (Relative Humidity: 5% to 90% non-condensing)
Non-Operating Temperature	-40° to 70° C (Relative Humidity: 5% to 90% non-condensing)
Power	100-120/200-240 VAC

*The system (hardware, software, accessories, etc.) being provided during installation would be of latest configuration.

- **12C Single Mode Fibre Cable***

Configuration	Multitube double sheath armoured cable
Nos. of Core	12
Maximum Tensile Loading	1361 x 1021
Installation	2700N
Long Term Installed	900N
Operating Temperature	-30°C to +60°C
Normal Dia	14.8 mm
Nominal weight	200 KG/KM

Mode	Single Mode
Single mode Fiber:	(G.652.B)

4.7. Server Panel

The equipment can be of any Standard make which can comply with the following standards:

Type	SERVER RACK 42U/600W/1000D
Specification	Captive Front Panel Hardware, Pkt of 20
	Castors (Plain)
	Server Rack, 19"/42U
	consisting of High quality extruded Aluminium vertical profiles 4 Nos. Top and Bottom steel end
	frames with bottom Panel having gland plate for cable entry, Top cover with FHU provision, Side
	Panels with latches and venting slots at bottom 1/3 area and 2 pairs of 19" Mounting Angles
	Dimension: 2150 x 600W x 1000D Powder Coated BLACK
	Front CRCA steel single door with Perforation
	Rear CRCA steel single door with Perforation
	Component Shelf, Universal, 19"W/575mmD, Load cc 50 kg.
	Top Mounting, Fan Housing Unit with 4 fans 230 V / 90CFM
	Rotary Keyboard Tray with slides
	Castors (with brake)
	Earth Continuity straps (kit)

4.8. Power Supply

Redundant power supplies shall be available for card rack mounting to form as an integral part of the system. The module rack must provide two individual power supply buses that to be driven by two independent power sources for high availability placed in the rack in current sharing mode. Each module shall be capable of using power from any of the two buses.

4.9. Enclosures

The racks shall be mounted in an industrial enclosure with a front & rear -access design, with all frequently accessed items (such as modules, connectors, status indicators, switches, and termination assemblies) located in the front of the enclosure. For maximum flexibility, the enclosures shall be modular, with the ability to be stacked, joined side to side, or joined back to back. To provide the degree of environmental security required, enclosures shall be available in sealed and vented versions.

Enclosure shall be i) for Indoor IP 44 and ii) for Outdoor IP 65

4.10. Input / Output Devices

Input/output Modules shall be intelligent I/O modules. Each module should be able to communicate with the CPU in a dedicated fashion without requirement of any additional interfacing hardware so as to reduce the common cause of the Failure. Each module should have its own microprocessor to execute its input/output function, maintain its configured data, and perform module diagnostics.

All process I/O shall be electrically isolated from both computer common and communications common. Isolation shall meet be min 1500 VAC requirements. Modules shall automatically determine their physical address and report this information to the controller. No range jumpers or user- configurable physical address jumpers should be necessary.

All configurable data shall be set via software, with no hardware jumpers used. Configurable data should include channel tag.

All the I/O modules shall have max 8 channels for the Analog and 16 channels for the Digital modules. Special modules like Counter inputs shall monitor dry contact pulses with an input resolution of one HZ minimum. More numbers per channel may be accepted if the overall reliability factor of MTBF within the service period of 15 + years is achieved.

4.11. Field Termination for I/O Modules

Each I/O module's field signals shall be wired into the system such that an I/O module can be removed at any time without disturbing the field wiring.

The field wiring should be separate from the I/O module(s). The extension from the module(s) shall be accomplished via a marshalled I/O cable assembly. This assembly should be a multi-conductor cable that attaches to the module rack (and the back of the I/O module) on one end and a finished termination end.

The marshalled termination assemblies shall be DIN rail-mounted PCB-based fixtures that include terminal blocks and two receptacles for accepting the interconnect cable plug. These receptacles must be female to eliminate the possibility of power from the terminal block being exposed on pins.

5. Detailed functional Specification of RTOLMS System Components

5.1. Data Acquisition

The RTOLMS system shall perform data acquisition from PLC ofall treatment plants, all LS / PS and field equipment. PLC is to be located at each location of the treatment plant and LS/PS. PLC communications with central system shall utilize the Open protocol like Modbus, Profibus and Ethernet TCP/IP.

5.2. Data Exchange

The RTOLMS systems shall be able to exchange various types of data with the other application software using ActiveX Data Objects (ADO) or Dynamic Data Exchange (DDE).

5.3. Data Processing

a) Analog data

Analog data processing shall be performed according to the requirements listed below.

- Conversion to measurable Units as required by ULB / {NATIONAL/STATE LEVEL AGENCY IF ANY}
- Reasonability limits checking
- Limit monitoring

b) Digital/Status Input Data

The following status input data types shall be accommodated as a minimum: Two-state points: The following pairs of state names shall be provided:

(1) Open/Closed
(2) Tripped/Closed
(3) Alarm/Normal
(4) On/Off
(5) Auto/Manual
(6) Remote/Local

c) Calculated Data

It shall be possible to define the calculations on real-time data and historical data, periodically and on request. The results shall be incorporated into the database as calculated data available for display & report generation.

The user shall be able to define calculated analog values using database points as the arguments and mathematical functions as the operations. Functions such as addition, subtraction, multiplication, division, maximum value, minimum value, average, count, square root, exponentiation, trigonometric functions, logarithms and other statistical functions shall be provided.

The RTOLMS system shall be capable of analyzing the open/closed status of switching devices, such as Motor, PUMP etc. The configuration shall be updated whenever a switching device status change is detected.

5.4. Sequence-Of-Events Recording

The Sequence-of-events (SOE) data shall be collected by the RTOLMS system from PLCs. The description of each event shall include the database description name, device state, the date, and the time (to the nearest millisecond) of each event.

5.5. Information Storage and Retrieval

Information Storage and Retrieval (ISR) system shall collect and store analog data (telemetered and calculated) periodically at every 5 minute (configurable) and status data by exception. Associated quality codes shall be included. It shall be possible to perform calculations on the stored data, and the results of these calculations shall be collected and stored. Other information such as alarms, events, SOE and reports shall also be stored. The data shall be stored on hard disc with date tag on daily basis for easy retrieval. Subsequently, the data shall be retrieved for analysis, display, trending, and report generation.

5.6. Extensive Use of Standard

The RTOLMS Software should be such that it uses an extensive use of standards, achieved by a corporate commitment to comply with all standards that are recognized on the RTOLMS market, and in particular:

- Intel (or compatible) based hardware;
- Operating system options of WNT 4.0, Windows 2000 or Windows 2003;
- Uses Microsoft Foundation Class (MFC) Object Oriented Database;
- Developed with Microsoft Developer's Studio;
- Installed using Microsoft Install Shield utilities;
- Component Based Architecture;
- Interfaced using Active X controls (OCX);
- TCP/IP for Local and Wide Area Networks (LAN & WAN);
- Web-enabled Operator Consoles;

- Control Center Application Programming Interface (CCAPI) Initiatives

5.7. System Sizing & Extensibility

The hardware and software openness of RTOLMS allows the Executing Agency / concessionaire to smoothly upgrade the proposed system with great facilities. Common upgrading needs include (but not limited to) the following items:

- Additional measurement points (analog and digital);
- Additional protocol-compliant IEDs;
- Additional protocol-compliant PLCs;
- Additional operator consoles;
- Additional printers;

5.8. Graphical User Interface (GUI)

The GUI shall operate within a window environment, the system shall use displays which mimic the existing control panels so that the operators working in conventional control room environment are comfortable while working on the new system. Concessionaire shall develop control panel display generally similar to the one existing in conventional control room.

The GUI shall allow the personnel to monitor and control the equipment through the control panel displays and Tabular displays. The control panel displays shall be dynamically updated for measurands, device positions, annunciations. To have better visibility of control panels, it shall be possible to iconise each control panel separately. Operator shall select that icon to zoom/view that panel display & carry out operations such as alarm annunciation accept/reset, device close/open operations etc.

5.9. Trending

Trend displays shall enable the user to select real-time and historical data for trending on graphical displays and for tabular displays. It shall be possible to take print of these trends.

5.10. Alarms

Alarms are conditions that require user notification when detected. Audio, visual alarm shall be generated for all such conditions. It shall be possible to accept & reset all trip & non-trip alarm

annunciation appearing on control panel facia from control panel display itself. Alarm annunciation on control panel shall have following characteristics:

Condition	Facia	Sound
Alarm initiation by relay contact	Flashing Glow	On
Accept PB pressed	Steady Glow	Off
Reset	Off (if relay contact is reset) Steady Glow (if relay contact is not reset)	Off

Other alarm conditions shall be acknowledged from respective alarm list displays. Other alarm conditions shall include, but not be limited to the following:

(a) Telemetered or calculated value limit violations
(b) Un-commanded changes of a power system device state
(c) Data source communication errors resulting in loss of data
(d) SCADA hardware and software element failures.

The standard products for advanced alarm management shall also be provided. Regardless of the alarm management technique used, all alarm messages shall be recorded with time & date tag on auxiliary memory for review and printing on demand by the user.

Displays shall highlight alarm condition using a combination of colour, intensity, inverse video and blinking. Alarm messages shall be a single line of text describing the alarm that has occurred with date & time of occurrence.

5.11. Events

Events are conditions or actions that shall be recorded by the SCADA system but do not require user action. Events shall be recorded in the form of an event message. The event message format shall be similar to the alarm message format. Events shall include but not be limited to the following:

Values returning to normal from a limit violation State Device status change on manual operation.

5.12. Hardcopy Printing of Display

A means shall be provided to produce a copy of a display. The display printout shall be initiated from user friendly push buttons/pull down menus. The options for printing mode shall include at

least selection for orientation, background colour, page size, colour or black & white print and print preview. It shall also be possible to print selected portions of display and direct printing on any of the connected printer.

5.13. Report Generation

The user shall be able to schedule periodic reports generation, direct a report to a display, print a report, and archive a report. Hardcopy report formats shall be handed over to Concessionaire for generation of report formats in the system. It shall also be possible to define and generate the additional user configurable reports. The generation and printing of any report shall not effect normal scanning of data from PLC. The report scheduling display shall enable entry of the following parameters, with default values provided where appropriate:

(a) Report name
(b) Report destination (printer or archiving device)
(c) Time the system should produce the report.

5.14. RTOLMS System Access Security

A mechanism for defining and controlling user access to the SCADA system shall be provided.

5.15. Alarm Summary Displays

Displays that list or summarize all unacknowledged and acknowledged alarms shall be provided. The user shall be able to select between viewing alarms in chronological and reverse chronological order. The default shall be most recent alarms. The summary shall separate acknowledged and unacknowledged alarms. To facilitate identification of unacknowledged messages the time field shall blink or entire row shall blink. It shall be possible to sort alarms by user defined text, date, time.

5.16. Event Summary Displays

Event summary displays shall list the most recent events. The user shall be able to select between viewing events in chronological and reverse chronological order. The user shall be provided with a convenient and efficient means of selecting an event summary display. It shall be possible to sort events by user defined text, date, time.

5.17. Operating Information Summaries

The operating information summaries defined below shall be provided. Summary items will be listed in reverse chronological order with the most recent item shown on the first page. The user shall have the ability to sort summary items by device.

5.18. Abnormal Summary

The summary display shall list devices and values that are found to be abnormal, i.e., are not in their normal state. Telemetered, calculated, and manually entered status and data values shall be included.

5.19. Out-Of-Scan Summary

The out-of-scan summary display shall list device status and data values that are not currently being processed by the system.

5.20. Alarm Inhibit Summary

This display shall list devices and data values for which the user has suspended alarm processing.

5.21. Tag Summary

This display shall list and describe all active device tags.

5.22. Help Displays

Help displays shall be provided to aid the user in interpreting displayed information and to guide the user through a data entry or control procedure.

5.23. Alarm Beeper Services

The Alarm Beeper service audibly notifies the operator of recent alarms by playing a wave file. Wave files can be used to distinguish between Alarm priorities. All the Windows' .wav files or customized wav files can be used.

5.24. Alarm Pager Services

The Alarm Pager service allows the user to configure the system to issue various pages in response to specified alarms.

Section G5.6
Inspection and testing at manufacturer's works

Section G5.6 : Inspection and testing at manufacturer's works

All inspection and testing shall be carried out in accordance with the Specification and in absence of Specification relevant Indian Standard or internationally approved equivalent standard. After award of contract, Concessionaire shall furnish QA plan, which will be mutually discussed with the Executing Agency and finalized QA plan shall include test, and incoming supply of raw materials and bought out items, stage inspections and tests on finished products at manufacturer's works / appropriate testing station. QA plan shall clearly indicate tests which are intended to be witnessed by the Concessionaire alone and those by both Concessionaire and Project Engineer and Executing Agency.

The Concessionaire shall carry out wherever practical, at the place of manufacture tests of the Plant / Equipment.

The Executing Agency shall be entitled to attend the aforesaid inspection and / or tests by his own duly authorized and designated representatives.

The Executing Agency and his duly authorized representative shall have access to the Concessionaire's premises at all suitable times to inspect and examine the material and workmanship of the mechanical and electrical plant and equipment during its manufacture there. If part of the plant and equipment is being manufactured on other premises, the Concessionaire shall obtain permission for the Executing Agency or his duly authorized representative, to inspect as if the plant and equipment was manufactured on the Concessionaires own premises. Testing (including testing for chemical analysis and physical properties) shall be carried out by the Concessionaire and certificates submitted to the Executing Agency who will have the right to witness or inspect the above mentioned inspection / testing at any stage desired by him. Where inspection or testing is to be carried out at a sub-contractor's works, a representative of the Concessionaire shall be present.

The procedure for the testing and inspection to be carried out during or following the manufacture of the materials to ensure the quality and workmanship of the materials and to further ensure that they conform to the Contract is whatever place they are specified shall be as described below.

The Concessionaire shall give the Executing Agency at least 21 clear days' notice in writing of the date and the place at which any plant or equipment will be ready for inspection/testing as provided in the Contract. The Executing Agency or his duly authorized representative shall thereupon at his discretion notify the Concessionaire of his intention either to release such part of the plant and equipment upon receipt of works test certificates or of his intention to inspect. The Executing Agency shall then give notice in writing to the Concessionaire, and attend at the place so named the said plant and equipment which will be ready for inspection and/or testing. As and

when any plant shall have passed the tests referred to in this section, the Executing Agency shall issue to the Concessionaire a notification to that effect.

The Concessionaire shall forward to the Executing Agency duly certified copies of the test certificates and characteristics performance curves for all equipment.

If the Executing Agency fails to attend the inspection and/or test, or if it is agreed between the parties that the Executing Agency shall not do so, then the Concessionaire may proceed with the inspection and/or test in the absence of the Executing Agency and provide the Executing Agency with a certified report of the results thereof as mentioned above

If any materials or any part of the works fails to pass any inspection / test, the Concessionaire shall either rectify or replace such materials or part of the works and shall repeat the inspection and/or test upon giving a notice as mentioned above. Any fault or shortcoming found during any inspection or test shall be rectified to the satisfaction of the Executing Agency before proceeding with further inspection.

Where the plant and equipment is a composite unit of several individual pieces manufactured in different places, it shall be assembled and tested as one complete working unit, at the maker's works or at site as mutually agreed by the Executing Agency and Concessionaire.

Neither the execution of an inspection test of materials or any part of the works, nor the attendance by the Executing Agency, nor the issue of any test certificate shall release the Concessionaire from any other responsibilities under the Contract.

The test equipment, meters, instruments etc., used for testing shall be calibrated at recognized test laboratories at regular intervals and valid certificates shall be made available to the Executing Agency's at the time of testing. The calibrating instrument used as standards shall be traceable to National / International standards. Calibration certificates or test instruments shall be produced from a recognized Laboratory for the Executing Agency's consent in advance of testing and if necessary instruments shall be recalibrated or substituted before the commencement of the test.

Items of plant or control systems not covered by standards shall be tested in accordance with the details and program agreed between the Executing Agency and Concessionaire.

Tests shall also be carried out such that due consideration is given to the Site conditions under which the equipment is required to function. The test certificates shall give all details of such tests.

The Concessionaire shall establish and submit a detailed procedure for the Inspection of materials or any part of the works to the Executing Agency for approval within the date indicated in the

Programme Details. The detailed procedure shall indicate or specify, without limitation, the following:

i) Applicable code, standard and regulations
ii) Fabrication sequence flow chart indicating tests and inspection points
iii) Detailed tests and inspection method, indicating tests and inspection points
iv) Acceptance criteria
v) Test report forms and required code certificates and data records
vi) Method of sampling, if any sampling test to be conducted
vii) Concessionaire's or Executing Agency's witness points.

The Concessionaire shall not pack for shipment any part of the Plant until he has obtained from the Executing Agency or his authorized representative his written approval to the release of such part for shipment after any tests required by the Contract have been completed to the Executing Agency's satisfaction.

Part-C

Testing and Commissioning

Part C

Testing and Commissioning

Requirements Inspection and TestingDuring Construction

1.1 General

Inspection and testing of all Facilities shall be carried out in accordance with the relevant Indian Standard or internationally approved equivalent standard. QA plan shall clearly indicate tests which are intended to be witnessed by the Concessionaire alone and those by Concessionaire and Project Engineer.

Inspection and tests schedule shall be as follows;

(i) Manufacturertests
(ii) Acceptance Inspection / Quantitychecking
(iii) Install /SiteInspection
(iv) Site AcceptanceTest
(v) Tests onCompletion
(vi) Process Wet Tests (by RawSewage/Faecal Sludge/Septage)
(vii) Operation Test (Tests AfterInstallation)

The Concessionaire shall establish and submit a detailed procedure for the inspection of materials or any part of the Facilities to the Project Engineer and Executing Agency for approval within the date indicated in the Programme Details.Thedetailedprocedureshallindicateorspecify,withoutlimitation,thefollowing:

- Applicable code, standard, andregulations.
- Fabricationsequenceflowchartindicatingtestsandinspectionpoints.
- Detailed tests and inspection method, indicating the measuring apparatus to be used, items to bemeasured,calculationformula,etc.
- Acceptancecriteria.
- Testreportformsandrequiredcodecertificatesanddatarecords.
- Methodofsampling,ifanysamplingtesttobeconducted.
- Concessionaire's or Project Engineer's witnesspoints.

The witness testing shall be carried out for all the Mechanical, Electrical, Instrumentation, PLC, SCADA and AssociatedEquipment.

1.2 Testing on ConstructionCompletion

For all the subject Facilities, prior to the commencement of Trial Operations on respective Construction Completion the Concessionaire shall submit the following to the Executing Agency:

(1) As-BuiltDrawings
(2) Operation and MaintenanceManuals
(3) Site testresults

The initial charges of oil, grease, generator fuel / oil, chemical, disposal of cake, etc. necessary for Trial Operation shall be borne by theConcessionaire.

a) Manual CommissioningTests

Manual commissioning tests shall be such preliminary trials, tests and retests on subject Facilitiesprior to subject Facilities COD respectively, in order to demonstrate that the subject Facilities as a whole are ready to undergo the manual operation tests and that these will take place with a minimum of interruption.

b) Manual OperationTests

When the manual commissioning tests have been completed so that the subject Facilities have been demonstrated to the satisfaction of the Project Engineer and Executing Agency, the Concessionaire shall commence the manual operation tests.

These tests shall demonstrate the correct operation of the subject Facilities whilst using the minimum quantity of automatic control and monitoring equipment. Such equipment shall be at least that required for the maintenance of safety and for the normal mode of operation of such Facilities.

The subject Facilities will be required to demonstrate satisfactory operation at all design flow rates.

c) Automatic CommissioningTests

The Automatic Commissioning Tests shall be such preliminary trials, tests and retests on subject Facilities in order to demonstrate that the subject Facilities as a whole ares ready to undergo the tests of completion and that these will take place with a minimum of interruption.

1.3 Dry Test Requirements

As a minimum requirement the following dry tests shall be carried out as a general requirement:

(1) A general inspection to check for correct assembly and quality ofworkmanship
(2) A check on the presence of lubricant, cooling medium, electrolyte, etc.
(3) A check on adequacy and security of Facilities fixing arrangements.
(4) A general check to ensure that all covers, access ladders, water proofing, guard railings etc. are in place.
(5) A check on damp-proofing, rust-proofing and vermin-proofing and particularly the sealing of apertures between building structures, chambers etc. and the outside.

a) Civil and BuildingWorks

As a minimum requirement, check for the presence of foreign bodies in pipe work and structures shall be carried out on the civil and building works.

b) MechanicalWorks

As a minimum requirement, preliminary running checks as far is permitted by circumstances in order to ensure smooth operation of Facilities shall be carried out on the mechanical systems.

c) ElectricalWorks

As a minimum requirement the following dry tests shall be carried out on the electrical systems:

a. Check phasing andpolarity.
b. Carry out point to point check oncables.
c. Check on security of cableterminations.
d. Check on completeness and adequacy of earthingsystems.
e. Check setting on protection relays, sizes of fuses and motor overloadsettings.
f. Carry out checks on cabling systems in accordance with the requirements of the relevant standards.
g. Check operation of main circuit breakers by secondary injectionmethods.
h. Check rotational direction ofPlant.
i. Check instrument loop integrity, functionality andcalibration.
j. Check operation of standby generator installation and mains / generator changeover procedures; a 4 hour load test (using the normal load of the Works) shall be carried out on the generator when the load isavailable.

k. Check plantfunctionality.
l. Check functionality of the central MMI and its powersupply.

1.4 Process plant item /equipment

All process plant items / equipment shall be tested to ensure they meet the requirements for quality of workmanship, construction and performance as laid down in the Concession Agreement.

1.4.1 Hydraulic Wet TestRequirements

Hydraulic wet tests shall be carried out on completion of dry tests.

Clear water shall be used for hydraulic wet tests. The purpose of the tests is to prove the hydraulic performance of the Works. In order to demonstrate this, the Concessionaire shall ensure that each part of the Works is hydraulically loaded to its rated throughput for a period of at least four hours.

In order to ensure a sufficient supply of water to carry out these tests the Concessionaire shall provide all requiredfacilities,includingbutnotlimitedtoanytemporaryfacilitiesthatmayberequiredforstorageand recycleofclearwaterorfacilitiesforthedisposalofthewateroffSiteinanapprovedmanner.

The following tests inter alia shall be carried out:

(i) Pressure testing of all piped systems laid direct in ground in accordance with the relevantstandards.
(ii) Fill all structures and check forleaks.
(iii) Filling of all storage vessels to check for leaks anddistortion.
(iv) Running of all pumped systems in order to checkfor.
(v) Correctfunctionality.
(vi) Absence ofleaks.
(vii) Correct runningtemperatures.
(viii) Smoothness of running and the absence of undue vibration orstress.
(ix) Check drive runningcurrents.
(x) Carry out calibration of instruments whereappropriate.
(xi) Carry out valve operation, diversions etc. to fully hydraulically load each process element (or where there is a requirement to withstand an over load), overload each processelement.
(xii) Demonstratecorrectfunctionalityofelectrical,controlandinstrumentationsystems.

1.4.2 Process Wet Tests (with RawSewage/Faecal Sludge/Septage)

On approval by the Project Engineer the Concessionaire shall carry out process wet tests.

Raw Sewage/Faecal Sludge/Septageshall be used as the primary feed stock for process wet tests. These tests shall be carried out to demonstrate the process performance of the Works. In order to demonstrate this, the Concessionaire shall ensure that each part of the Works is loaded to its rated throughput (including a period of overload if required in order to demonstrate compliance with the Project Engineer's Requirements) for a continuous stable operating period of not less than 48 hours.

TheConcessionaireshallprovideallrequiredfacilitiesforthedisposaloff Siteinanapprovedmanner.Th e followingtestsinteraliashallbecarriedout:

(i) Check for leaks on vessels, structures, pumps and pipework.
(ii) Running of all pumped systems in order to checkfor.
- Correctfunctionality.
- Absence ofleaks.
- Correct runningtemperatures.
- Smoothnessofrunningandtheabsenceofunduevibrationorstress.
- Check drive running currents where the solution pumped is different from that pumped during hydraulic wettests.

(iii) Carry out calibration ofinstruments.
(iv) Carry out valve operation, diversions etc. to fully hydraulically load each process element (or wherethereisarequirementtowithstandanoverload),overloadeachprocesselement.
(v) Demonstrate correct functionality of electrical, control and instrumentation systems not checked during dry or hydraulic wet tests or which may have changed as a result of the different operating conditions nowprevailing.

On completion of the tests on the various parts of the works the Concessionaire shall run all subject Facilities as a whole in order to demonstrate the full functionality and performance of the subject Facilities at various throughput rates for a continuous period as specified in Concession Agreement.

1.5 TrialOperations

The Trial Operations shall be used to prove the operation of the subject Facilities are in compliance with the KPIs at varying flows and with varying Influent Standards.

1) The quality of Treated Effluentproduced
2) Guaranteed EnergyConsumption

3) Quality of DigestedSludge
4) The quality of Treated Waterproduced

Raw Sewage/Faecal Sludge/Septageshall be used as the main feed stock for Trial Operations. These tests shall be carried out to demonstrate the process performance of the Facilities. In order to demonstrate this, the Concessionaire shall ensure that each part of the Facilities are loaded to rated throughput.

The following tests, inter alia, shall be carried out:

(1) Check for leaks on vessels, structures, pumps and pipework.
(2) Running of all pumped systems in order to checkfor.
    - ✓ Correctfunctionality.
    - ✓ Absence ofleaks.
    - ✓ Smoothnessofrunningandtheabsenceofunduevibrationorstress.
    - ✓ Check drive running currents where the solution pumped is different from thatpumpedduring hydraulic wet tests.
(3) Carry out calibration ofinstruments.
(4) Carry out valve operation, diversions etc. to fully hydraulically load each process element (or wherethereisarequirementtowithstandanoverload),overloadeachprocesselement.
(5) Demonstrate correct functionality of electrical, control and instrumentation systems not checked during dry or hydraulic wet tests or which may have changed as a result of the different operating conditions nowprevailing.

1.6 Trial Operation & minimum performance standards testrecord

The Concessionaire shall maintain two copies of Trial Operation test reports for documentation of the following information on daily basis.

- Print outs of data logs from SCADAsystem.
- Samples collected for assessment the quality of TreatedEffluent
- Samples collected for assessment the quality of TreatedWater
- Electricityconsumption.
- Stabilized Digested Sludgecharacteristics

Log sheets required for noting down readings / results of various tests shall be prepared.

PART D
Specifications for Operation and Maintenance

Part D : Specifications for Operation and Maintenance

1.1. General

The Facilities and Associated Infrastructure shall run 24 hours every day and 365 days each year continuously under normal operation.

1.2. The O&M manual

The Concessionaire shall submit an O&M Manual as per the Concession Agreement before COD. The O&M of the Facilities and Associated Infrastructure shall be done as per the approved O&M Manual, any approved updations to it as agreed by the Executing Agency and the EHS Plan.

1.3. Guidelines of operations

1.3.1. Inventory control

Throughout the O&M Period, the Concessionaire shall provide and maintain tools and spare parts in accordance with the Concession Agreement.

The current stock levels shall be updated on-line by monitoring signals of the SCADA system (e.g. level of chemical tanks). All delivery of spare parts and consumables shall be recorded as appropriate.

The Concessionaire shall carry out inventory checks every six months. The inventory checks shall be scheduled to avoid disturbance to the O&M.

1.3.2. Chemicals, Dangerous Goods and Hazardous Materials

The Concessionaire shall provide and maintain storage of chemicals, dangerous goods and hazardous materials required for the O&M. Dangerous goods include any of the goods or substances to which the Dangerous Goods Ordinance applies.

1.4. Guidelines for Maintenance

The Concessionaire shall carry out corrective and preventive maintenance of the Facilities and Associated Infrastructure in accordance with the Design and Drawings, O&M Manual, Scheduled Maintenance Programme and EHS Plan to ensure the facilities and equipment perform to the specific standards.

The maintenance of all civil structures shall be done for a period of 15 years as per the frequency as per CPWD maintenance manual 2012 as approved by Executing Agency.

1.5. Maintenance Management

A Computerized Maintenance Management System (CMMS) shall include functions for the creation and upkeep of work orders and maintenance records. The database shall include the following information:

- Preventive maintenance programmes of systems, equipment, building and infrastructure of the Facility, which are used to generate work orders for preventive maintenance automatically;
- Logs of system or equipment fault / breakdown and automatic generation of work orders for corrective maintenance;
- Date of inspection / maintenance (preventive or corrective) carried out;
- Names and positions of Concessionaire's staff carried out the inspection / maintenance;
- Logs of manual alterations of any operations records, etc;
- Details of inspection / maintenance carried out including:
  - Causes of maintenance
  - Maintenance procedures
  - Special gears / equipment used
  - Spare parts used
  - Equipment / parts replaced
  - Any follow-up actions / recommendations (e.g. change of operational procedures, etc.)

The CMMS shall have functions to organise, sort and filter the maintenance records in the database as required and perform statistical analysis and generate reports for performance monitoring. The CMMS database shall be archived on a monthly basis. One electronic copy of the entire database shall be stored on the Site for retrieval as necessary.

1.5.1. Calibration of Instruments and Measuring Equipment

The Concessionaire shall maintain accuracy and reliability of all measurement facilities throughout the O&M Period to enable correct and effective monitoring and control of the Facilities and Associated Infrastructure.

The Concessionaire shall be responsible for the calibration and re-calibration as necessary of all measurement facilities. All calibration work shall be carried out so as not to delay or disrupt the

O&M. Calibration frequency shall not be less than that recommended by the manufacturers of the instruments or measuring equipment and in any case no longer than 12-month intervals.

1.5.2. Tools and Spare Parts

During the O&M Period, the Concessionaire shall provide and maintain tools and spare parts in accordance with the Concession Agreement.

The storage of special tools and inventory of spare parts shall be recorded and monitored.

At the expiry of the O&M Period, the Concessionaire shall handover to the Executing Agency all special tools and spare parts in accordance with the Concession Agreement. The stock level of spare parts shall be sufficient for 1 year operation from the end of the Concession Term.

1.6. Records and Reporting

1.6.1. Archiving of SCADA and CMMS Data

The Concessionaire shall maintain all operation and maintenance records, including SCADA, throughout the O&M Period in a safe and secure manner. Any amendment to the records shall only be made in accordance with proper checking and authorization procedures, which shall be included as part of the O&M Manual.

The Project Engineer shall be allowed to check the above mentioned data and records described at any time.

As far as possible, all records shall be kept electronically utilizing the Concessionaire's computer facilities with backup security. If the computer facilities fail, then appropriate paper records shall be produced and filed.

1.6.2. Site Diary

The Concessionaire shall maintain a Site Diary which shall include, as a minimum, the following information on a daily basis:

- Date and weather;
- Operation hours;
- Labour on the Site;
- Flow and quality records of influent and effluent;
- Disposal records of treatment by-products;
- Accidents and incidents;

- Instructions to the Concessionaire;
- Comments by the Concessionaire;
- Complaints received and action taken;
- Authorized visitors to the Site; and

The Site Diary shall be checked and signed by authorized personnel of the Concessionaire in accordance with the O&M Manual.

The Concessionaire shall keep appropriate records of all personnel employed at the Site. These records shall be available for inspection by the Project Engineer at any time.

1.6.3. Safety and Health Records

The Concessionaire shall keep records on all safety and health matters as per the requirements of the Concession Agreement, O&M Plan and the EHS Plan and update such records daily for inspection by the Project Engineer.

1.6.4. Daily report

The Concessionaire shall provide details in the form of daily reports, of operational data and information in relation to the O&M of the Facilities to the Executing Agency in a systematic and concise manner, which shall include the following. The frequency of testing must as per the Table:Testing Methodology and Frequency

- Availability of the Facilities
- Characteristics of the Treated Effluent and deviations from the KPIs, if any
- Characteristics of the Digested Sludge and deviations from the KPIs, if any

1.6.5. Monthly Report

The Concessionaire shall provide details in the form of monthly reports, of operational data and information in relation to the O&M of the Facilities to the Executing Agency in a systematic and concise manner. Monthly reports shall be submitted to the Executing Agency by the 7th day of the subsequent month and shall include the following:

- Availability of the Facilities
- Characteristics of the Treated Effluent and deviations from the KPIs, if any
- Characteristics of the Digested Sludge and deviations from the KPIs, if any
- Summary of energy consumption (fuel and electricity) of the Facility;
- Quantities of chemicals, reagents, fuel and spare parts consumed;
- Stock level of chemicals, reagents, fuel and spare parts;

- Programme showing the scheduled maintenance (including planned and ongoing) work in the following month.

1.6.6. Quarterly Report

The Concessionaire shall provide details in the form of monthly reports, of operational data and information in relation to the O&M of the Facilities to the Executing Agency in a systematic and concise manner. Quarterly reports shall be submitted to the Executing Agency within 7 days of end of a quarter and shall include the following:

- Availability of the Facilities
- Characteristics of the Treated Effluent and deviations from the KPIs, if any
- Characteristics of the Digested Sludge and deviations from the KPIs, if any
- Summary of energy consumption (fuel and electricity) of the Facility;
- Quantities of chemicals, reagents, fuel and spare parts consumed;
- Stock level of chemicals, reagents, fuel and spare parts;

Programme showing the scheduled maintenance (including planned and ongoing) work in the following quarter.

1.6.7. Annual Report

The Concessionaire shall submit Annual Reports to the Executing Agency within 30 days of end of the year and the report shall include the following:

- Summaries of quantities and characteristics of Sewage/Faecal Sludge/Septage received and treated at the STP(s)/FSTP(s) during the reporting year;
- Overall performance of theSTP(s)/FSTP(s) with highlights on non-compliance with KPIs as reported in each quarter;
- Summary of expiry dates for licences, permits and certificates for the O&M;
- Summary of major equipment breakdown, repair, overhaul, renewal, replacement, modification, performance tests, condition surveys carried out;
- Summary of incidents related to safety and health, environmental issues, security and complaints;
- Scheduled maintenance, overhaul, renewal, replacement, modification of major plant and equipment, Performance Tests and Condition Surveys in the forthcoming 12 months;
- List of Changes ordered by the Executing Agency, with details and status;

1.6.8. Monthly Environmental Monitoring Report

The Concessionaire shall submit Monthly Environmental Monitoring Reports to the Executing Agency providing overview of compliance with EHS Plan.

1.6.9. Testing Methodology and Frequency

The raw sewage/faecal sludge/septage and treated effluent shall be tested and checked for compliance with KPIs as defined below.

Parameterstobemeasured	Frequency	Methodology
Raw sewage/faecal sludge/septage and treated effluent (pH ,TOC based BOD & COD,TSS, TP, TN and Residual Chloride)	It should be every 2 hours	Analysing the average of periodical values at every 5 minutes (configurable) and status data by exception of respective online instruments/analyzers
Raw sewage/faecal sludge/septage and treated effluent (pH ,BOD,TSS,COD,TP, TN and Fecal Coliform)	Onecompositesa mpleaday	24-hourcomposite becollectedandanalysed.Thesesamplesshall bestoredina refrigeratoratatemperaturebetween1°Cand4°C.The sampleshall notbeallowedtofreeze.
Raw sewage/faecal sludge/septage and treated effluent (pH ,BOD,TSS,COD, TP, TN and Fecal Coliform)	One Composite sample of a day every month	ThesampleshallbetestedinNationalAccreditationBo ardforTestingandCalibrationLaboratories(NABL)a ccreditedlaboratoryrecognisedbyCPCBandSPCB.
Digested/dewateredSludge		
OutletConcentrationofdewatered sludge, and volatile suspended solids	Attime ofdisposal	Seven samples of sludge shall be collected at the time of disposal and analyzed for Outlet concentration of dewatered sludge , and volatile suspended solids,. The geometric mean of the Outlet concentration of dewatered sludge, and volatile suspended solidsof these seven samples shall not exceed the prescribed standards/ limits as mentioned in the KPI.
Fecalcoliform, Salmonella, viruses and helminth egg	Attime ofdisposal	Sevensamples ofsludgeshallbecollectedatthetimeofdisposalandan alyzedfor faecalcoliforms.The geometricmean of the thesesevensamplesshall notexceedthefecalcoliformlimits.
OutletConcentrationofdewatered	Oncein month	TheOutlet Concentration ofdewateredsludge,

Parameterstobemeasured	Frequency	Methodology
sludge,Fecalcoliform,Salmonell a, viruses ,helminth eggand volatile suspended solids.		volatile suspended solids, andfecalcoliformofanyonesampleeverymonthshall betestedinNationalAccreditationBoardforTestinga ndCalibrationLaboratories(NABL)accreditedlabor atoryrecognisedbyCPCBandSPCB

1.6.10. Staffing

For all operation and maintenance works, the Concessionaire shall provide skilled staff which has adequate qualifications and sufficient experience of similar works.

The Concessionaire shall appoint an overall Facilities Manager to be responsible for managing the Operation of the Facilities. The detailed staffing schedule shall be approved by Executing Agency. No staff / labour below the age of 18 years shall be employed. The Concessionaire shall make appropriate arrangements for maintenance of items like road work, buildings, horticulture, patrolling and maintenance of civil structures, vehicle operations and other activities defined to fulfill its obligations under O&M Contract.

PART E

Electrical Load List

Part E : Electrical Load List

List of Electrical Drives

This information requested for each proposed STP(s)/FSTP(s), and PS and LS is to consider the Bidders load calculations for Transformer Sizing Calculation and for communication to the Electricity Board and for assessment of Emergency Load requirement. The Bidders shall include any particular additional equipment anticipated for the running of the facilities. The bidders shall fill in the requisite information as per the technology considered.

Sl. No.	*DESCRIPTION*	*QTY.*	*W*	*S*	*q = flow capacity (m^3/h)*	*h = differential head (m)*	*$Ph = q \rho g h / (3.6\ 10^6)$* *g = gravity (9.81 m/s^2) ρ = density of fluid (kg/m3)*	*η = pump efficiency*	*$P_S = Ph / \eta$* *P_S = shaft power (kW)*	*Motor efficiency*	*motor KW*	*KW of the Motor with relevant margin in case of raw sewage/faecal sludge/septagepumps with 25% over shaft power)*	*KW of Motor / Unit selected (each)*	*Type of feeder*	*V*	*DUTY HOURS*	*Total KW*	*Total energy consumption per day, kWH*	*LOAD FACTOR*	*corrected P.F.*	*KW ABSRBED*	*KVA INPUT*
	STP/FSTP																					
1.	Fine Screens																					
2.	Conveyor System																					
3.	Vortex Grit Mechanism																					
4.	Primary Clarifier Mechanism																					
5.	Primary Sludge Pumps																					
6.	Scum pumps																					
7.	Mixers in Anoxic Tank																					
8.	Air Blowers																					
9.	EOT for Blowers																					
10.	Secondary Clarifier Mechanism																					
11.	Return Activated Sludge Pumps																					
12.	Waste Activated Sludge																					
13.	Decanters (If SBR provided)																					

Sl. No.	*DESCRIPTION*	*QTY.*	*W*	*S*	*q = flow capacity (m^3/h)*	*h = differential head (m)*	*$Ph = q \rho g h / (3.6\ 10^6)$* *g = gravity (9.81 m/s^2) ρ = density of fluid (kg/m3)*	*η = pump efficiency*	*$Ps = Ph / \eta$* *Ps = shaft power (kW)*	*Motor efficiency*	*motor KW*	*KW of the Motor with relevant margin in case of raw sewage/faecal sludge/septagepumps with 25% over shaft power)*	*KW of Motor / Unit selected (each)*	*Type of feeder*	*V*	*DUTY HOURS*	*Total KW*	*Total energy consumption per day, kWH*	*LOAD FACTOR*	*corrected P.F.*	*KW ABSRBED*	*KVA INPUT*
14.	Motorized Gates																				
15.	Thickened Sludge Pumps																				
16.	Dilution Water Pumps																				
17.	Digester Feed Pumps																				
18.	Digester Mixers																				
19.	Air Compressor																				
20.	Biogas Scrubber																				
21.	Dewatering equipment Feed Pumps																				
22.	Dewatering equipment																				
23.	Poly dosing Agitator																				
24.	Poly dosing Pumps																				
25.	Centrate return Pumps																				
26.	Plant Water Pumps																				
27.	Analytical Instruments																				
28.	Lighting and Miscellaneous Works																				
29.	Any other equipment anticipated by bidders																				

SCHEDULE 13: TERMINATION COMPENSATION

In case of termination of the Agreement for a Concessionaire Event of Default, the Capex Annuity payable as termination compensation under Clause 18.1(b), Clause 18.2(b) and Clause 18.3(b) will be in accordance with the table below:

Termination in Year post relevant COD	% of Capex Annuity
1	65
2	65
3	65
4	70
5	70
6	70
7	75
8	75
9	75
10	80
11	80
12	80
13	85
14	85
15	85

Schedule-14
SITE LAYOUT

[map/layout/google image of the site to be inserted here]

SCHEDULE 15: LIST OF DRAWINGS

S.No.	Content
1.	***[please add the relevant drawings related to the project – zonal plan, city maps, site layout, discharge point, indicative drawing for pumping station (if any)etc.]***

(Note: All drawings provided are indicative only)

NITI Aayog

National Institution for Transforming India

Government of India

Selection of Concessionaire

for

Integrated Development and Operation of Sewage Treatment Plants and Faecal Sludge Management System

under

Hybrid Annuity Model

of

Public-Private Partnership

Request for Proposals

[Name of the Executing Agency]

[Month, 20]**

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DISCLAIMER

The information contained in this RFP or any other information provided to the Bidders, whether verbally or in writing or in any other form, by or on behalf of the [EXECUTING AGENCY] or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY)[1] and its employees or advisors is provided to the Bidders on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

This RFP is not an agreement and further it is neither an offer nor an invitation by the [EXECUTING AGENCY] to the Bidders or any other Person. The purpose of this RFP is to provide the Bidders with information that may be useful to them in the preparation and submission of their Bids.

This RFP includes statements which reflect various assumptions and assessments arrived at by the [EXECUTING AGENCY], (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and their advisors for the Project. Such assumptions, assessments and statements do not purport to contain all the information that the Bidders may require. The information contained in this RFP may not be appropriate for all Persons and it is not possible for the [EXECUTING AGENCY], (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and their employees or advisors to consider the investment objectives, financial situation and particular needs of each Person who reads this RFP. The assumptions, assessments, statements and information contained in this RFP may not be complete, accurate, adequate or correct. Each Bidder should therefore conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP.

The information provided in this RFP to the Bidders is on a wide range of matters, some of which may depend upon interpretation of the law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of the law. The [EXECUTING AGENCY], (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and their employees and advisors accept no responsibility for the accuracy or otherwise for any interpretation or opinion on laws expressed in this RFP.

The issue of this RFP does not imply that the [EXECUTING AGENCY] is bound to qualify any Bidder or to award the Project to any Bidder. The [EXECUTING AGENCY] reserves the right to reject all or any of the Bids without assigning any reasons whatsoever.

[1] Delete if not applicable.

GLOSSARY

In this RFP, unless the context otherwise requires, capitalised terms shall have the meaning given to them in the table below. Capitalised terms not defined below shall have the meaning given to them in the Concession Agreement.

Acre	means a unit of land area equal to 43,560 sq.ft.
Addendum or Addenda	means an addendum or addenda to this RFP.
Additional Performance Security	means a performance security that must be submitted by the Selected Bidder to [EXECUTING AGENCY] together with the Performance Security and ESHS Performance Security to secure the obligations of the Concessionaire/Bidder in relation to the *clause 16.5 of the RFP document.*
Annexure	means an annexure to this RFP.
Appointed Date	means the date of signing of the Concession Agreement.
Associate	means, in relation to a Bidder or a Member of a Consortium, a Person who Controls, or is Controlled by/ with such Bidder or Member of a Consortium.
Associated Infrastructure	means infrastructure facilities associated with operation of an STP and/or FSTP including but not limited to sewage pumping stations (including main pumping stations, intermediate pumping stations and any other pumping stations) and the rising mains, as described in greater details in technical specifications of each STP /FSTP in relevant Facility Schedule, which need to be constructed and/or renovated and/or operated and maintained by the Concessionaire in accordance with this Agreement, and complete such infrastructure as lighting, ancillary infrastructure, other functional building such as administrative building, etc. if any.
[EXECUTING AGENCY]	Refers to the ***EXECUTING AGENCY***, i.e., [EXECUTING AGENCY]

Average Guaranteed Energy Consumption	has the meaning ascribed to it in Clause 2.5
[Bank][2]	means [the International Bank for Reconstruction and Development (**IBRD**)/ International Development Association (**IDA**)]
Bid	means a bid consisting of the Qualification Proposal and the Financial Proposal submitted by a Bidder for qualification and award of the Project, and **Bids** mean collectively, all the bids for the Project.
Bid Due Date	means the last date for submission of the Bids specified in the Bid Schedule, as may be extended from time to time in accordance with Clause 19.
Bid Price Sheet	means the sheet provided on the e-Procurement Portal, in which the Bidders shall quote for the [LOCATION] STP and/or FSTP and its Associated Infrastructure, the: (a) Bid Project Cost (including all Taxes); (b) [LOCATION] Facilities O&M Charges for the first month after COD for the STP and the Associated Infrastructure (including all Taxes); (c) Guaranteed Energy Consumption for the O&M Period for the STP and for the Associated infrastructures; and (d) [LOCATION] Facilities Land Requirement, as required based on which the Bid Price will be calculated.
Bid Process	means the single-stage bidding process, with two sub-stages, undertaken by [EXECUTING AGENCY] to award the Project to the Selected Bidder on the terms and conditions set out in this RFP. The Bid Process has commenced with the issuance of this RFP and will end on the date that the Concession Agreement is executed with the Special Purpose Vehicle incorporated by the Selected Bidder for the Project.
Bid Project Cost	means the cost of construction of the [LOCATION] Facilities, any power plant proposed to be set up by the Bidder, as quoted

[2] For Bank Funded Projects

	by a Bidder in its Bid, which must include the interest during construction, Taxes and all other pre-operative expenses in relation to the [LOCATION] Facilities and the power plant, if any.
Bid Schedule	means the schedule of the Bid Process set out in Clause 2.14, as may be amended from time to time.
Bid Security	means a bid security that must be submitted by a Bidder along with its Bid in accordance with Clause 15.
Bidder	means an interested entity or a Consortium of entities as described in Clause 3.1(a) which submits a Bid to [EXECUTING AGENCY] in accordance with this RFP and includes each Member when the Bidder is a Consortium, and **Bidders** shall be construed accordingly.
BOD	means biochemical oxygen demand.
Capital	means, in respect of the SPV that is incorporated by the Selected Bidder to act as the Concessionaire, the total capital of such SPV that will be raised by the issuance of equity shares, preference shares and convertible instruments.
Clause	means a clause of this RFP.
COD Certificate	means the certificate issued or deemed to be issued by [EXECUTING AGENCY] upon successful completion of the Trial Operations of the [LOCATION] Facilities, in accordance with the Concession Agreement.
Commercial Operations Date or COD	means the date on which the COD Certificate is issued or deemed to be issued to the Concessionaire in accordance with the Concession Agreement.
Companies Act	means the (Indian) Companies Act, 1956 or the (Indian) Companies Act, 2013, as amended from time to time, as the context may require.
Company	means a company incorporated under the Companies Act or a foreign company incorporated under the relevant statute of its

	jurisdiction.
Concession Agreement	means the tripartite concession agreement to be executed between (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) , [EXECUTING AGENCY] and the Concessionaire. A draft of the Concession Agreement is attached to this RFP.
Concessionaire	means the Special Purpose Vehicle incorporated by the Selected Bidder to implement the Project.
Conflict of Interest	has the meaning ascribed to it in Clause 3.3.
Consortium	means any combination of Companies that have formed a consortium for the purpose of submitting a Bid and to implement the Project if such consortium is declared the Selected Bidder.
Construction Completion Date	means, with respect to the [LOCATION] Facility, the date on which the Construction Completion Certificate is issued or deemed to be issued to the Concessionaire and with respect to [LOCATION] Facility in accordance with the Concession Agreement and the reference to **Construction Completion Date** shall be construed accordingly.
Construction Period	means the period from the Effective Date until the Construction Completion Date.
Control	means, with respect to a Person: (a) the ownership, directly or indirectly, of more than 50% of the voting shares of such Person; or (b) the power, directly or indirectly, to direct or influence the management and policies of such Person by operation of law, contract or otherwise, and the term **Controlled and Controlling** shall be construed accordingly.
Effective Date	means the date on which all the Conditions Precedent have been satisfied by [EXECUTING AGENCY], (NAME OF THE

	STATE /NATIONAL LEVEL AGENCY IF ANY) , and the Concessionaire in accordance with the Concession Agreement.
Eligibility Criteria	means the eligibility criteria set out in Clause 3 that a Bidder is required to satisfy (in addition to the Qualification Criteria), to be qualified for evaluation of the Financial Proposal.
e-Procurement Portal	means the e-procurement portal of the Go*[xx]* available at the following url: https://etender.up.nic.in
ESHS	means environment, social, health and safety.
ESHS Performance Security	means [LOCATION] Facility's ESHS Performance Security and the term '**ESHS Performance Securities**' shall mean collectively, the ESHS Performance Security of all [LOCATION] Facilities combined.
EXECUTING AGENCY	means the [EXECUTING AGENCY], a statutory body constituted under the [Reference of the Act]
Expiry Date	means the date which is 15 years from the COD
FSTP	Faecal Sludge Treatment Plant
[LOCATION] Facilities	means collectively, the [LOCATION] STP and/or FSTP, the online monitoring system for the STP/FSTP and SPS, the on-site testing laboratory facilities, and such other facilities associated with the [LOCATION] STP, and its Associated Infrastructure, or under any schedule, required to be set up by the Concessionaire, as described in greater detail in the Scope of Work and Technical Specifications.
[LOCATION] Facilities Bid Price	means the price calculated for each Bidder, based on the values provided by such Bidder in the Bid Price Sheet, as a part of its Financial Proposal, to design, finance, develop, construct, operate, and maintain the [LOCATION] Facilities
[LOCATION] Facilities Capex Annuity	means the amount to be specified in the Concession Agreement, which is payable to the Concessionaire per quarter during the O&M Period, towards reimbursement of 60% of the *[LOCATION] Facility's* Bid Project Cost, as adjusted to

	account for inflation in accordance with the Concession Agreement.
[LOCATION] ***Facilities*** **Construction Completion Certificate**	means the certificate issued to the Concessionaire to certify completion of construction of the *[LOCATION]* Facilities in accordance with the Concession Agreement.
[LOCATION] ***Facilities*** **ESHS Performance Security**	means a demand bank guarantee that must be submitted by the Selected Bidder or the Concessionaire to [EXECUTING AGENCY], in accordance with Clause 16A, on or before execution of the Concession Agreement to secure the obligations of the Concessionaire to comply with the ESHS requirements in relation to the ***[LOCATION]*** Facilities, as set out in the Concession Agreement.
[LOCATION] ***Facilities*** **Land Price**	means the price of the land required by the Bidder to develop the [LOCATION] Facilities, determined by multiplying the [LOCATION] Facilities Land Requirement quoted by such Bidder and the [LOCATION] Facilities Land Rate.
[LOCATION] Facilities **Land Rate**	means the cost per Acre of the land forming the *[LOCATION] Facilities Site*, which, for the purpose of this RFP shall be INR *[MENTION LAND RATE]*.
[LOCATION] ***Facilities*** **Land Requirement**	means the area required by the Selected Bidder at the Site to construct, operate and maintain the [LOCATION] STP and/or FSTP and other assets to be created at the STP site by the Concessionaire as per the scope of work.
[LOCATION] Facilities **O&M Charges**	means the amount required by a Bidder per quarter (including all Taxes) to operate and maintain the *[LOCATION]* Facilities, excluding the *[LOCATION] Facilities* Power Charges, during the O&M Period. The *[LOCATION] Facilities* O&M Charges for the first quarter after the COD will be determined on the basis of the O&M Charges quoted by the Bidder for the first month from the COD, in its Financial Proposal, which amount shall be adjusted to account for inflation, in accordance with the Concession Agreement.

***[LOCATION] Facilities* Payment Milestones**	means the milestones listed in the Concession Agreement for release of 40% of the *[LOCATION] Facilities* Bid Project Cost (as adjusted to account for inflation in accordance with the Concession Agreement) to the Concessionaire.
***[LOCATION] Facilities* Power Charges**	means the cost of the power consumed by the Concessionaire to operate and maintain the *[LOCATION]* Facilities during the O&M Period, which will be calculated in accordance with the Concession Agreement. For the purpose of evaluation of Bids, the '***[LOCATION] Facilities* Power Charges**' means the cost of power (for operation and maintenance of the *[LOCATION]* Facilities) for each Bidder determined in accordance with the formula set out in the Bid Price Sheet.
***[LOCATION]* STP /FSTP**	means the STP of [CAPACITY OF STP in MLD] MLD and/or FSTP of [CAPACITY in cubic meter] to be set up as part of the Project.
Financial Capacity	means the financial capacity and strength of the Bidder, as determined in accordance with Clause 4.2.
Financial Proposal	means the financial proposal, comprising the Bid Price Sheet, to be submitted by a Bidder in accordance with this RFP.
Financial Year	means each 12-month period commencing on 1 April of one calendar year and ending on 31 March of the next calendar year; and if different for a Bidder, then the 12-month period for which such Bidder files its statutory audited accounts in the normal course of its business.
GoI	means the Government of India.
Go[xx]	means the Government of [xx]
Guaranteed Energy Consumption	means the maximum number of units of power quoted by a Bidder in its Financial Proposal, which it expects the Concessionaire to consume during the O&M Period (other than any units expected to be generated and consumed from any power plant proposed to be set up by the Concessionaire),

	to operate and maintain the *[LOCATION]* Facilities (at varying volumes and BOD of sewage).
Guidelines	has the meaning ascribed to it in Clause 1.8
Information Memorandum	means the Project Information Memorandum for the Project set out in Schedules.
Joint Bidding Agreement	means a binding joint bidding agreement to be entered into by the Members of a Consortium that submits a Bid pursuant to this RFP, in the format set out at Annexure 1K.
Lead Member	means the Member nominated by the Members of the Selected Bidder to act as the lead member.
LOA	means the letter of award that will be issued by [EXECUTING AGENCY] to the Selected Bidder in accordance with Clause 30.
Member	means a member of a Consortium.
MLD	means million litres per day.
Mo-------	means the Ministry of ----------[3]
Net Worth	means the net worth of a Bidder, which shall be determined as follows, in case of a: (a) ***Company**, means* (i) subscribed and paid up equity share capital; and (ii) reserves LESS (i) revaluation reserves; (ii) miscellaneous expenditure not written off; (iii) reserves not available for distribution to equity shareholders; and (iv) aggregate value of accumulated losses (b) ***trust** or **society**, means the sum of available corpus*

[3] If applicable.

	and reserves; (c) ***partnership firm***, means the sum of the partners' capital account and undistributed profits; (d) ***limited liability partnership***, means the sum of partners' capital account and undistributed profits as per the 'Statement of Account' prepared as per Limited Liability Partnership Rules, 2009; (e) ***sole proprietorship***, means the value of all assets minus liabilities of the proprietorship but does not include the personal assets or liabilities of the sole proprietor; and (f) ***individual***, means the sum of the value of all unencumbered assets owned by the individual minus the sum of the value of all liabilities of the individual.
[Sponsoring/Funding entity][4]	means the (Name of the state /national level agency if any)[5].
Nominated STP Sub-Contractor	means a sub-contractor nominated by the Bidder, in accordance with Clause 4.1(a)(F)(ii) and 4.1(b)(ii) of this RFP, for construction and operation and maintenance of STPs for the Project.
O&M	means operation and maintenance.
O&M Period	means the period of 15 years from the COD during which the Concessionaire is required to operate and maintain the [LOCATION] Facilities.
Performance Security	means a performance security that must be submitted by the Selected Bidder or the Concessionaire to [EXECUTING AGENCY] on or before execution of the Concession Agreement to secure the obligations of the Concessionaire in relation to the [LOCATION] Facilities during the Construction Period in accordance with Clause 16.

[4] If there is a State Level/National Level intermediate agency funding the project and such an entity is part of the contract/procurement process the name of that agency can be inserted here. Otherwise all references to the National/State Level agency in the document are to be deleted.

[5] Delete if not applicable. In such a case the concession agreement will be bipartite.

Person	means any [individual,] company, corporation, partnership, joint venture, trust, society, sole proprietor, limited liability partnership, co-operative society, government company, unincorporated organization or any other legal entity.
Power Unit Rate	means the cost per unit of power drawn from the grid (through the relevant distribution licensee for the Site), which for the purpose of evaluation of the Financial Proposals is INR *7.47* (Seven Rupees and Forty-Seven paise) per kWh. For the purpose of reimbursement of Power Charges to the Concessionaire during the O&M Period, the Concessionaire will be paid on the basis of the then prevailing cost per unit of power charged by the relevant distribution licensee and/or the cost of fuel for any power consumed from any diesel generator back-up sets, installed by the Concessionaire.
PPP	means public private partnership.
Pre-Bid Meeting	means the meeting to be held in accordance with Clause 8.2.
Preferred Bidder	means the Bidder which: (a) meets the Qualification Criteria and the Eligibility Criteria; and (b) quotes the lowest [LOCATION] Facilities Bid Price.
Project	means the design, development, finance, construction, operation and maintenance of the [LOCATION] Facilities at the Site in accordance with the Concession Agreement.
Project Engineer	means the engineering firm appointed by (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) for the Project, in accordance with the Concession Agreement.
Public Financial Institution	means a Public Financial Institution referred to in the Companies Act 2013 and/or as regulated by the Reserve Bank of India.
Qualification Criteria	means the qualification criteria set out in Clause 4 that a Bidder is required to satisfy (in addition to the Eligibility Criteria), to be qualified for evaluation of the Financial Proposal.

Qualification Proposal	means the proposal to be submitted by each Bidder to demonstrate that it meets the Eligibility Criteria and the Qualification Criteria as set out in Clause 3 and Clause 4.
RFP	means this request for proposal dated [DATE] along with its Schedules and Annexures and includes any Addenda, if issued.
Rupee(s) or INR or Rs	means Indian National Rupees, the lawful currency of Republic of India.
Schedule	means a schedule of this RFP.
Scheduled Bank	means a bank as defined under section 2(e) of the Reserve Bank of India Act, 1934.
Scheduled Construction Completion Date	means the date which is 21 months from the Effective Date.
Scope of Work	means the scope of work for construction and O&M of the [LOCATION] Facilities as set out in the Concession Agreement.
Second Preferred Bidder	means the Bidder who: (a) meets the Qualification Criteria and the Eligibility Criteria; and (b) quotes the second lowest [LOCATION] Facilities Bid Price.
Section	means a section of this RFP.
Selected Bidder	means the eligible Bidder selected by [EXECUTING AGENCY] for award of the Project.
Site	(or the [LOCATION] Facilities Site) means the location for the *[LOCATION]* Facilities, admeasuring [AREA AVAILABLE FOR STP FACILITIES] in *[LOCATION]*, as set out in more detail in the [LOCATION] Project Information Memorandum provided.
SPV or Special Purpose Vehicle	means a company incorporated under the Companies Act by the Selected Bidder to carry out the obligations of the Concessionaire under the Concession Agreement.

STP	means a sewage treatment plant.
Sub-Contractor Undertaking	means an irrevocable and duly notarized undertaking to be submitted by the Nominated STP Sub-Contractor on a stamp paper, to meet the Technical Criteria defined in Clause 4.1(a)(B), 4.1(a)(F)(ii) and 4.1(b)(ii) of this RFP, in the format set out at Annexure 1M.
Supporting Infrastructure	means the supporting infrastructure facilities required for the operation of the [LOCATION] Facilities, which will be provided, operated and maintained by [EXECUTING AGENCY] during the term of the Concession Agreement.
Taxes	means all taxes, levies, imposts, cesses, duties and other forms of taxation, including (but without limitation) income tax, goods and services tax, corporation profits tax, advance corporation tax, capital gains tax, residential and property tax, customs and other import and export duties, stamp duty or capital duty, and any interest, surcharge, penalty or fine in connection therewith which may be payable by the Concessionaire.
Technical Capacity	means the technical capacity and experience of a Bidder, as determined in accordance with Clause 4.1.
Technical Specifications	means the technical specifications for design, construction, operation and maintenance of the [LOCATION] Facilities, which the Concessionaire and/or its subcontractors must comply with, as set out in the Concession Agreement.
Technology Agreement	means a binding agreement to be entered into between the proposed technology provider and the Bidder that submits a Bid pursuant to this RFP, to meet the technology requirement to be adopted for the proposed STP and/or FSTP in this Project as defined in Clause 4.1(a)(F)(ix) of this RFP.
Technology Performance Security	means additional performance security that shall be submitted by the technology provider, which has been named by the Selected Bidder as part of the bid, to the [EXECUTING AGENCY] to secure the obligations of the technology

	provider in relation to the Clause 16.6 of this RFP document.
Trial Operations	means the operation of the [LOCATION] Facilities on a trial basis for 3 months post the Construction Completion Date in accordance with the Concession Agreement.

SECTION I
INTRODUCTION

1. BACKGROUND

1.1 ----------(**Brief about the genesis of the project).**

1.2 The Government of India has received loan (Loan number: IBRD-_____) and credit (Credit number: IDA – ----) (hereafter jointly or separately called "loan") from the International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA) (hereafter interchangeably called "the Bank") of the U.S. dollar amount one Billion under the ----------(Name of the loan). The loan will be used in various currencies toward the cost of the Project ----------(name of the project/scheme). The Borrower intends to apply a portion of the proceeds of this loan to eligible payments under the contract for which this RFP is issued.[6]

1.3 The [EXECUTING AGENCY] ([EXECUTING AGENCY]), hereinafter referred to as the [EXECUTING AGENCY], is a statutory body constituted under _____, and has the power to _____. With a view to implement the ----------(Name of the project/scheme), the [EXECUTING AGENCY] in association with the (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) , has decided to undertake the development, operation and maintenance of STP and/or FSTP, with a proposed capacity of [STP CAPACITY IN MLD] STP and their Associated Infrastructure at *[LOCATION]*, on a PPP basis, through a hybrid annuity model. While the [EXECUTING AGENCY] will be the principal executing agency and bidding authority for the Project, (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will be responsible for making payments to the Concessionaire.

1.4 The objectives that (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and [EXECUTING AGENCY] wish to achieve through the Project are to:

(a) intercept raw sewage flowing into the (name of water body/source) and divert the raw sewage to the [LOCATION] STP[7];

(b) treatment of the raw sewage and/or septage/faecal sludge at the [LOCATION] STP;

(c) implement viable technologies and international best practices for development, operation and maintenance of the [LOCATION] Facilities; and

(d) demonstrate large scale private sector participation and mobilization of private sector investment to further the national aim of ----------(insert the aim of any).

[6] For Bank Funded Projects only. If the funding is from any other Multilateral agency this clause and reference in the definition may be suitably modified.

[7] These lines may be replaced suitably to reflect the nature of project such as I &D works or sewerage networks.

1.5 The main features of the Project are set out below:

(a) The [EXECUTING AGENCY] will provide such part of the Site as required by the Concessionaire to develop the [LOCATION] Facilities and implement the Project based on the [LOCATION] Facilities Land Requirement quoted by the Selected Bidder, free of all encumbrances and encroachments, and along with all necessary rights of way.

(b) The Concessionaire will be required to design, finance, construct and complete the [LOCATION] Facilities on or prior to the Scheduled Construction Completion Date, in accordance with the Concession Agreement.

(c) The [EXECUTING AGENCY] will provide, operate and maintain the Supporting Infrastructure for the *[LOCATION]* STP , to enable the Concessionaire to operate the *[LOCATION]* STP in accordance with the Concession Agreement.

(d) In order to meet its power consumption requirements for the *[LOCATION]* Facilities, the Concessionaire [shall/may][8] construct and operate a biogas power plant at the *[LOCATION] STP* Site, to utilise the biogas generated from the treatment of raw sewage at the *[LOCATION]* STP to produce clean energy. The Concessionaire may also set up a rooftop solar project at the *[LOCATION] STP* Site to meet its power consumption requirements.

(e) On and from the COD and until the Expiry Date, the Concessionaire will be required to operate and maintain the [LOCATION] Facilities in accordance with the Concession Agreement, such that the [LOCATION] Facilities meet the key performance indicators specified in the Concession Agreement.

(f) Upon the expiry of the O&M Period, the [LOCATION] Facilities and any power plant set up by the Concessionaire, will be transferred to the [EXECUTING AGENCY] after the rectification of any defects or deficiencies, in accordance with the Concession Agreement.

(g) The construction, operation and maintenance of the [LOCATION] Facilities must be in accordance with Applicable Laws, Applicable Permits and other requirements specified in the Concession Agreement.

(h) Prior to the Effective Date, (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will appoint a Project Engineer to assist the [EXECUTING AGENCY] in supervising the construction, operation and maintenance of the [LOCATION] Facilities. The Project Engineer shall support the [EXECUTING AGENCY] in monitoring compliance with the key performance indicators to be specified in the Concession Agreement. (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will

[8] Construction of bio gas power plant compulsory in case of STP capacity > 40 MLD

solely bear the costs of the Project Engineer.

(i) The Concessionaire shall operate the [LOCATION] Facilities at its risk for the term of the Concession Agreement.

(j) 40% of the [LOCATION] Facilities Bid Project Cost will be reimbursed to the Concessionaire during the Construction Period, which will be linked to completion and certification of the works corresponding to specified [LOCATION] Facilities Payment Milestones (refer clause 9.3 of Concession Agreement)

(k) From the COD, the [LOCATION] Facilities Capex Annuity (along with interest) and the [LOCATION] Facilities O&M Charges will be paid on a quarterly basis to the Concessionaire. Additionally, the Concessionaire will also be reimbursed on a quarterly basis for the [LOCATION] Facilities Power Charges at actuals (subject to a cap of the [LOCATION] Facilities Power Charges based on the Guaranteed Energy Consumption) for power consumed for O&M of the Facilities. If the Concessionaire consumes more power for O&M of the Facility than the Guaranteed Energy Consumption in any given quarter, it will be liable to pay damages to the [EXECUTING AGENCY] in accordance with the Concession Agreement.

(l) The (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will set up a revolving escrow account for the Project, and all Payment Milestone (linked construction payments, Capex Annuities (along with interest), [LOCATION] Facilities O&M Charges and the [LOCATION] Facilities Power Charges will be paid to the Concessionaire through this escrow account. From the Effective Date and until the Construction Completion Date, (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will ensure that the escrow account is funded with an amount equivalent to the construction payments due to the Concessionaire for the next 2 [LOCATION] Facilities Payment Milestones. From the COD and at all times thereafter until the expiry or termination of the Concession Agreement, (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) shall keep the escrow account funded with the Capex Annuities (along with interest), the [LOCATION] Facilities O&M Charges and the estimated [LOCATION] Facilities Power Charges (based on the Guaranteed Energy Consumption) for the *[LOCATION]* Facilities for the subsequent 2 years.

(m) Subject to early termination, the Concession Agreement shall be valid until the Expiry Date.

1.6 The [EXECUTING AGENCY] is now inviting interested natural persons, Companies, other private entities and State-owned entities to submit Bids to implement the Project.

1.7 The bidding will be conducted through the International Competitive Bidding (ICB) procedures specified in the World Bank's Guidelines: Procurement of Goods, Works and Non-consulting

Services under IBRD Loans and IDA Credits& Grants, January 2011, revised July 2014 (Guidelines) and is open to all Bidders from eligible source countries as defined in the Guidelines.[9]

1.8 This RFP follows the General Procurement Notice for ----------(name of the scheme/project if any) that was published on United Nations Development Business online Page 17 of 92 on March 30, 2011 and updated on January 31, 2014.[10]

1.9 The Selected Bidder is required to incorporate a Special Purpose Vehicle to implement the Project and such Special Purpose Vehicle will be required to execute the Concession Agreement with the [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) in the format attached to this RFP.

1.10 The statements and explanations contained in this RFP are intended to provide the Bidders with an understanding of the subject matter of this RFP and the Project. Such statements and explanations should not be construed or interpreted as limiting in any way or manner:

(a) the scope of the rights and obligations of the Concessionaire, which will be set out definitively in the Concession Agreement; or

(b) the [EXECUTING AGENCY]'s right to alter, amend, change, supplement or clarify the rights and obligations of the Concessionaire or the terms and conditions that will be set out in the Concession Agreement, in accordance with this RFP.

Consequently, any omissions, conflicts or contradictions between this RFP and the Concession Agreement are to be noted, interpreted and applied appropriately to give effect to this intent. (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and the [EXECUTING AGENCY] will not entertain any claims on account of such omissions, conflicts or contradictions.

2. BRIEF DESCRIPTION OF THE BID PROCESS

2.1 The [EXECUTING AGENCY] has adopted a single-stage Bid Process for declaration of the Selected Bidder for award of the Project, which is divided into 2 sub-stages.

2.2 The Bidders shall download the RFP from the e-Procurement Portal [web address for TENDER PORTAL]. A complete set of bidding documents will be available on the e-Procurement Portal in the 'Active Tenders" section and will be available only until the specified time on the Bid Due Date. The [EXECUTING AGENCY] is not responsible for the completeness of the RFP, if it is not downloaded directly from the e-Procurement Portal complete with Addenda, if issued and uploaded on the e-Procurement Portal by the bid inviting authority.

[9] For Bank Funded Projects

[10] For Bank Funded Projects

2.3 Each Bidder is required to submit a single Bid, which should consist of 2 parts: (a) the Qualification Proposal; and (b) the Financial Proposal.

2.4 **Evaluation stages**

The evaluation of the Bids will be carried out in 2 sub-stages:

(a) The first sub-stage will involve qualification of the Bidders based on the evaluation of their Qualification Proposals to determine compliance with the Eligibility Criteria and the Qualification Criteria in accordance with Clause 3 and 4. Only those Bidders who are found to meet the Eligibility Criteria and the Qualification Criteria will be qualified for the next sub-stage.

(b) The second sub-stage will involve evaluation of the Financial Proposals of those Bidders whose Qualification Proposals meet the requirements set out in Clause 3 and 4, to identify the Selected Bidder for the Project.

2.5 **Bid parameter**

Each Bidder will be required to quote in the Bid Price Sheet, for the *[LOCATION]* Facilities, the following 4 components (on the basis of net present value): (a) the [LOCATION] Facilities Bid Project Cost (including all Taxes); (b) the [LOCATION] Facilities O&M Charges for the first month after COD (including all Taxes); (c) the Guaranteed Energy Consumption for the O&M Period; and (d) the [LOCATION] Facilities Land Requirement.

For the purposes of calculation of the 'Guaranteed Energy Consumption' of the *[LOCATION]* Facilities, each Bidder will be required to quote in its Bid Price Sheet the maximum number of units of power (in kWh) per MLD which it expects the Concessionaire to consume to treat the varying volumes (expressed in MLD) and BOD of sewage and faecal sludge, as specified in the format of the Bid Price Sheet for the *[LOCATION]* Facilities. Based on the number of units of power per MLD quoted by a Bidder for the varying volumes and BOD of sewage, the average number of units (in kWh) that the Concessionaire is expected to consume per MLD of sewage and /or faecal sludge treated at the *[LOCATION]* STP will be calculated using the formula specified in the Bid Price Sheet (such average, the *[LOCATION]* **Average Guaranteed Energy Consumption**). The *[LOCATION] Facilities'* Average Guaranteed Energy Consumption will be used to calculate the *[LOCATION] Facilities* Power Charges of a Bidder in accordance with the Bid Price Sheet.

Bidder shall carefully quote the [LOCATION] Facilities Land Requirement in the Financial Proposal. No additional Land shall be ordinarily allocated to the Concessionaire beyond the quoted Land in the Financial Proposal for the Construction of the Project. However, under unavoidable circumstances and in the interest of the Project, the [EXECUTING AGENCY] based on availability, may consider allocating additional land for the construction of the Project upon the request of the Concessionaire and such allocation shall be subject to the payment of a

sum equivalent to one hundred and fifty percentage of the [LOCATION] Facilities Land Rate, for each additional acres of Land and part thereof. If the additional land requirement changes position of the Selected Bidder/Concessionaire vis a vis the Second Preferred Bidder, then the Concessionaire shall pay to [EXECUTING AGENCY], a sum of equivalent to (a) one hundred and fifty percentage of the [LOCATION] Facilities Land Rate for each additional acres of Land and part thereof; OR (b) the difference between [LOCATION] Facilities Bid Price of Second Preferred Bidder and the revised [LOCATION] Facilities Bid Price of the Selected Bidder; whichever is higher.

Based on the components quoted by the Bidders in the Bid Price Sheet for the *[LOCATION]* Facilities, the *[LOCATION] Facilities* Bid Price, will be calculated as per the formula in the Bid Price Sheet.

The only criterion for evaluation and comparison of Financial Proposals will be the [LOCATION] Facilities Bid Price.

2.6 The Bidder shall quote the [LOCATION] Facilities Bid Project Cost in INR i.e., Indian National Rupees. However, for any inputs required by the Bidder from outside India during the Construction Period, the Bidder may specify in its [Financial Proposal] the percentage of the Bid Project Cost that it would want to receive in a foreign currency. Payments for such inputs required from outside India may be quoted in up to 3 foreign currencies using RBI selling (exchange) rate prevailing 28 days prior to the Bid Due Date. It is clarified that the aggregate construction payments due to the Concessionaire during the Construction Period shall not exceed 40% of the Bid Project Cost, as quoted by the Selected Bidder in Rupees and adjusted for inflation under the Concession Agreement, on account of a percentage of the Bid Project Cost being paid to the Concessionaire in foreign currencies.[11]

2.7 Subject to Clause 7.1(e), the Preferred Bidder shall be the one which: (a) meets the Qualification Criteria and the Eligibility Criteria; and (b) quotes the lowest [LOCATION] Facilities Bid Price. Generally, the Preferred Bidder shall be the Selected Bidder for the Project. If the Preferred Bidder withdraws its Bid or is not selected for any reason, then the [EXECUTING AGENCY] may, in its discretion, select the Second Preferred Bidder as the Selected Bidder or annul the Bid Process.

2.8 Bidders are required to submit the Bid Security along with their Bids as per Clause 15. The Bidders shall provide the Bid Security in the form of a bank guarantee issued by a Scheduled Bank in India or by a foreign bank listed with the Reserve Bank of India or a guarantee issued by a Public Financial Institution, and payable at *[LOCATION]* in favour of "[EXECUTING AGENCY]" represented by the Project Manager, Urban Works Unit 2nd, in the format set out at Annexure 1I. The original Bid Security must be submitted to [EXECUTING AGENCY] at the

[11] For Bank Funded Proejcts and International Projects

address mentioned in Clause 24.11 below before the date/time of opening of the Bids (Qualification Proposals), either by registered/speed post/courier or by hand, failing which the Bid will be declared non-responsive. A scanned copy of the Bid Security must be uploaded by the Bidders on the e-Procurement Portal along with their Bids.

2.9 All Bids are required to be prepared and submitted electronically in accordance with the terms of this RFP on or before the Bid Due Date.

2.10 The Bidders may inspect the Site and carry out, at their own cost, such inspections as may be required to submit their respective Bids at any time prior to the date specified in the Bid Schedule. The [EXECUTING AGENCY] shall facilitate such site visits provided that the Bidder gives the [EXECUTING AGENCY] at least 3 days' prior written notice of its intention to visit the Site.

2.11 It will be assumed that the Bidders have accounted for all relevant factors, including technical data, status and condition of the Supporting Infrastructure, the Site conditions, climate, weather conditions, availability of power (including the requirement of any power back-up), water and other utilities for construction and/ or operations and maintenance of the [LOCATION] Facilities, access to the Site, handling and storage of materials, Applicable Laws and Applicable Permits while submitting their Bids. The Bidders will be deemed to have full knowledge of the Project, including the scope of activities required to be undertaken by the Bidders to undertake the Project.

2.12 **e-Procurement**

(a) The Bid Process will be conducted by way of e-tendering. In order to participate in the Bid Process, a Bidder must procure a digital signature certificate (class II or III) and register on the e-Procurement Portal using its digital signature. A digital signature certificate may be procured from a registered certifying authority as stipulated by Controller of Certifying Authorities, GoI.

(b) In case of a Consortium, the Bidder must register with the e-Procurement Portal in the name of the Lead Member, using the digital signature certificate issued in the name of the authorized signatory of the Lead Member.

(c) The Bidders must: (i) upload a soft copy/scanned copy of their Qualification Proposal, including a copy of the Bid Security on the e-Procurement Portal in PDF format; and (ii) populate the Bid Price Sheet provided on the e-Procurement Portal, before the specified time on the Bid Due Date. Upon submitting the Qualification Proposals and the Financial Proposals on the e-Procurement Portal, the Bidders must affix their digital signature both to the Qualification Proposals and the Financial Proposals.

(d) The Bidders are encouraged to visit the e-Procurement Portal to acquaint themselves with the process of submitting their Bids online.

(e) For the purposes of determining the cut-off time for submission of queries and Bids, the central server time displayed on the clock on the e-Procurement Portal will be followed by the Bidders and the [EXECUTING AGENCY].

2.13 Any queries or requests for additional information relating to this RFP should be submitted by the Bidder on the e-Procurement Portal on or before the specified time and date mentioned in the Bid Schedule.

2.14 [EXECUTING AGENCY] shall endeavour to adhere to the following schedule for the Bid Process:

S. No.	Event	Date/Location
1.	Issue of RFP	From [Date], through website [WEB ADDRESS] [EXECUTING AGENCY], [LOCATION]
2.	Site Visit	Up to [1 week from issue of RFP]
3.	Last date for receiving queries from Bidders	Date: [10 days from issue of RFP] Time: 16:00 hrs Email: ___
4.	Pre-Bid Meeting	Date [2 weeks from issue of RFP] time: 12:00 Hrs Location: [Address of the ***EXECUTING AGENCY***]
5.	Issue of Addendum/Revised RFP and Concession Agreement by [EXECUTING AGENCY] latest by	[2 weeks from the Pre-bid Meeting]
6.	Bid Due Date	[4 weeks from issue of Addendum]
7.	Opening of Bids (Qualification Proposals)	[within 2 days from the Bid Due Date] [Bid Opening Address]
8.	Notification of qualified Bidders	Within 7 days from the date of opening of Qualification Proposals

9.	Opening of Financial Proposals	Within 7 days from the date of notification of qualified Bidders
10.	Issue of LOA	Within 30 days from the date of opening of Financial Proposals
11.	Signing of the Concession Agreement	Within 45 days from the date of issue of LOA to the Selected Bidder

SECTION II

ELIGIBILITY AND QUALIFICATION CRITERIA

3. ELIGIBILITY OF BIDDERS

3.1 **Nature of Bidder**

(a) A Bidder may be a natural person, a Company registered under the Companies Act or an equivalent law outside India, or any other private entity or State-owned entity, acting in its individual capacity or as a Consortium. The term Bidder used in this RFP shall apply to both a single entity as well as a Consortium.

However, Bidders that are Government-owned enterprises or institutions in India may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) or [EXECUTING AGENCY].

To be eligible, a government-owned enterprise or institution shall establish to [EXECUTING AGENCY] Bank's satisfaction, through all relevant documents, including its Charter and other information [EXECUTING AGENCY] Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.

(b) Eligible Countries[12]

(i) In accordance with paragraph 1.10 of the Guidelines, the Bank permits firms and individuals from all countries to offer goods, works and services for Bank-financed projects. As an exception, firms of a country or goods manufactured in a country may be excluded if:

(A) Paragraph 1.10 (a)(i): as a matter of law or official regulation, India prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the services required under the Project; or

(B) Paragraph 1.10 (a)(ii): by an act of compliance with a decision of the

[12] For Bank Funded Projects and International Projects

United Nations Security Council taken under Chapter VII of the Charter of the United Nations, India prohibits any import of goods from that country or any payments to persons or entities in that country.

(ii) For the information of Bidders, at the present time, firms, goods and services from the following countries are excluded from this bidding:

(A) With reference to paragraph 1.10(a)(i) of the Guidelines: *none*

(B) With reference to paragraph 1.10(a)(ii) of the Guidelines: *none*

(c) If a Bidder is a Consortium, then the Consortium and its Members shall comply with the following conditions:

(i) The number of Members in such Consortium shall not exceed 3.

(ii) The Bid submitted by the Consortium should contain the required information for each Member and a brief description of the roles and responsibilities of each Member.

(iii) The Consortium will nominate one of the Members as the Lead Member. Such nomination will be supported by a power of attorney from each Member of the Consortium and will be in the format set out in Annexure 1J. The Lead Member will have the authority to represent and bind all the Members during the Bid Process.

(iv) The Members of the Consortium shall enter into a binding and enforceable Joint Bidding Agreement, in the format set out in Annexure 1K, and shall appoint one of the Members to represent the Consortium. All Members shall be jointly and severally liable for the performance of the Project till the end of the term of the Concession Agreement or till the date of exit from the Concessionaire subject to clause 3.2(b)(iii) of the RFP document, whichever is earlier. The Members will not be permitted to amend or terminate the Joint Bidding Agreement, at any time during the validity of the Bid without the prior consent of [EXECUTING AGENCY].

3.2 **Lock-in Restrictions and Change in Control**

(a) Each Bidder (whether a single entity or Consortium) is required to incorporate a Special Purpose Vehicle to implement the Project.

(b) If the Selected Bidder is a Consortium, then the Members are required to comply with the following conditions with respect to the SPV to be incorporated by the Selected Bidder to implement the Project:

(i) the Lead Member shall hold not less than 26% of the total Capital and voting rights of the Concessionaire until 3 years after the COD;

(ii) any Member, other than the Lead Member, whose Technical Capacity or Financial Capacity is being assessed for the purpose of qualification, shall hold at least 26% of the total Capital and voting rights of the Concessionaire for 3 years after the COD; and

(iii) after the expiry of 3 years from the COD, the Lead Member and/or other Members can exit the Concessionaire, subject to: (A) the Member who demonstrated the O&M experience for the purposes of qualification continuing to be part of the Concessionaire; or (B) the entity acquiring the shareholding of the Lead Member/any other Member in the Concessionaire meeting the technical qualification criteria set out in Clause 4.1 (b); or (C) the Concessionaire appointing an O&M contractor who complies with the technical qualification criteria set out in Clause 4.1 (b).

(c) If the Selected Bidder is a single entity, then:

(i) the Selected Bidder shall hold at least 51% of the total Capital and voting rights of the Concessionaire until the COD, and at least 26% of the total Capital and voting rights of the Concessionaire for 3 years after the COD; and

(ii) after the expiry of 3 years from the COD, the Selected Bidder can exit the Concessionaire, subject to: (A) the entity acquiring the shareholding of the Selected Bidder in the Concessionaire meeting the technical qualification criteria set out in Clause 4.1 (b); or (B) the Concessionaire appointing an O&M contractor who complies with the technical qualification criteria set out in Clause 4.1 (b).

(d) If, post submission of the Bid, any Associate and/ or Nominated STP Sub-Contractor, whose credentials have been taken into consideration for determining Technical Capacity and/or Financial Capacity, ceases or will cease to be an Associate of the Bidder or such Member, or Nominated STP Sub-Contractor of the Bidder, then, the Selected Bidder shall seek the approval of the [EXECUTING AGENCY] for such occurrence. If the [EXECUTING AGENCY] is of the view that such occurrence is likely to affect the Technical Capacity and/or Financial Capacity of the Bidder adversely, then the [EXECUTING AGENCY] may disqualify the Bidder from participation in the Bid Process; or, if the Bidder has been declared as the Selected Bidder, withdraw the LOA or treat such occurrence as a Concessionaire event of default in accordance with the Concession Agreement, without the [EXECUTING AGENCY] incurring any liability towards the Selected Bidder or the Concessionaire for such withdrawal or possible

termination. While the [EXECUTING AGENCY] will not unreasonably withhold or delay such approval, the decision of the [EXECUTING AGENCY] will be final in this regard.

(e) In the event of the experience of Nominated STP Sub-Contractor being claimed for qualification purpose, as per clause 4.1, and if such entity ceases to be the sub-contractor after the issue of LoA and/ or before the completion of 2 years from the COD, then with prior approval of [EXECUTING AGENCY] and/ or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) , the Selected Bidder shall propose to substitute such entity with another sub-contractor who shall meet the qualification criteria set out in Clause 4.1(a)(B), 4.1(a)(F)(ii) and 4.1(b)(ii) of this RFP. The substituted sub-contractor shall then be the Nominated STP Sub-Contractor. While the [EXECUTING AGENCY] will not unreasonably withhold or delay such approval, the decision of the [EXECUTING AGENCY] will be final in this regard.

If the [EXECUTING AGENCY] is of the view that such occurrence is likely to affect the Technical Capacity of the Bidder adversely, then the [EXECUTING AGENCY] may withdraw the LOA or treat such occurrence as a Concessionaire event of default in accordance with the Concession Agreement, without the [EXECUTING AGENCY] incurring any liability towards the Selected Bidder or the Concessionaire for such withdrawal or possible termination.

3.3 Conflict of Interest

Any Bidder found to have a conflict of interest (**Conflict of Interest**) shall be disqualified. A Bidder, a Member (in case of a Consortium), its Group Companies or Associates may be considered to have a Conflict of Interest with one or more Bidders, its Members, its Group Companies or Associates in this Bid Process if, as indicated in this Clause 3.3:

(a) they have a common Controlling partner, except that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in the Companies Act, 2013. Bidder can view the Companies Act, 2013 at http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf. The current list of Public Financial Institutions is annexed at Annexure 6. The Bidders are advised to ascertain the updated list of Public Financial Institutions from the available sources; or

(b) they receive or have received any direct or indirect subsidy from any of them; or

(c) they have the same legal representative for purposes of this Bid; or

(d) they have a relationship with each other, directly or through common third parties, that puts them in a position to access the information about or influence the Bid of another

Bidder, or influence the decisions of [EXECUTING AGENCY] regarding this Bid Process; or

(e) the Bidder participates in more than one Bid for the same Project (as described in Clause 17); or

(f) the Bidder, or any of its Group Companies or Associates participated as a consultant in the preparation of any documents, design or technical specifications of the Project that are subject of the Bid; or

(g) the Bidder or any of its Group Companies or Associates has been hired (or is proposed to be hired) by [EXECUTING AGENCY] as project manager for the Project.

(h) The Bidder or any of its Group Companies or Associates has a close business or family relationship with a professional staff of (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) (or of [EXECUTING AGENCY], or of a receipt of a part of the loan) who:

(i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or

(ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to [EXECUTING AGENCY]the Bank throughout the Bid Process and execution of the Concession Agreement.

3.4 **Fraud and Corrupt Practices**

It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts[13]. In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;[14];

[13] In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

[14] For the purpose of this sub-paragraph, "*another party*" refers to a public official acting in relation to the procurement process or contract execution. In this context, "*public official*" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;[15]

(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;[16]

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;[17]

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.

(b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action

[15] For the purpose of this sub-paragraph, "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

[16] For the purpose of this sub-paragraph, "parties" refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

[17] For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution.

satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

(d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,[18] including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated[19];

(e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

3.4.1 Inspection and Audit

In further pursuance of the policy referred to in ITB 3.4 above, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

3.5 **Other Eligibility Criteria**

(a) A Bidder or any Member of a Consortium that has been sanctioned by the Bank in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, shall be ineligible to be awarded a Bank-financed contract, or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall determine.

(b) If the Bidder or any Member (in case of a Consortium) is party to any litigation (required to be disclosed as per Annexure 1H), in which, any subsequent ruling/judgment by any court/judicial authority after the submission of bid affects or could have a material adverse effect on the financial condition, prospects or business of such Bidder or

[18] A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

[19] A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

Member or its ability to fulfill its obligations under the Concession Agreement, the Bid will not be evaluated further by [EXECUTING AGENCY].

(c) If a Company has entered into a contract for operation of the e-Procurement Portal, which is currently valid and subsisting, then such Company and its Associates will not be eligible to submit a Bid. The e-Procurement portal (etender.up.nic.in) is operated by National Informatics Centre.

(d) If any contract of the Bidder or any Member (in case of a Consortium) has been suspended or terminated and/or performance security has been called by an employer for reasons related to the non-compliance by the Bidder with any ESHS requirements or safeguard in the past 5 years (required to be disclosed as per Annexure 1L), which, in [EXECUTING AGENCY]'s opinion, affects or could have a material adverse effect on the financial condition, prospects or business of such Bidder or Member or its ability to fulfill its obligations under the Concession Agreement, the Bid will not be evaluated further by [EXECUTING AGENCY].

Bidders will provide such evidence of their continued eligibility as [EXECUTING AGENCY] may request at any time during or after the Bid Process.

If a Bidder is a Consortium, then the term "**Bidder**" as used in Clause 3.3, Clause 3.4 and Clause 3.5 shall include each Member of such Consortium, and the term "**Associate**" as used in Clause 3.3, Clause 3.4 and Clause 3.5 shall include Associates of each Member of the Consortium.

If the Bidder has a Nominated STP Sub-Contractor to meet the Technical Criteria defined in Clause 4.1 (a) and Clause 4.1 (b), then the Clause 3.3, Clause 3.4 and Clause 3.5 shall also be applicable to such Nominated STP Sub-Contractor.

4. QUALIFICATION CRITERIA

The Bidders should satisfy the following minimum technical criteria and financial criteria set out in Clause 4.1 and Clause 4.2 respectively to qualify for evaluation of the Financial Proposals:

4.1 Technical Criteria

To demonstrate its technical capacity and experience (**Technical Capacity**), the Bidder must have the following experience:

(a) Development/Design and Construction experience

(A) For demonstrating technical capacity and experience (the **"Technical Capacity"**), the Bidder shall, during the 5 Financial Years immediately preceding the Bid Due Date, have:

(i) paid for, or received payments for, construction of Eligible Project(s); and/or

(ii) paid for development of Eligible Project(s) in Category 1 and/or Category 2 specified in Clause 4.1(a)(B); and/ or

(iii) collected and appropriated revenues from Eligible Project(s) in Category 1 and/or Category 2 specified in Clause 4.1(a)(B),

such that the sum total of the above, is more than Rs. [Capital Cost of the Project] (the **"Threshold Technical Capability"**).

If the Bidder is a Consortium, then the Threshold Technical Capability as required above shall be demonstrated cumulatively, i.e. the Consortium as a whole should meet the requirement.

If the Bidder is relying on a Nominated STP Sub-Contractor for the Project Specific STP experience as per the clause 4.1(a)(F), then 25% of the Threshold Technical Capability shall be met by such **Nominated STP Sub-Contractor**. The bidder shall meet the remaining 75% of the Threshold Technical Capability requirement.

The Bidder shall provide the necessary information relating to Technical Capacity in the formats provided in Annexure 1E Part-III and Annexure 1E Part-IV along with the necessary supporting documents as per this RFP.

(B) Technical Capacity for purpose of evaluation

Subject to the provisions of Clause 4.1(a)(A), the following categories of experience would qualify as Technical Capacity and Eligible Experience (the **"Eligible Experience"**) in relation to eligible projects, as stipulated in Clauses 4.1(a)(C) and 4.1(a)(D) (the **"Eligible Projects"**):

- Category 1: Development (PPP) experience on Eligible Projects in Infrastructure Sector that qualify under Clause 4.1(a)(C)
- Category 2: Construction experience on Eligible Projects in Infrastructure Sector that qualify under Clause 4.1(a)(D)

(i) For the purpose of this RFP, Infrastructure Sector would be deemed to include highways/roads, power, telecom, ports, airports, railways, metro rail, industrial parks/ estates, logistic parks, pipelines, irrigation, sewerage network, water, waste water, drainage and real estate development.

(ii) Eligible Experience in respect of each category shall be evaluated only for Eligible Projects.

(iii) The Bidders shall quote experience in respect of a particular Eligible Project under any one category only, even though the Bidder (either individually or along with a member of the Consortium) may have played multiple roles in the cited project. Double counting for a particular Eligible Project shall not be permitted in any form.

(iv) The Bidder shall furnish the required Project-specific information and evidence in support of its claim of Technical Capacity, in the format provided in Annexure 1E Part-IV.

(C) For a project to qualify as an Eligible Project under Category 1:

(i) It should have been undertaken as a PPP project on BOT, BOLT, BOO, BOOT or other similar basis for providing its output or services to a public sector entity or for providing non-discriminatory access to users in pursuance of its charter, concession or contract, as the case may be. For the avoidance of doubt, a project which constitutes a natural monopoly such as an airport or port should normally be included in this category even if it is not based on a long-term agreement with a public entity;

(ii) the entity claiming experience should have held, in the company owning the Eligible Project, a minimum of 26% (twenty-six per cent) equity during the entire year for which Eligible Experience is being claimed;

(iii) the capital cost of the project should be more than Rs. [10% of the Project Capital Cost]; and

(iv) the entity claiming experience shall, during the 5 Financial Years immediately preceding the Bid Due Date, have (1) paid for development of the project (excluding the cost of land), and/ or (2) collected and appropriated the revenues from users availing of non-discriminatory access to or use of fixed project assets, such as revenues from highways, airports, ports and railway infrastructure, but shall not include revenues from sale or provision of goods or services such as electricity, gas, petroleum products, telecommunications or fare/freight revenues and other incomes of the company owning the Project.

(D) For a project to qualify as an Eligible Project under Category 2:

(i) the entity claiming experience shall, during the 5 Financial Years immediately preceding the Bid Due Date, have paid for the execution of

its construction works or received payments from its client(s) for construction works executed, fully or partially, during the 5 Financial Years immediately preceding the Bid Due Date. For the avoidance of doubt, construction works shall not include operation and maintenance costs, supply of goods or equipment except when such goods or equipment form part of a turn-key construction contract/ EPC contract for the project. Further, the cost of land shall not be included hereunder.

(ii) only the payments (gross) actually made or received, as the case may be, during such 5 (five) financial years shall qualify;

(iii) the capital cost of the project should be more than Rs. [10% of the Project Capital Cost];

(E) Experience for any activity relating to an Eligible Project shall not be claimed by two or more Members of the Consortium. In other words, no double counting in respect of the same experience shall be permitted in any manner whatsoever. Provided that, the experience taken into assessment will be only of those who contribute a minimum 26% share to the Consortium.

Further, in case of a Nominated STP Sub-Contractor, experience for any activity relating to an Eligible Project shall not be claimed by both the Nominated STP Sub-Contractor and the Bidder.

(F) Specific Experience to the project:

(i) The Bidder shall have developed and/or designed and constructed, in the last 10 years immediately preceding the Bid Due Date, 1 Sewage Treatment Plant (STP) / Effluent Treatment Plant (ETP) / Common Effluent Treatment Plant (CETP) of at least [25% of the Project STP Capaicty] Capacity, which shall have been developed or designed and constructed using any technology;

(ii) Provided if the Bidder does not have the STP/ ETP/ CETP experience, then the bidder may rely upon the experience of a Nominated STP Sub-Contractor for the purpose. In such case, the Nominated STP Sub-Contractor shall meet the eligibility criteria under this section. Further, the same Nominated STP Sub-contractor shall also meet the Operation & Maintenance Experience specified under clause 4.1(b) of this RFP.

(iii) The bidder shall submit a Sub-contractor Undertaking to the extent that such Nominated STP Sub-Contractor will be engaged for designing and/or constructing the proposed Project along with the certificate of experience from the relevant government authority/client for the project experience. In addition to this, both the Nominated STP Sub-Contractor

and the bidder shall each submit 50% of the Performance Security as mentioned in Clause 16.1 of this RFP. The Performance Security submitted by the Nominated STP Sub-Contractor shall be liable to be forfeited in the event of the Nominated STP Sub-Contractor leaving the project before the COD. In such situation, the Concessionaire is required to nominate another sub-contractor as per the Clause 3.2(e) of this RFP.

(iv) One Nominated STP Sub-Contractor can associate with only one Bidder at any point in time during the bidding. The approved Nominated STP Sub-Contractor shall not be changed without prior approval of [EXECUTING AGENCY] and/or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) .

(v) The experience claimed shall be evidenced by the issuance of a completion certificate by the relevant government authority/client, certifying that the STP/ETP/CETP have been completed in terms of the concession agreement or similar contract executed for such plants;

(vi) To claim development experience, the entity claiming the experience shall have held, in the company developing the STP/ETP/CETP, a minimum of 26% equity share capital as on the commercial operations date of such project.

(vii) To claim design and construction experience, the entity claiming experience should have been appointed as the principal contractor (i.e., the contractor hired directly by the owner of the project/entity developing the relevant STP/ETP/CETP) and any other subcontractor experience is not permitted for claiming Technical Capacity.

(viii) The Bidder shall be required to develop the [LOCATION] STP Project using any technology prescribed in the CPHEEO Manual.

(ix) For using technologies other than those mentioned in the CPHEEO manual, the bidder shall tie up with a suitable technology provider subject to following conditions:

a. That the Bidder shall clearly indicate the name of the technology provider in Annexure 1B;

b. That the STPs using such new technology have been developed or designed and constructed in the 5 years preceding the Bid Due Date, as evidenced by the issuance of a completion certificate by the relevant government authority/client, certifying that the STP(s) have been completed in terms of the

concession agreement or similar contract executed for such STP(s); and

c. That the STPs using such new technology have been successfully operational for any 24 consecutive months in the 5 years preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP(s), as evidenced by a certificate from the relevant government authority.

d. That the technology provider undertakes to associate with the construction of the proposed Project up to completion of 2 years from COD as evidenced by a suitable Technology Agreement and a Technology Performance Security of 5% of the Bid Project Cost, which shall be forfeited if the technology provider leaves the project before the completion of 2 years from COD. The Technology Performance Security shall be returned on completion of 2 years from COD.

e. That one technology provider can associate with one Bidder at any point in time during the bidding

(b) Operation and maintenance experience

(i) The Bidder shall have successfully operated and maintained 1 STP/ETP/CETP of at least [25% of the Project STP Capacity] capacity for any 12 consecutive months in the 10 years immediately preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP/ETP/CETP. For demonstrating O&M experience of STP/ETP/CETP, the Bidder (and in case of a Consortium, any Member) is required to submit a certificate from the relevant governmental authority, evidencing successful operations and maintenance of the STP/ETP/CETP for which the Bidder is claiming O&M experience.

(ii) Provided if the Bidder does not have the required experience, then the bidder may rely upon the experience of the Nominated STP Sub-Contractor whose experience is claimed for the requirement under clause 4.1(a)(F) for the purpose.

(iii) The bidder shall submit a Sub-contractor Undertaking to the extent that such Nominated STP Sub-Contractor will be engaged for the Operation & Maintenance of the proposed Project, along with the certificate of experience from the relevant government authority/client for the project experience. In addition to this, both the Nominated STP Sub-Contractor

and the bidder shall each submit 50% of the O&M Securities as mentioned in Clause 16B.1 of this RFP. The performance security submitted by the Nominated STP Sub-Contractor shall be liable to be forfeited in the event of the Nominated STP Sub-Contractor leaving the project before the completion of 2 years from the COD. In such situation, the Concessionaire is required to nominate another sub-contractor as per the Clause 3.2(e) of this RFP. Also, one Nominated STP Sub-Contractor can associate with only one Bidder at any point in time during the bidding.

(c) It is clarified that:

(i) the Bidder must demonstrate both development/design and construction experience specified in Clause 4.1(a) above and O&M experience specified in Clause 4.1(b) above to be technically qualified for evaluation of the Financial Proposals;

(ii) the Bidder/Member may rely on the experience of its Associate(s) for demonstrating the Technical Capacity (including, if applicable, under Clause 4.1(d). However, a Bidder claiming the experience of the Associates for Technical Capacity, shall submit a Letter of Commitment from such Associate that the expertise of the Associate will be made available during the development and operation of the Project;

(iii) in case of a Consortium, the development/design and construction experience set out in Clause 4.1(a) above, may be demonstrated by one Member and the O&M experience of the STP set out in Clause 4.1(b) may be demonstrated by a different Member;

(iv) if the development/design and construction experience as set out in clause 4.1(a)(i) and the O&M experience as set out in the clause 4.1(b) is being claimed by a different Member, then the Member who demonstrates development/design and construction experience and the Member who demonstrates the O&M experience must each hold 26% of the total Capital and voting rights of the Concessionaire for atleast 3 years post COD;

(v) the development/design and construction experience of STP as set out in clause 4.1(a)(i) and the O&M experience as set out in clause 4.1(b) may be claimed in relation to the same STP. If, however, the development/design and construction experience and the O&M experience is being claimed for different STP, then it is clarified that the STP for which O&M experience is being claimed may be based on a

technology which is different from the technology used in the STP(s) for which development/design and construction experience is being claimed; and

(vi) for certificates claiming Technical Capacity through an experience that are issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the certificate is being issued. However, the certificates provided by the Bidders from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.

(d) [The Bidder shall set up a biogas power plant at the [LOCATION] Facilities Site.][20] [If the Bidder proposes to setup a biogas power plant at its own discretion,][21], the Bidder/Member will be required to demonstrate its experience (in the format set out in Annexure 2) in developing or designing and constructing a biogas power plant, which should have:

(A) a capacity of at least 0.25MW;

(B) been based on STP effluent/faecal sludge;

(C) been developed or designed and constructed in the 10 years preceding the Bid Due Date, as evidenced by the issuance of a completion certificate by the relevant government authority/ client, certifying that the biogas power plant has been completed in terms of the relevant contract executed for such biogas power plant; and

(D) successfully operational for any 24 consecutive months in the 10 years preceding the Bid Due Date, in accordance with the relevant contract executed for such biogas power plant, as evidenced by a certificate from the relevant government authority/ client;

If the Bidder or any Member of the Consortium does not have any experience of having developed or designed and constructed a biogas power plant, the Bidder will be required to nominate an experienced power plant developer which has developed and/or designed a biogas power plant, which meets the criteria set out in (A) to (D) above. The nominated Subcontractor will be engaged to develop the power plant for the Project, if the Bidder is declared the Selected Bidder, and will be required to provide a consent letter in the format set out in Annexure 3 (along with certificate(s) from the relevant government authority).

[20] Applicable if the STP capacity is > 40MLD

[21] Applicable if the STP capacity is < 40MLD

4.2 **Financial Criteria**

To demonstrate its financial capacity to undertake the Project (**Financial Capacity**), the Bidder must meet each of the financial qualification criteria specified in this Clause 4.2.

(a) Net worth

(i) In each of the Financial Years [Mention the 3 Financial Years preceding the Bid Due Date], the Bidder's Net Worth (as per the audited annual financial statements) shall be at least INR [25 to 33% of the Bid Project Cost].

(ii) If the Bidder is a Consortium, then the Net Worth, as required in Clause 4.2 (a)(i) above shall be demonstrated cumulatively, i.e., the Consortium as a whole should meet the requirement. Provided further that if the Bidder is subsequently declared the Selected Bidder for the Project, then any Member of the Consortium whose Net Worth was assessed for the purposes of demonstrating that the Consortium has the Financial Capacity to undertake the Project, shall hold at least 26% of the total Capital and voting rights of the Concessionaire for 3 years post the COD.

(iii) A Bidder or a Member of a Consortium may rely on the Net Worth of its Associate(s) for demonstrating its Financial Capacity. In such a case, the Bidder or a Member of a Consortium shall submit an undertaking from the Associate(s) stating that the necessary proportionate equity for the project will be provided for successful implementation of the project. In addition to this, during Financial Closure, necessary board resolution from the Associate(s) has to be submitted to the extent of equity contribution.

(b) The Bidder (and in case of a Consortium, any Member) and its Associate(s) (in case the Net Worth of the Associate is being claimed) is not affected by and has not been affected by any of the following events, conditions or circumstances in the 3 Financial Years immediately preceding the Bid Due Date, as certified by the statutory auditor of the Bidder (and in case of a Consortium, the statutory auditor of a Member) and its Associate(s) (if applicable):

(i) the Bidder (and the Associate(s), if applicable) having been categorized as a wilful defaulter in accordance with Applicable Laws or laws of the country of its incorporation;

(ii) the Bidder (and the Associate(s), if applicable) being subject to proceedings for declaration of or being declared bankrupt, being wound up, or having its affairs administered or conducted by any court, administrator, receiver; or

(iii) the Bidder (and the Associate(s), if applicable) having been declared by a court or other competent authority as being unable to pay its debts, or having made

any composition or arrangements with creditors or having had the repayment of its debts suspended.

(c) The Bidder (and in case of a Consortium, any Member) and its Associate(s) (if applicable) has not been convicted or otherwise being found responsible (or having any of its directors, partners, trustees, officers or managers convicted or being found responsible) by any court, tribunal, regulatory, public or other competent authority for a breach of any laws or regulations which:

(i) related to any act of fraud or dishonesty for which a fine, penalty, damages, compensation or other payment was levied against the Bidder (and the Associate(s), if applicable) or any of its directors, partners, trustees, officers or managers; or

(ii) resulted in the permanent or temporary suspension of the rights of the Bidder (and the Associate(s), if applicable) to provide any service or carry on any type of business or operations.

SECTION III

INSTRUCTION TO BIDDERS

PART A. GENERAL

5. SCOPE OF RFP

5.1 [EXECUTING AGENCY] wishes to receive Bids in accordance with this RFP for award of the Project.

5.2 The RFP must be read as a whole. If any Bidder finds any ambiguity or lack of clarity in this RFP, the Bidder must inform [EXECUTING AGENCY] at the earliest. [EXECUTING AGENCY] will then direct the Bidders regarding the interpretation of the RFP. If any discrepancy, ambiguity or contradiction arises between the terms of the RFP and the Concession Agreement in relation to:

(a) the Bid Process, the provisions of the RFP shall prevail; and

(b) the scope of services or any other terms or conditions of the Concession Agreement, including Technical Specifications, the provisions of the Concession Agreement shall prevail.

6. ACKNOWLEDGEMENT BY THE BIDDER

6.1 It shall be deemed that by submitting the Bid, the Bidder has:

(a) made a complete and careful examination of the RFP (including all instructions, forms, terms and specifications) and any other information provided by [EXECUTING AGENCY] under this RFP and the Bidder acknowledges that its submission of a Bid that is not substantially responsive to the RFP in every respect will be at the Bidder's risk and may result in rejection of the Bid;

(b) received all relevant information requested from [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) ;

(c) accepted the risk of inadequacy, error or mistake in the information provided in the RFP or furnished by or on behalf of [EXECUTING AGENCY];

(d) satisfied itself about all things, matters and information, necessary and required to submit a Bid;

(e) acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the RFP or ignorance of any matter in relation to the Project shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations or loss of profits or revenue from [EXECUTING

AGENCY] or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) , or a ground for termination of the Concession Agreement;

(f) satisfied itself regarding the suitability of the Site conditions to undertake the Project; and

(g) agreed to be bound by the undertakings provided by it under and in terms of this RFP.

6.2 [EXECUTING AGENCY] shall not be liable for any omission, mistake or error in respect of any of the above or on account of any matter or thing arising out of or relating to the RFP or the Bid Process.

7. RIGHTS OF [EXECUTING AGENCY]

7.1 [EXECUTING AGENCY], in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to:

(a) suspend the Bid Process and/or amend and/or supplement the Bid Process or modify the dates or other terms and conditions relating thereto;

(b) consult with any Bidder in order to receive clarification or further information at any stage of the Bid Process;

(c) retain any information, documents and/or evidence submitted to [EXECUTING AGENCY] by and/or on behalf of any Bidder;

(d) independently verify, disqualify, reject and/or accept any and all documents, information and/or evidence submitted by or on behalf of any Bidder;

(e) reject any Bid, if:

(i) at any time, a material misrepresentation is made or uncovered; or

(ii) the Bidder in question does not provide, within the time specified by [EXECUTING AGENCY], the supplemental information sought by [EXECUTING AGENCY] for evaluation of the Bid; or

(f) accept or reject a Bid, annul the Bid Process and reject all Bids, at any time, without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons whatsoever to any Person, including the Bidders.

If [EXECUTING AGENCY] annuls the Bid Process and rejects all Bids, it may in its sole discretion invite fresh Bids for the Project.

7.2 If [EXECUTING AGENCY] exercises its right under this RFP to reject a Bid and consequently, the Preferred Bidder for the Project gets disqualified or rejected, then [EXECUTING AGENCY] reserves the right to:

(a) select the Second Preferred Bidder as the Selected Bidder for the Project; or

(b) take any such measure as may be deemed fit in the sole discretion of [EXECUTING AGENCY], including inviting fresh Financial Proposals from the qualified Bidders or annulling the entire Bid Process.

7.3 If it is found during the Bid Process, at any time before signing the Concession Agreement or after its execution and while it is in force, that one or more of the Qualification Criteria and/or the Eligibility Criteria have not been met by a Bidder or that the Bidder has ceased to meet them, or a Bidder has made material misrepresentations or has given any materially incorrect or false information, then such Bidder will be disqualified.

If such Bidder has been declared as the Selected Bidder or has already been issued the LOA or has entered into the Concession Agreement, the LOA or the Concession Agreement, as the case may be, shall be liable to be terminated, by a notice in writing from [EXECUTING AGENCY] to the Selected Bidder. Upon any disqualification, cancellation or termination in accordance with this Clause 7.3, [EXECUTING AGENCY] will not be liable in any manner whatsoever to the Bidder. Additionally, [EXECUTING AGENCY] will have the right to forfeit and appropriate the Bid Security or, as the case may be, appropriate an equivalent amount from the Performance Security if the Concession Agreement has been executed, as a mutually agreed genuine pre-estimate of the loss suffered by [EXECUTING AGENCY] for, amongst others, [EXECUTING AGENCY]'s time, cost and efforts in conducting the Bid Process. Such forfeiture will be without prejudice to any other right or remedy that [EXECUTING AGENCY] may have under the RFP, the Concession Agreement or Applicable Laws.

8. CLARIFICATIONS ON THE RFP

8.1 Clarifications and Queries

(a) If a Bidder requires any clarification on or has any query in relation to the RFP, it should submit such query or request for clarification to [EXECUTING AGENCY] on the e-Procurement Portal or send an email to [email ID] before the specified time and date mentioned in the Bid Schedule. All queries or clarification requests should be received on or before the date and time mentioned in the Bid Schedule.

(b) [EXECUTING AGENCY] shall make reasonable efforts to respond to the queries or requests for clarifications on or before the date mentioned in the Bid Schedule. [EXECUTING AGENCY]'s responses (including an explanation of the query but not identification of its source) will be made available to all the Bidders and shall be uploaded on the e-Procurement Portal.

(c) [EXECUTING AGENCY] may, on its own initiative, if deemed necessary, issue

clarifications to all the Bidders. All clarifications and interpretations issued by [EXECUTING AGENCY] shall be deemed to be part of this RFP. Should [EXECUTING AGENCY] deem it necessary to amend the RFP as a result of a request for clarification, it will do so following the procedure under Clause 9.

(d) It shall be the responsibility of the Bidders to check the e-Procurement Portal for the response to the queries or requests for clarifications.

(e) Verbal clarifications and information given by (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) , [EXECUTING AGENCY] or any other Person for or on its behalf shall not in any way or manner be binding on (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) or [EXECUTING AGENCY].

8.2 **Pre-Bid Meeting**

(a) All interested Companies shall be invited to attend the Pre-Bid Meeting on the date, time and place mentioned in the Bid Schedule. The purpose of the Pre-Bid Meeting will be to clarify issues and answer questions on any matter relating to the RFP, the Bid Process and the Project.

(b) All interested Companies may nominate up to 3 authorized representatives to participate in the Pre-Bid Meeting, by confirming the participation of its authorized representatives at the Pre-Bid Meeting at least 3 days prior to the date of the Pre-Bid Meeting. Such confirmation shall be sent by e-mail to [email ID].

(c) During the course of the Pre-Bid Meeting, all interested Companies will be free to seek clarifications and make suggestions to [EXECUTING AGENCY].

(d) Non-attendance at the Pre-Bid Meeting will not be a cause for disqualification of an interested Company from participating in the Bid Process.

9. AMENDMENT OF THE RFP

9.1 Up until the date that is mentioned in the Bid Schedule, [EXECUTING AGENCY] may, for any reason, whether on its own initiative or in response to a query raised or clarifications requested by a Bidder, amend the RFP by issuing an Addendum or an amended RFP and amended draft Concession Agreement. The addendum will appear on the e-Procurement Portal under "Latest Corrigendum" and email notification is also automatically sent to those bidders who have moved this tender to their "My Tenders" area. Any addendum thus issued shall be part of the bidding documents and deemed to have been communicated to all the bidders who have moved this tender to their "My Tenders" area.

9.2 All Addenda/amendments and amended RFP & amended draft Concession Agreement will be uploaded on the e-Procurement Portal.

9.3 The Bidders are required to visit the website before submission of the Bid so as to take into account with any Addenda/amendments that may be issued in accordance with this Clause 9.

9.4 Each Addendum/amendment will be binding on the Bidders, whether or not the Bidders convey their acceptance of the Addendum/amendment.

9.5 Any oral statements made by (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) or [EXECUTING AGENCY] or its advisors regarding the Bid Process, the RFP or on any other matter, shall not be considered as amending the RFP.

9.6 [EXECUTING AGENCY] will assume that the information contained in the Addendum/amendments will have been taken into account by the Bidder in its Bid. [EXECUTING AGENCY] assumes no responsibility for the failure of a Bidder to submit the Bid in accordance with the terms of the Addendum/amendments or for any consequent losses suffered by the Bidder.

10. AVAILABILITY OF INFORMATION

10.1 The information relating to or in connection with the Project, the Bid Process and this RFP, including all notices issued by [EXECUTING AGENCY] to all Bidders in accordance with this RFP; queries and responses or clarifications and any Addenda will be uploaded on the e-Procurement Portal.

10.2 All such information will be made available for review by the Bidders until the Bid Due Date.

10.3 If a Bidder faces any technical issue or technical error in accessing the e-Procurement Portal, the Bidder may seek assistance from [EXECUTING AGENCY] by sending an e-mail request to [email ID], no later than 3 days prior to the Bid Due Date.

10.4 [EXECUTING AGENCY] will use its best endeavours to respond to a written e-mail request and resolve the technical issue or error or provide an alternative solution to the Bidder within 3 days of receipt of such request.

11. CORRESPONDENCE WITH BIDDERS

Save as expressly provided in this RFP, (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and [EXECUTING AGENCY] will not entertain any correspondence with the Bidders, whether in connection with the acceptance or rejection of their Bids or otherwise.

12. CONFIDENTIAL INFORMATION AND PROPRIETARY DATA

12.1 **Proprietary Data**

All documents and other information provided by [EXECUTING AGENCY] or submitted by a Bidder to [EXECUTING AGENCY] will remain or become the property of [EXECUTING AGENCY], as the case may be. Bidders are required to treat all information provided by [EXECUTING AGENCY] in the RFP as strictly confidential and not to use them for any purpose other than for preparation and submission of their Bids.

12.2 **Confidentiality Obligations of** [EXECUTING AGENCY]

[EXECUTING AGENCY] will treat all information, submitted as part of a Bid as confidential and will require all those who have access to such material to treat it in confidence. [EXECUTING AGENCY] may not divulge any such information or any information relating to evaluation of Bids or the qualification of Bidders unless:

(a) such publication is contemplated under this RFP;

(b) such publication is made to any Person who is officially involved with the Bid Process or is a retained professional advisor advising [EXECUTING AGENCY], (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) or the Bidder on matters arising out of or in connection with the Bid Process;

(c) it is directed to do so by any statutory authority that has the power under law to require its disclosure;

(d) such publication is to enforce or assert any right or privilege of the statutory authority and/or [EXECUTING AGENCY] and/or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) or as may be required by law (including under the Right to Information Act, 2005); or

(e) in connection with any legal process.

13. GOVERNING LAW AND JURISDICTION

13.1 **Governing Law**

The Bid Process, this RFP and the Bids shall be governed by, and construed in accordance with, the laws of India.

13.2 **Exclusive Jurisdiction**

The competent courts in [Name of the State] shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the Bid Process, this RFP and the Bids.

14. VALIDITY OF THE BIDS

14.1 The Bids shall remain valid for a period of 180 days from the Bid Due Date. A Bid valid for a shorter period shall be rejected by [EXECUTING AGENCY] as being non-responsive.

14.2 In exceptional circumstances, prior to the expiry of the Bid validity period, [EXECUTING AGENCY] may request Bidders to extend the Bid validity period. The request and the responses

shall be made in writing. A Bidder may refuse [EXECUTING AGENCY]'s request to extend the validity period of its Bid, without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its bid.

PART B. BID SECURITY, PERFORMANCE SECURITY AND ESHS PERFORMANCE SECURITY

15. BID SECURITY

15.1 The Bidder shall furnish as part of its Bid, a bid security for the Project (the **Bid Security**). The Bid Security shall be for an amount equivalent to INR [*2% of the capital cost for contracts estimated to cost up to INR 1000 million, or 1% of the capital cost subject to a minimum of INR 20 million if estimated cost exceeds INR 1000 million. In case of NCB, amount should be in INR only. Provide US$ option in case of ICB]* or an equivalent amount in a freely convertible currency.

15.2 The Bid Security shall remain valid for 45 days beyond the Bid validity period specified in Clause 14.

15.3 The Bidder shall provide the Bid Security in the form of a bank guarantee issued by a Scheduled Bank in India or by a foreign bank listed with the Reserve Bank of India having its branches in India or a guarantee issued by a Public Financial Institution. The Bid Security shall be issued in favour of the "[EXECUTING AGENCY]", represented by the [**Designation of the Representative**]**{-,** payable at [LOCATION], and in the format set out in Annexure 1I.

Details of the Beneficiary –

Bank Account Holder Name

Bank Account Number

Bank Name

IFSC Code

15.4 Unless forfeited in accordance with Clause 15.5 below, the Bid Security of the unsuccessful Bidders will be returned by [EXECUTING AGENCY] no later than 30 days from the date of execution of the Concession Agreement with the SPV incorporated by the Selected Bidder.

The Bid Security of the Selected Bidder will be returned upon the SPV incorporated by the Selected Bidder furnishing the [LOCATION] Facilities' Performance Security, ESHS Security, and, if applicable, Additional Performance Security, in accordance with Clause 16 and ESHS Performance Security in accordance with Clause 16A.

15.5 The Bid Security shall be forfeited and appropriated by [EXECUTING AGENCY] as mutually agreed genuine pre-estimated compensation and damages payable to [EXECUTING AGENCY] for time, cost and effort of [EXECUTING AGENCY], without prejudice to any other right or remedy that may be available to [EXECUTING AGENCY] hereunder or otherwise, under the following conditions:

(a) if a Bidder is disqualified in accordance with, Clause 3.2 (Lock-in Restrictions and Change in Control), Clause 3.3 (Conflict of Interest), Clause 3.5 (Other Eligibility Criteria), Clause 7.3 (Rights of [EXECUTING AGENCY]), Clause 17 (Number of Bids) and Clause 31 (Execution of Concession Agreement);

(b) if, after the Bid Due Date, a Bidder withdraws its Bid during the Bid validity period; or

(c) if a Bidder is selected as the Selected Bidder and it fails, within the specified time limit, to:

(i) sign and return, as acknowledgement, the duplicate copy of the LOA;

(ii) cause the Concessionaire to furnish the Performance Security, and if applicable, the Additional Performance Security, in accordance with Clause 16;

(iii) cause the Concessionaire to furnish the ESHS Performance Security in accordance with Clause 16A;

(iv) cause the Concessionaire to furnish the O&M Performance Security in accordance with Clause 16B;

(v) fulfil any other condition precedent to the execution of the Concession Agreement; or

(vi) cause the Concessionaire to execute the Concession Agreement.

16. PERFORMANCE SECURITY

16.1 Subject to clause 16.2, the Selected Bidder shall cause the Concessionaire to furnish to [EXECUTING AGENCY] the Performance Security for a value equal to 9% of the [LOCATION] Facilities Bid Project Cost, on or before execution of the Concession Agreement to secure the obligations of the Concessionaire under the Concession Agreement.

If the Selected Bidder has nominated a Sub-Contractor to meet the Technical Criteria defined in Clause 4.1(a), the bidder and the Nominated STP Sub-Contractor shall each submit 50% of the [LOCATION] Performance Security as mentioned in this Clause 16.1. On substitution of Nominated STP Sub-Contractor as per Clause 3.2 (e), the new sub-contractor shall submit to the [EXECUTING AGENCY] 50% of the [LOCATION] Performance Security.

16.2 The Performance Security/Securities shall remain valid until 1 month from the COD.

16.3 The Selected Bidder shall cause the Concessionaire to provide the [LOCATION] Performance Security in the form of bank guarantee(s) issued by a Scheduled Bank in India or a guarantee issued by a Public Financial Institution. The [LOCATION] Performance Security shall be issued in favour of "[EXECUTING AGENCY]", represented by the **[Designation of the Representative]**, payable at [LOCATION] and in the format set out in Annexure 4.

16.4 If the Selected Bidder fails to cause the Concessionaire to furnish the Performance Security /Securities in accordance with this Clause 16 on or before the execution of the Concession Agreement, then [EXECUTING AGENCY] shall have the right to forfeit the Bid Security of the Selected Bidder in accordance with Clause 15.5.

16.5 During evaluation of Financial Proposal and before award of the Project, if it is found that the Selected Bidder has submitted an unreasonable Bid for the entire Project or for any components thereof, [EXECUTING AGENCY] reserves right to seek Additional Performance Security over and above that is mentioned in the Clause 16.1. The quantum of such Additional Performance Security will be determined by [EXECUTING AGENCY] on the basis of reasonable assessment of various Project components and after seeking suitable justifications/clarifications on the price components of the Bid from the Selected Bidder. The Selected Bidder shall submit this Additional Performance Security together with the Performance Security and ESHS Performance Security. The Additional Performance Security shall be in force till the end of Construction period if the Bid Project Cost is found to be unreasonable and till the end of the Concession Period if [LOCATION] Facilities O&M Charges are found to be unreasonable. The Additional Performance Security shall be liable to be forfeited, either fully or partially, as it deems fit for the reasons mentioned in Clause 16.1 of the draft Concession agreement.

16.6 If the Bidder has associated with a technology provider to meet to meet the technology requirement to be adopted for the proposed STP/FSTP in this Project, as defined in Clause 4.1(a)(F)(ix) of this RFP, then the technology provider shall furnish to the [EXECUTING AGENCY][EXECUTING AGENCY] a Technology Performance Security of 5% of the Bid Project Cost.

The Technology Performance Security shall be forfeited if the technology provider leaves the project before the completion of 2 years from COD. The Technology Performance Security shall be returned to the technology provider on completion of 2 years after COD.

16A. ESHS PERFORMANCE SECURITY

16A.1 The Selected Bidder shall cause the Concessionaire to furnish to [EXECUTING AGENCY], the [LOCATION] Facilities ESHS Performance Security for a value equal to 1% of the [LOCATION] Facilities Bid Project Cost, on or before execution of the Concession Agreement to secure due performance of the ESHS obligations of the Concessionaire under the Concession Agreement.

16A.2 The ESHS Performance Security/Securities shall remain valid for the entire term of the Concession Agreement. The ESHS Security shall have an initial validity period till COD, which must thereafter be renewed on a year-on-year basis, before the expiry of the 11th month of the relevant year, until the Expiry Date. If any of the ESHS Security is not renewed by the expiry of the 11th month of the relevant year, then [EXECUTING AGENCY] shall be entitled to drawdown the total amount available under the ESHS Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the ESHS Security.

16A.3 The Selected Bidder shall cause the Concessionaire to provide the [LOCATION] ESHS Performance Security in the form of bank guarantees issued by a Scheduled Bank in India or a guarantee issued by a Public Financial Institution. The [LOCATION] ESHS Performance Security shall be issued in favour of "[EXECUTING AGENCY]", represented by the **[Designation of the Representative],** payable at [LOCATION], in the format set out in Annexure 5.

16A.4 If the Selected Bidder fails to cause the Concessionaire to furnish the ESHS Performance Security/Securities in accordance with this Clause 16A on or before the execution of the Concession Agreement, then [EXECUTING AGENCY] shall have the right to forfeit the Bid Security of the Selected Bidder in accordance with Clause 15.5(c).

16B. O&M SECURITY

16B.1 The Selected Bidder shall cause the Concessionaire to furnish to [EXECUTING AGENCY], the O&M Security, within 60 days of the Construction Completion Date or 30 days before COD, whichever is earlier. The O&M security should be an unconditional and irrevocable bank guarantee to [EXECUTING AGENCY] for an amount corresponding to 4% of the Bid Project Cost. The O&M security for [LOCATION] Facilities would need to be furnished to secure the obligations of the Concessionaire under the Concession Agreement. If the Selected Bidder has nominated a Sub Contractor to meet the Technical Criteria defined in Clause 4.1(a), the bidder and the Nominated STP Sub-Contractor shall each submit 50% of the [LOCATION] O&M Performance Security as mentioned in this Clause 16B.1. On substitution of Nominated STP Sub-Contractor as per Clause 3.2 (e), the new sub-contractor will furnish the O&M Security. Further, in case the Nominated STP Sub-Contractor choses to leave the project after 2 years from COD, the Concessionaire shall fulfil the requirement of O&M Security, as specified in this Clause, for the remaining period.

16B.2 The O&M Security shall have an initial validity period of 1 year, which must be renewed on a year-on-year basis, before the expiry of the 11th month of the relevant year, until the expiry of the O&M Period. If any of the O&M Securities is not renewed by the expiry of the 11th month of the relevant year of the O&M Period, then [EXECUTING AGENCY] shall be entitled to drawdown the total amount available under the O&M Security, and retain such amount as cash

security until such time that the Concessionaire submits an extension or replacement of the O&M Security

16B.3 The Selected Bidder shall cause the Concessionaire to provide the [LOCATION] O&M Security in the form of bank guarantees issued by a Scheduled Bank in India or a guarantee issued by a Public Financial Institution. The [LOCATION] O&M Security shall be issued in favour of "[EXECUTING AGENCY]", represented by the **[Designation of the Representative],** payable at [LOCATION].

16B.4 If the Selected Bidder fails to cause the Concessionaire to furnish the O&M Security/Securities in accordance with this Clause 16B on or before the respective due dates, then [EXECUTING AGENCY] shall have the right to forfeit the Bid Security of the Selected Bidder in accordance with Clause 15.5.

PART C. PREPARATION AND SUBMISSION OF BIDS

17. NUMBER OF BIDS

Each Bidder shall be permitted to submit only 1 Bid for the Project, either individually or as a Member of a Consortium. A Bidder applying individually or as a Member of a Consortium shall not be entitled to submit another Bid either individually or as a Member of any other Consortium, as the case may be. A Bidder who submits or participates in more than 1 Bid for the Project shall cause all the Bids with the Bidder's participation to be disqualified.

18. LANGUAGE OF BIDS AND CORRESPONDENCE

18.1 The Bid prepared by the Bidder and all correspondence and documents related to the Bid exchanged by the Bidder and [EXECUTING AGENCY] shall be in English.

18.2 Any document furnished by the Bidder may be in another language, as long as such document is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall take precedence. If any document submitted by a Bidder is in a local language, then the English translation must be certified by an advocate and notarised in India. If any document submitted by a Bidder is in a foreign language, then the English translation must be certified by the embassy/consulate/high commission of the relevant foreign country in India or the Ministry of Foreign/External Affairs or any other relevant ministry empowered to certify such English translations in the foreign country where the project is situated. Supporting materials which are not translated into English or certified/notarised in accordance with this Clause 18.2 may not be considered by [EXECUTING AGENCY].

19. BID DUE DATE

19.1 The Bid shall be submitted on or before the date, time and place specified in the Bid Schedule.

19.2 [EXECUTING AGENCY] may, at its discretion and for any reason, extend the Bid Due Date for all Bidders by issuing an Addendum in accordance with Clause 9, in which case all rights and obligations of [EXECUTING AGENCY] and the Bidders will thereafter be subject to the Bid Due Date as extended.

19.3 Bids received by [EXECUTING AGENCY] after the specified time on the Bid Due Date will not be eligible for consideration and will be summarily rejected.

20. QUALIFICATION PROPOSAL

The Bidder shall submit Bids online in two separate Folders/Envelopes as under:

Folder I - for submission of Qualification Proposal; and

Folder II – for submission of Financial Proposals

20.1 The Qualification Proposal submitted by a Bidder shall comprise scanned copies of the

following:

(a) bid letter in the format set out in **Annexure 1A**;

(b) description of the Bidder/ Members/ Nominated STP Sub-Contractor / technology provider (if applicable) in the format set out in **Annexure 1B**;

(c) Power of Attorney in the format set out in **Annexure 1C**, executed by the Bidder or the Lead Member authorizing the signatory of the Bid to commit the Bidder;

(d) certificate issued by the statutory auditor of the Bidder (and its Associate(s), if applicable), in the format set out in **Annexure 1D**, certifying the Net Worth of the Bidder (and its Associate(s), if applicable) and compliance with other financial qualification criteria specified in Clause 4.2;

(e) details of the eligible STP/ ETP/ CETP for which development/design and construction experience is being claimed in the format set out in **Annexure 1E – Part 1** and details of the eligible STP/ ETP/ CETP for which O&M experience is being claimed in the format set out in **Annexure 1E – Part 2**;

(f) certificate from the statutory auditor certifying the shareholding of the Bidder (or in case of a Consortium, the relevant Member) or Nominated STP Sub-Contractor (if applicable) in the Company developing the STP/ ETP/ CETP, for which development experience is being claimed by the Bidder in the format set out in **Annexure 1F**;

(g) self-attested certificate regarding Associate, if applicable, in the format set out in **Annexure 1G**;

(h) information on any litigation that the Bidder (or in case of a Consortium, the relevant Member) or Nominated STP Sub-Contractor (if applicable) is a party to, in the format set out at **Annexure 1H**;

(i) Bid Security in the format set out at **Annexure 1I**;

(j) if applicable, experience certificate for a biogas power plant in the format set out at **Annexure 2** or a consent letter for a biogas power plant in the format set out at **Annexure 3**, along with certificate(s) from the relevant government authority / client;

(k) for each STP/ ETP/ CETP for which O&M experience is being claimed, certificate from the relevant government authority certifying that the Bidder (or, in case of a Consortium, the relevant Member) has successfully operated and maintained the STP/ ETP/ CETP for which O&M experience is being claimed, for at least 12 consecutive months in the 10 years immediately preceding the Bid

Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP;

(l) audited annual financial statements of the Bidder (including profit and loss statements) as well as the Associate (if the Net Worth of the Associate is being claimed) for the 3 Financial Years FY2016-17, FY2017-18 and FY2018-19;

(m) Self-attested copies of the certificate of incorporation, memorandum of association and articles of association. If the Bidder is a Consortium, then each Member shall submit self-attested copies of its certificate of incorporation, memorandum of association and articles of association; In case of a Nominated STP Sub-Contractor being nominated by the Bidder for meeting the Technical Criteria defined in Clause 4.1(a) and Clause 4.1(b), then such Nominated STP Sub-Contractor shall also submit self-attested copies of its certificate of incorporation, memorandum of association and articles of association; and

(n) declaration listing the contract(s) of the Bidder or each Member (in case of a Consortium) and the Nominated STP Sub-Contractor (if applicable) that has/have been suspended or terminated and/or performance security that has been called by an employer for reasons related to the non- compliance by such Bidder or Member(s) with any ESHS requirements or safeguard in the past 5 years, in the format set out at **Annexure IL.**

(o) Details of the Eligible Projects for which development or construction experience is being claimed for meeting the Threshold Technical Capability, in the formats set out in Annexure 1E Part-III and Annexure 1E Part-IV.

(p) For each project submitted in Annexure 1E Part-IV, certificate(s) from the relevant government authority/client certifying the experience being claimed, along with certificate from the statutory auditors stating the payments made/ received, as the case may be, during the past 5 financial years, in respect of the projects specified in clause 4.1(a)(A). In case a particular job/ contract has been jointly executed by the entity (Bidder and/ or the Nominated STP Sub-contractor) claiming the experience (as part of a Consortium), it should further support its claim for the share in work done for that particular job/ contract by producing a certificate from its statutory auditor or the client. (In jurisdictions that do not have statutory auditors, the firm of auditors which audits the annual accounts of the Bidder may provide the certificates required under this RFP);

20.2 If the Bidder is a Consortium, it will also be required to submit the following documents:

(a) Power of Attorney in the format set out at **Annexure 1J**, executed by the Members of the Consortium authorizing the Lead Member of the Consortium to act on behalf of and

commit the Consortium.

(b) Joint Bidding Agreement in the format set out at **Annexure 1K**.

21. FINANCIAL PROPOSAL

21.1 The Financial Proposal submitted by a Bidder shall comprise the Bid Price Sheet provided on the e-Procurement Portal.

21.2 The Bidders shall quote in the Bid Price Sheet, for the [LOCATION] Facilities, the: (a) Bid Project Cost (including all Taxes); (b) [LOCATION] Facilities O&M Charges for the first month after COD (including all Taxes); (c) Guaranteed Energy Consumption for the O&M Period; and (d) [LOCATION] Facilities Land Requirement. Based on these components quoted by a Bidder, the Bid Price is calculated by the system using the formula set out in the Bid Price Sheet.

21.3 The Bidder shall quote 1 (one) figure for any of the components of the [LOCATION] Facilities Bid Price after all discounts the Bidder wishes to offer on any or all of the components of the [LOCATION] Facilities Bid Price.

21.4 If the Bidder: (a) quotes more than 1 figure for any of the components of the [LOCATION] Facilities Bid Price; (b) offers a discount on any or all of the components of the [LOCATION] Facilities Bid Price; (c) quotes a [LOCATION] Facilities Land Requirement which is in excess of the area of the Facilitates STP and/or FSTP Site(s); then the Financial Proposal of such Bidder will be deemed to be non-responsive.

21.5 Bidders may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under World Bank loan/credits. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, [EXECUTING AGENCY] will not compensate the bidder (Operator). The bidder shall furnish along with his bid a declaration to this effect in the Declaration Format provided in Annexure 7 of the bidding documents.

21.6 Where the bidder has quoted taking into account such benefits, he must give all information required for issue of certificates in terms of the Government of India Central Excise Notification and Customs Notification as per form stipulated in Annexure 7 of the bidding documents. In case the bidder has not provided the required information or has indicated to be furnished later on in the Declaration Format, the same shall be construed that the goods/equipment for which certificate is required is Nil.

21.7 To the extent [EXECUTING AGENCY] determines the quantities indicated therein are reasonable keeping in view the work schedule, construction programme and methodology, the certificates will be issued, and no subsequent changes will be permitted. The certificate will be

issued within 60 days of signing of the Concession Agreement for material, equipment and machinery.

21.8 If the bidder has considered the customs/excise duty exemption for materials/construction equipment to be bought for the work, the bidder shall confirm and certify that [EXECUTING AGENCY] will not be required to undertake any responsibilities of the Government of India Scheme or the said exemptions being available during the contract execution, except issuing the required certificate.

21.9 The bids which do not conform to the above provisions or any condition by the bidder which makes the bid subject to availability of customs duty/Tax exemption for materials/construction equipment or compensation on withdrawal of any variations to the said exemptions will be treated as non-responsive and rejected.

21.10 Any delay in procurement of the construction equipment /machinery/goods as a result of the above shall not be entertained as a reason for granting any extension of time.

22. COST AND CURRENCY OF BIDS

22.1 Cost of the Bid

The Bidders will bear their own costs associated with or relating to the preparation and submission of their Bids, including copying, postage, delivery charges and expenses associated with any presentations which may be required by [EXECUTING AGENCY] or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) or any other costs incurred in connection with or relating to their Bids, including any costs incurred on conducting any due diligence. All such costs and expenses will be borne by the Bidders and [EXECUTING AGENCY], (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) and their employees and advisors will not be liable in any manner whatsoever for such costs and expenses, regardless of the conduct or outcome of the Bid Process.

22.2 Currency of the Bid

All amounts in the Bid should be stated in INR (Indian Rupees).

23. SIGNING OF BIDS

23.1 Each Bidder (and in case of a Consortium, the Lead Member) must affix the digital signature of its authorised signatory to the soft copies of both the Qualification Proposal and the Financial Proposal, upon uploading the soft copy of the Qualification Proposal and submission of the Financial Proposal to the e-Procurement Portal.

24. SUBMISSION OF BIDS

24.1 Each Bidder is required to upload a soft copy/scanned copy of its Bid on the e-Procurement Portal.

24.2 While uploading the Bid on the e-Procurement Portal, Bidder must ensure that files containing the Qualification Proposal and scanned copies of the Bid Security are uploaded separately under the relevant heads in a PDF format. The Bidder shall be required to fill all mandatory forms and fields indicated in the e-Procurement Portal at the time of uploading its Bid.

24.3 The Bidders should ensure the legibility of the documents uploaded to the e-Procurement Portal.

24.4 The Bidder shall upload the Bid sufficiently before the specified time on the Bid Due Date to avoid any technical issues or malfunction in the network caused by heavy traffic of Bidders on the Bid Due Date. [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will not be responsible for any failure, malfunction or breakdown of the electronic system during the e-procurement process.

24.5 The Bidder should check the system generated summary of its Bid submission to confirm successful uploading of its Bid.

24.6 All Bids uploaded to the e-Procurement Portal will be encrypted and the encrypted Bids can only be opened by the authorised representatives of [EXECUTING AGENCY] at or after the specified time for opening of Bids (Qualification Proposals).

24.7 Each Bidder shall also submit a hard copy of the original Bid Security, Power of Attorney, Joint Bidding Agreement, Sub-contractor Undertaking (if applicable) to [EXECUTING AGENCY], before the date/ time specified in clause 2.12 (c).

It is clarified that the Bidder will not be required to submit a hard copy of its Financial Proposal, and if a hard copy of the Financial Proposal is submitted, then the Bid submitted by such Bidder shall be rejected as being non-responsive.

24.8 The Bid will contain no alterations, omissions or additions, unless such alterations, omissions or additions are signed by the authorized signatory of the Bidder/Lead Member. Any interlineations, erasures, or overwriting will be valid only if they are signed by the authorized signatory of the Bidder/Lead Member.

24.9 The hard copy of the Bid Security, Power of Attorney, Joint Bidding Agreement, Sub-contractor Undertaking (if applicable), etc. will be duly sealed in an envelope, which will be super-scribed as follows:

"[LOCATION] STP PPP PROJECT

QUALIFICATION PROPOSAL

DO NOT OPEN BEFORE SPECIFIED TIME FOR OPENING OF BIDS (QUALIFICATION PROPOSALS)"

24.10 The sealed envelope containing the Bid Security, Power of Attorney, joint bidding agreement, etc will clearly indicate the name, address and contact details of the Bidder. If the envelope is not sealed, marked and submitted as instructed in this Clause 24, [EXECUTING AGENCY] assumes no responsibility for the misplacement or premature opening of the contents of the envelope and consequent losses, if any, suffered by the Bidder.

24.11 The hard copy of the Bid Security, Power of Attorney, Joint Bidding Agreement, etc. will either be hand delivered or sent by registered post acknowledgement due or courier to the address below:

[Designation of the Representative, and Address]

Bids submitted by fax, telex, telegram or e-mail shall not be entertained and will be rejected.

24.12 [EXECUTING AGENCY] will not be responsible for any delays, loss or non-receipt of Bids.

25. SUBSTITUTION/WITHDRAWAL/MODIFICATION OF BIDS

25.1 Bidders may modify their bids by using the appropriate option for bid modification on e-Procurement Portal, before the deadline for submission of bids. For bid modification and consequential resubmission, the Bidder is not required to withdraw his bid submitted earlier. The last modified Bid submitted by the Bidder within the Bid Due Date shall be considered as the Bid. For this purpose, modification/withdrawal by other means will not be accepted. In online system of bid submission, the modification and consequential re-submission of Bid is allowed any number of times. A bidder may withdraw his Bid by using the appropriate option for Bid withdrawal, before the deadline for submission of Bids. However, if the Bid is withdrawn, re-submission of the Bid is not allowed.

25.2 Bids requested to be withdrawn in accordance with ITB 25.1 shall not be opened.

25.3 No Bid may be withdrawn, substituted, or modified in the interval between the Bid Due Date and the expiration of Bid validity period specified by the Bidder in the Bid Letter or any extension thereof. This will result in the forfeiture of the Bid Security pursuant to ITB 15.5.

PART D. OPENING AND EVALUATION OF BIDS

26. OPENING OF BIDS

26.1 [EXECUTING AGENCY] will publicly open all Bids that are submitted on or before the specified time on the Bid Due Date, and this could be viewed by the Bidders online.

26.2 [EXECUTING AGENCY] will open the soft copy of the Bids (Qualification Proposals) at the time and on the date specified in the Bid Schedule at the following address:

[Designation of the Representative and Address]

The Financial Proposals of the Bids shall remain unopened in the e-Procurement System, until the subsequent public opening in accordance with Clause 28 following the evaluation of the Qualification Proposals of the Bids.

The Bids will be opened in the presence of the Bidders whose designated representatives choose to be present. The Bidders can also view the summary of opening of Bids by logging on to the e-Procurement Portal.

26.3 If the specified date for opening the Qualification Proposals is declared a holiday in [EXECUTING AGENCY]'s office, then the Qualification Proposals will be opened at the specified time and location on the next working day, which will be notified through an addendum.

26.4 [EXECUTING AGENCY] will prepare a record of the opening of the Bids that will include, as a minimum, the names of the Bidders from whom Bids have been received. The Bidders' representatives who are present will be requested to sign the record. The omission of a Bidder's representative's signature on the record will not invalidate the contents and effect of the record.

26.5 Once all the Qualification Proposals have been opened, they will be evaluated for responsiveness and to determine whether the Bidders are qualified for opening of the Financial Proposals. The procedure for evaluation of the Qualification Proposals is set out in Clause 27.

26.6 Once the Qualification Proposals have been evaluated, all Bidders whose Qualification Proposals meet the Qualification Criteria and the Eligibility Criteria, will be informed of a date, time and place for opening of their Financial Proposals. The Financial Proposals will be opened in the presence of the representatives of the qualified Bidders that choose to be present. The procedure for evaluation of the Financial Proposals is set out in Clause 28.

26.7 The qualification of Bidders will be entirely at the discretion of [EXECUTING AGENCY]. Bidders will be deemed to have understood and agreed that no explanation or justification on any aspect of the Bid Process or selection will be given.

26.8 Any information contained in a Bid will not in any manner be construed as binding on [EXECUTING AGENCY], its agents, successors or assigns; but will be binding on the Bidder.

27. DETERMINATION OF RESPONSIVENESS AND EVALUATION OF QUALIFICATION PROPOSALS

27.1 [EXECUTING AGENCY] will examine the Qualification Proposals to determine whether they are complete, whether the documents have been properly signed, and whether the Qualification Proposals are generally in order. If any Bidder is found to be disqualified in accordance with the terms of the RFP or if any Qualification Proposal is found to be non-responsive or not meeting the Technical Capacity or the Financial Capacity, the Bid comprising such Qualification Proposal will be rejected by [EXECUTING AGENCY] and not included for further consideration. No request for alteration, modification, substitution or withdrawal shall be entertained by [EXECUTING AGENCY] in respect of such Bid.

27.2 Prior to evaluation of the Qualification Proposals, the Qualification Proposals will be evaluated to determine responsiveness to the RFP. A Qualification Proposal, shall be considered responsive only if:

(a) the Qualification Proposal and all documents specified in Clause 20 are received in the prescribed formats and original documents are received as specified in Clause 24.7;

(b) the Bid is received by the specified time on the Bid Due Date;

(c) it is signed, marked, and uploaded as stipulated in Clauses 23 and 24;

(d) it contains all the information and documents (complete in all respects) as requested in this RFP; and

(e) it does not contain any condition or qualification.

27.3 [EXECUTING AGENCY] shall then evaluate and determine whether the Bidders who have submitted responsive Qualification Proposals satisfy the Eligibility Criteria and the Qualification Criteria set out at Clause 3 and Clause 4 respectively.

27.4 In order to determine whether the Bidder satisfies the Eligibility Criteria set out at Clause 3 and the Qualification Criteria set out in Clause 4, [EXECUTING AGENCY] will review the documentary evidence of the Bidder's eligibility and qualifications submitted by the Bidder and any additional information which [EXECUTING AGENCY] seeks from the Bidder.

27.5 Where any information provided by a Bidder is found to be patently false or amounting to a material misrepresentation, [EXECUTING AGENCY] reserves the right to reject the Bid submitted by such Bidder.

27.6 Upon completion of evaluation of the Qualification Proposals, and the issuance of Bank’s no objection (if applicable), [EXECUTING AGENCY] will notify in writing those Bidders whose

Bids were considered non-responsive to the RFP or failed to meet the Qualification Criteria set out in this RFP, advising them of the following information:

(a) their Qualification Proposals of Bid failed to meet the requirements of the RFP and the reasons for disqualification;

(b) their Financial Proposals of Bid shall not be opened; and

(c) notify them of the date and time for public opening of Financial Proposals of the Bids.

27.7 [EXECUTING AGENCY] shall, simultaneously, notify in writing those Bidders whose Qualification Proposals have been evaluated as substantially responsive to the RFP and met all Qualifying Criteria, advising them of the following information:

(a) their Qualification Proposal has been evaluated as substantially responsive to the RFP and met the Qualification Criteria;

(b) their Financial Proposal of Bid will be opened at the public opening of the Financial Proposals; and

(c) notify them of the date and time on which their Financial Proposals will be opened.

28. PUBLIC OPENING AND EVALUATION OF FINANCIAL PROPOSALS

28.1 [EXECUTING AGENCY] shall open the Financial Proposals of only those Bidders, whose Qualification Proposals meet the criteria set out in this RFP.

28.2 The Financial Proposals of the Bids shall be opened publicly in the presence of Bidders' designated representatives and anyone who chooses to attend, and this could also be viewed by the Bidders online. [EXECUTING AGENCY] shall open the Financial Proposal of each qualified Bidder and announce the [LOCATION] Facilities Bid Price quoted by each Bidder. [EXECUTING AGENCY] shall prepare the minutes of the online opening of the Financial Proposals which will be signed by the representatives of the Bidders present at the time of opening and upload these minutes for viewing online.

28.3 **Evaluation of Financial Proposals**

(a) Following the opening of the Financial Proposals, [EXECUTING AGENCY] shall evaluate the Financial Proposals for responsiveness. If any Financial Proposal is found:

(i) not to be complete in all respects;

(ii) not duly signed by the authorized signatory of the Bidder/Lead Member;

(iii) not to be in the prescribed format; or

(iv) to contain any handwritten values

(v) not in accordance with the Clause 21.3;

then such Financial Proposal shall be deemed to be substantially non-responsive.

(b) Financial Proposals, which are substantially responsive to the Bidding Documents (comprising RFP and Concession Agreement), shall be evaluated for each STP included in the scope of work, by adding various components of quoted [LOCATION] Facilities Bid Price for as under (on the basis of net present value):

(i) **Design-Build Price (Bid Project Cost) including all taxes & GST**;

(ii) **O&M prices for STP and/or FSTP for 15 years**

= ([LOCATION] Facilities O&M Charges including all taxes & GST for first month after COD) * 180

(iii) **Cost of Energy Consumption for STP and /or FSTP during 15 years of O&M Period**= Average Guaranteed Energy Consumption per MLD flow rate * Base Energy Tariff Rate * STP and/or FSTP Design Capacity * Number of days of the O&M period

For the purpose of this calculation of energy cost:

Average Guaranteed Energy Consumption per MLD flow rate = Average of different Guaranteed Energy Consumption figures in KWh quoted in Bid Price Sheet for treating various combinations of effluent flow rates and BOD;

Base Energy Tariff Rate = INR [Rate]/KWh; and

Number of days of the O&M period = 5475

(iv) **Cost of Land required for the STP and/or FSTP** = [LOCATION] Facilities Land Requirement in sq.m. as quoted by the Bidder * [LOCATION] Facilities Land Price per sq.m.

For the purpose of evaluation, land price = INR [Price] per sqm

(v) **O&M prices for Associated Infrastructure for 15 years**= ([LOCATION] Facilities O&M Charges including all taxes & GST for first month after COD) * 180

(vi) **Cost of Energy Consumption for Associated Infrastructure during O&M period**= Average Guaranteed Energy Consumption per MLD flow rate * Base Energy Tariff Rate * Pumping Capacity* Number of days of the O&M period

For the purpose of this calculation of energy cost:

Average Guaranteed Energy Consumption per MLD flow rate = Average of different Guaranteed Energy Consumption figures in KWh quoted in Bid Price Sheet for treating various combinations of effluent flow rates and BOD;

Base Energy Tariff Rate = INR [Rate]/KWh; and

Number of days of the O&M period = 5475

Total Evaluated [LOCATION] Facilities Bid Price = (i) + (ii) + (iii) + (iv) + (v) + (vi)

(c) [EXECUTING AGENCY] shall compare the Total Evaluated [LOCATION] Facilities Bid Price of all substantially responsive Financial Proposals to determine the Lowest Evaluated Bid.

(d) The Bidder whose Bid has been determined to be the Lowest Evaluated Bid, will be the Preferred Bidder, and shall be selected for award.

(e) The Preferred Bidder shall ordinarily be the Selected Bidder.

(f) If the Bid Price determined for 2 or more qualified Bidders is the same, then the Bidder whose Net Worth is higher shall be the Preferred Bidder.

If the Preferred Bidder is disqualified or rejected for any reason whatsoever, then the procedure set out in Clause 7.2 shall follow.

29. CLARIFICATION ON BIDS

29.1 To facilitate evaluation of the Bids, [EXECUTING AGENCY] may, in its sole discretion, seek clarifications and/or any additional information from any Bidder regarding its Bid (including if the Bid is not signed, marked and sealed in accordance with Clauses 23 and 24). Such clarification(s) will be provided within the time specified by [EXECUTING AGENCY] for this purpose. Any request for clarification(s) and all responses to such clarification(s) will be in writing. Any clarification submitted by a Bidder that is not in response to a request by [EXECUTING AGENCY] will not be considered.

29.2 If a Bidder does not provide clarifications and/or any additional information sought under Clause 29.1 within the prescribed time, its Bid may be liable for rejection. If the Bid is not rejected, [EXECUTING AGENCY] may proceed to evaluate the Bid by construing the particulars requiring clarification to the best of its understanding, and the Bidder will be barred from subsequently questioning such interpretation of [EXECUTING AGENCY].

PART E. AWARD OF PROJECT

30. LETTER OF AWARD (LOA)

30.1 After declaration of the Selected Bidder, [EXECUTING AGENCY] will issue the LOA to the Selected Bidder in duplicate:

(a) declaring it as the Selected Bidder;

(b) accepting its Financial Proposal;

(c) requesting it to sign and return, as acknowledgement, a copy of the LOA within 15 days of receipt of the LOA;

(d) requesting it to submit the Performance Securities and O&M securities in accordance with Clause 16,16A and 16B; and

(e) requesting it to incorporate the Special Purpose Vehicle, which will act as the Concessionaire.

30.2 If the Selected Bidder fails to return a duly signed copy of the LOA to [EXECUTING AGENCY] within 15 days of receipt of the LOA, then [EXECUTING AGENCY] may, unless it consents to an extension, without prejudice to any of its rights under the RFP or law, disqualify the Selected Bidder, revoke the LOA, and forfeit the Bid Security. If [EXECUTING AGENCY] elects to disqualify such Bidder and revoke the LOA, then the procedure set out in Clause 7.2 shall follow.

30.3 After notification of award in accordance with Clause 30.1, [EXECUTING AGENCY] may also notify all other Bidders of the results of the bidding, and shall publish in UNDB online and the Procurement Portal, results of the bidding process and the following information:

(i) name of each Bidder who submitted a Bid;

(ii) results of evaluation of Qualification Proposals;

(iii) names of bidders whose Qualification Proposals were rejected and the reasons for their rejection

(iv) bid prices as read out at opening of Financial Proposals;

(v) name and evaluated prices of each Bid that was evaluated;

(vi) names of bidders whose Financial Proposals were rejected and the reasons for their rejection; and

(vii) name of the Selected Bidder, the Price it offered, and summary scope of the contract awarded.

30.4 [EXECUTING AGENCY] shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with Clause 30.3, requests in writing the grounds on which its bid was not selected.

31. EXECUTION OF THE CONCESSION AGREEMENT

31.1 The Special Purpose Vehicle incorporated by the Selected Bidder shall execute the Concession Agreement in the draft form provided by [EXECUTING AGENCY], with minimal changes or

amendments to reflect facts or to correct minor errors. [EXECUTING AGENCY] shall, within 15 days of the acceptance of the LOA by the Selected Bidder, provide the Selected Bidder with the final execution draft of the Concession Agreement.

31.2 [EXECUTING AGENCY] shall not entertain any request from the Selected Bidder for negotiations of or deviations to the final execution draft of the Concession Agreement provided by [EXECUTING AGENCY] under Clause 31.1.

31.3 If the Selected Bidder seeks to materially negotiate or seeks any material deviations from the final execution draft of the Concession Agreement, [EXECUTING AGENCY] may elect to disqualify the Selected Bidder and revoke the LOA issued to the Selected Bidder. If [EXECUTING AGENCY] elects to disqualify such Bidder and revoke the LOA, then the procedure set out in Clause 7.2 shall follow.

31.4 Subject to satisfaction of the conditions specified in Clause 30.1 and any other conditions specified in the LOA, the Special Purpose Vehicle incorporated by the Selected Bidder shall execute the Concession Agreement within 45 days from the date of acceptance of the LOA by the Selected Bidder.

31.5 If the Special Purpose Vehicle fails to execute the Concession Agreement on or before the date specified in Clause 31.4, [EXECUTING AGENCY] may, unless it consents to an extension, without prejudice to any of its rights under the RFP or law, disqualify the Selected Bidder, revoke the LOA and forfeit the Bid Security. If [EXECUTING AGENCY] elects to disqualify such Bidder and revoke the LOA, then the procedure set out in Clause 7.2 shall follow.

ANNEXURES

ANNEXURE 1A

FORMAT OF BID LETTER

[The bidder must prepare this Letter of Bid on stationery with its letterhead, clearly showing the Bidder's complete name and business address]

Date: Place:

To,

[Designation of the Representative]

[EXECUTING AGENCY]**,**

[LOCATION]

Sub: Bid for [LOCATION] STP PPP Project

Sir/Madam,

Please find enclosed our Qualification Proposal in respect of the above-mentioned project and complying with the Request for Proposal (RFP) issued by the [EXECUTING AGENCY] dated [Date of issue of RFP].

We hereby confirm the following:

1. The Qualification Proposal is being submitted by _____ ***(name of the Bidder/Lead Member)***, who is the Bidder/Lead Member of the Consortium [comprising _____ ***(mention the names of the entities who are Members)*****]**[22], [in association with _____ ***(mention the name of the entity)*** as the Nominated STP Sub-Contractor]**[23]** [, in association with _____ ***(mentioned the name of the entity)*** as the technology provider]**[24]** in accordance with the terms and conditions stipulated in the RFP.

2. We have examined in detail and have understood the terms and conditions stipulated for qualification of the Bidders in the RFP issued by [EXECUTING AGENCY]. We agree and undertake to abide by all these terms and conditions. We acknowledge and agree to submission of an unconditional Bid.

[22] To be deleted if the bidder is a single entity

[23] To be deleted if not applicable

[24] To be deleted if not applicable

3. This statement is made for the express purpose of qualifying as a Bidder for the design, finance, construction, completion, operation and maintenance of the Moradabad Facilities in accordance with the relevant Concession Agreement.

4. We acknowledge that [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) will be relying on the information provided in the Bid and the documents accompanying such Bid for selection of the Bidder for implementing the Project, and we certify that all information provided in the Bid and Annexures is true and correct; nothing has been omitted which renders such information misleading; and all documents accompanying such Bid are true copies of their respective originals.

5. The information submitted with respect to our Qualification Criteria is complete, and strictly as per the requirements stipulated in the RFP. We would be solely responsible for any errors or omissions in our Bid.

6. We shall make available to [EXECUTING AGENCY] any additional information it may find necessary or require to supplement or authenticate the Bid.

7. We acknowledge the right of [EXECUTING AGENCY] to reject our Bid without assigning any reason or otherwise and we hereby waive, to the extent permitted by applicable law, our right to challenge the same on any account whatsoever.

8. We acknowledge the right of [EXECUTING AGENCY] to not award the Project without assigning any reason or otherwise and we hereby waive, to the extent permitted by applicable law, our right to challenge the same on any account whatsoever.

9. We certify that in the 3 Financial Years immediately preceding the Bid Due Date, we or any Member of our Consortium [or Nominated STP Sub-Contractor][25] has not been affected by any of the following circumstances:

   (i) failure to perform any contract, as evidenced by the imposition of a penalty by an arbitral or judicial authority or arbitration award or a judicial pronouncement against us or any Member;

   (ii) expulsion from any project or contract by GoI or any State Government, or its instrumentalities;

   (iii) termination of a contract by GoI or any State Government, or its instrumentalities for breach by us or any Member;

   (iv) having been categorized as a wilful defaulter in accordance with Applicable Laws;

   (v) being subject to proceedings for declaration of or being declared bankrupt, being wound up, or having its affairs administered or conducted by any court, administrator, receiver;

[25] To be deleted if not applicable

(vi) having been declared by a court or other competent authority as being unable to pay its debts, or having made any composition or arrangements with creditors or having had the repayment of its debts suspended; or

(vii) having being convicted or otherwise being found responsible (or having any of its directors, partners, trustees, officers or managers convicted or being found responsible) by any court, tribunal, regulatory, public or other competent authority for a breach of any laws or regulations which:

(a) related to any act of fraud or dishonesty for which a fine, penalty, damages, compensation or other payment was levied against us or any of our directors, partners, trustees, officers or managers; or

(b) resulted in the permanent or temporary suspension of our rights to provide any service or carry on any type of business or operations.

10. We certify that we or any Member of our Consortium [or the Nominated STP Sub-Contractor][26] have not been determined to be ineligible by the World Bank/ any other multi-lateral agency under the guidelines on preventing and combating fraud and corruption.

11. We certify that we or any Member of our Consortium [or the Nominated STP Sub-Contractor][27] have not been barred by GoI or any State Government, or its instrumentalities from participating in any project or being awarded any contract and no such bar subsists on the Bid Due Date.

12. We declare that:

(a) we have examined and have no reservations to the RFP and do not seek any deviations to the RFP, including any Addendum issued by [EXECUTING AGENCY];

(b) we do not have any Conflict of Interest in accordance with Clauses 3.3 of the RFP;

(c) we have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in Clause 3.4 of the RFP, in respect of any tender or request for proposal issued by or any agreement entered into with [EXECUTING AGENCY] or (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) ; and

(d) we hereby certify that we have taken steps to ensure that in conformity with the provisions of the RFP and submission of the Bid, no person acting for us or on our behalf has engaged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

[26] To be deleted if not applicable

[27] To be deleted if not applicable

13. We understand that [EXECUTING AGENCY] may cancel the Bid Process at any time and that [EXECUTING AGENCY] is neither bound to accept any Bid that it may receive nor to invite the Bidders to submit a Bid for the Project, without incurring any liability to the Bidders, in accordance with Clause 7 of the RFP.

14. The [Bidder/ Consortium of which we are the Lead Consortium Member (strike out whichever is not applicable),] satisfies the legal requirements and in our opinion by itself/along with its Members and Associates [and the Nominated STP Sub-Contractor][28] [and the technology provider][29] meets all the Qualification Criteria and Eligibility Criteria laid down in the RFP.

15. We declare that we and our Associates [and the Nominated STP Sub-Contractor][30] [and the technology provider][31] are not submitting separate Bids for the Project.

16. We declare that we are not submitting more than 1 Bid for the Project.

17. We certify that in regard to matters other than security and integrity of the country, we or any Member [or the Nominated STP Sub-Contractor][32] has not been convicted by a court of law or indicted or adverse orders passed by a regulatory authority which could cast a doubt on our ability to undertake the Project.

18. We further certify that in regard to matters relating to security and integrity of the country, we or any Member [or the Nominated STP Sub-Contractor][33] has not been charge-sheeted by any agency of the state or convicted by a court of law.

19. We further certify that no investigation by a regulatory authority is pending either against us or against any Member [or the Nominated STP Sub-Contractor][34] or against our CEO or any of our directors/managers/employees, which could have a material adverse effect on our ability to undertake the Project.

20. I/ We further certify that we are qualified to submit a Bid in accordance with the guidelines for qualification of bidders seeking to acquire stakes in Public Sector Enterprises through the process of disinvestment issued by the GOI vide Department of Disinvestment OM No. 6/4/2001-DD-II dated 13th July, 2001 which guidelines apply mutatis mutandis to the Bid Process.

21. Subject to the disclosures made in Annexure 1L, we further certify that any work contracts previously undertaken by us have not been suspended or terminated and/or performance

[28] To be deleted if not applicable

[29] To be deleted if not applicable

[30] To be deleted if not applicable

[31] To be deleted if not applicable

[32] To be deleted if not applicable

[33] To be deleted if not applicable

[34] To be deleted if not applicable

security called by an employer for reasons related to the non-compliance with any ESHS requirements or safeguard in the past 5 years

22. We undertake that in case due to any change in facts or circumstances during the Bid Process, we attract the provisions of disqualification in terms of the provisions of the RFP, we shall inform [EXECUTING AGENCY] of the same immediately.

23. In the event of us being declared as the Selected Bidder for the Project, we agree to incorporate a Special Purpose Vehicle, which will enter into a Concession Agreement provided by [EXECUTING AGENCY]. We agree not to seek any changes in or deviations from the aforesaid draft and agree to abide by the same.

24. We agree and undertake to abide by all the terms and conditions of the RFP.

25. We have studied the RFP and all the information carefully. We understand that except to the extent expressly set forth in the Concession Agreement, we shall have no claim, right or title arising out of any documents or information provided to us by [EXECUTING AGENCY] or in respect of any matter arising out of or concerning or relating to the Bid Process including the award of the Project.

26. [A power of attorney, by all Members of the Consortium, appointing the Lead Member, authorizing the Lead Member to sign the Bid related documents and sign the Concession Agreement, is included as part of the Bid.][35]

27. A Power of Attorney from the [Bidder/Lead Member][36] authorizing the undersigned as the authorised representative, signatory and contact person who is authorised to perform all tasks including, but not limited to providing information, responding to queries, entering into contractual commitments on behalf of the Bidder etc., in respect of the Project is included as a part of the Bid.

28. [We have submitted an undertaking from the Associate for deploying the expertise of the associate for the development of the project and/ or commitment of the equity during the construction of the project.][37]

29. We certify that in terms of the RFP, our Net Worth is INR [_____] (Rupees in words).

30. We certify that we have the Technical Capacity and Financial Capacity to undertake the Project.

31. We agree and understand that the Bid is subject to the provisions of the RFP. In no case, we shall have any claim or right against [EXECUTING AGENCY] if the Project is not awarded to us or our Bid is not opened.

---

35 To be deleted for a single entity bidder.

36 Delete Lead Member if the Bidder is a single entity.

[37] To be deleted if not applicable. If the Bidder is claiming the credentials of an Associate for meeting the Technical Capacity and/or Financial Capacity requirement, the Bidder shall submit a suitable undertaking in the Associate firm's letter head, in addition to the formats mentioned in this RFP.

32. We have submitted all the relevant information as per the formats specified in the RFP, in 1 original and, where required, 1 copy, along with the requisite Bid Security.

33. Our Bid shall remain valid for a period of not less than 180 days from the Bid Due Date.

For and on behalf of:

Signature:

(Authorised Representative and Signatory)

Name of the Person:

Designation:

ANNEXURE 1B

DESCRIPTION OF THE BIDDER[38]

1.

(a) Name:

(b) Country of incorporation:

(c) Principal Address:

(d) Date of incorporation and/or commencement of business:

(e) GSTIN (GST Number):

2. Brief description of the Bidder including details of its main lines of business: [*Note. Such description shall not exceed 5 type-written pages.*]

3. Details of individual(s) who will serve as the point of contact/communication for [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) :

(a) Name:

(b) Designation:

(c) Address:

(d) Telephone Number:

(e) E-mail Address:

(f) Fax Number:

4. In case of a Consortium:

(a) The information above (1-3) should be provided for all the Members of the Consortium.

(b) Additional information regarding each Member of the Consortium should be provided as per table below:

S. No.	Name of Member	Proposed percentage holding in the total Capital of the SPV
1.		
2.		

[38] The information above (1-3) should be provided for all the Members of the Consortium, Nominated STP Sub-Contractor (if any), Technology Provider (if any).

3.		

5. Details of the Nominated STP Sub-Contractor, *if applicable*:

6. Details of the technology provider (in case an STP technology other than those mentioned in the CPHEEO manual is being proposed):

ANNEXURE 1C

FORMAT OF POWER OF ATTORNEY AUTHORISING THE SIGNATORY OF THE BID

(*on stamp paper*)

Know all men by these presents, We ……..……..……..…… (*name of the Company and address of the registered office*) do hereby irrevocably constitute, nominate, appoint and authorise Mr/ Ms (*name*), ……..……..……..……..……. son/daughter/wife of…….……..……..……. and presently residing at,…….……..……..…… who is presently employed with us/the Lead Member of our Consortium and holding the position of ……..……..……..……..., as our true and lawful attorney (hereinafter referred to as the **Attorney**) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for the [LOCATION] STP PPP Project proposed or being developed by the [EXECUTING AGENCY] ([EXECUTING AGENCY]) and the ----------(Name of the state /national level agency if any)[39], including but not limited to signing and submission of all Bid documents and other documents and writings, participate in investor consultations and other conferences and providing information/responses to [EXECUTING AGENCY], representing us in all matters before [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) , signing and execution of all contracts including the Concession Agreement and undertakings consequent to acceptance of our Bid, and generally dealing with [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) in all matters in connection with or relating to or arising out of our Bid for the Project and/or upon award of the Project to us and/or till the entering into of the Concession Agreement with [EXECUTING AGENCY] and (NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY) .

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE……..……..…. THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS…….DAY OF……., 20…..

For

.....

(Signature, name, designation and address)

Witnesses:

[39] Delete if not applicable

1.

2.

(Notarised)
Accepted

.....
(Signature)

(Name, Title and Address of the Attorney)

Instructions:

(1) The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

(2) *Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*

ANNEXURE 1D

FORMAT OF CERTIFICATE FROM THE STATUTORY AUDITOR FOR NET WORTH AND COMPLIANCE WITH OTHER FINANCIAL QUALIFICATION CRITERIA

(On the letter head of the statutory auditor of the Bidder/Member/Associate)

Based on the books of accounts of ***(insert name of the Bidder/Member/Associate)*** and other published information authenticated by it, this is to certify that:

(a) As on (***insert date***), the ***(insert name of the Bidder/Member/Associate)*** Net Worth is Rs. [.] (Rupees [_____]).

Further, the annual Net Worth as per the balance sheets of the 3 Financial Years (including the above) exceeds Rs. [.] (Rupees [*mention amount in figures and words*]). The details are provided below:

Financial Year	**Net Worth (Rs. Crores)**
Financial Year [ ]	
Financial Year [ ]	
Financial Year [ ]	

The Net Worth of Rs. [.] (Rupees [.] has been calculated in accordance with the terms set out in the Request for Proposal (**RFP**) issued by [EXECUTING AGENCY] on [*insert date*].

(b) ***(insert name of the Bidder/Member/Associate)*** is not affected by and has not been affected by any of the following events, conditions or circumstances in the 3 Financial Years immediately preceding the Bid Due Date:

(i) having been categorized as a willful defaulter in accordance with Applicable Laws;

(ii) being subject to proceedings for declaration of or being declared bankrupt, being wound up, or having its affairs administered or conducted by any court, administrator, receiver; or

(iii) having been declared by a court or other competent authority as being unable to pay its debts, or having made any composition or arrangements with creditors or having had the repayment of its debts suspended.

Name of the auditor:

Seal of the auditor:

Signature:

Name:

Membership Number:

Designation:

Date:

Instructions:

In the event that the Networth of an Associate is being claimed, the Bidder should also provide a certificate in the format set out at Annexure 1G.

ANNEXURE 1E

PART I

FORMAT OF DETAILS OF THE DEVELOPMENT/DESIGN AND CONSTRUCTION EXPERIENCE FOR ELIGIBLE STP/ ETP/ CETP

Item (1)	**Refer Instruction**	**Details of the Project**
Entity claiming experience		
Title and Nature of the project (STP/ ETP/ CETP)		
Capacity of the project and technology		
Entity for which project was developed/designed and constructed	(2)	
Project Cost		
Location		
Date of award, completion/ commissioning of project/status of project	(3), (4)	
Whether credit is being taken for the experience of an Associate (Yes/No)	(5)	
Whether credit is being taken for the experience of a Nominated STP Sub-Contractor (Yes/No)	(6)	
In case of development experience, shareholding in the company developing and owning the project	(7)	

Instructions:

(1) Bidders are expected to provide information in respect of the STP/ ETP/ CETP project for which they are claiming design and construction/development experience. A separate sheet should be filled for each STP project.

(2) In case of development experience, details such as name, postal address, email address and contact details of the authority/implementing agency (i.e., concession grantor) should be provided. In case of design and construction experience, details such as name, postal address, email address and contact details of both the developer (i.e., the concessionaire) and the authority/implementing agency (i.e., the concession grantor) should be provided.

(3) The date of award of the project and completion or commissioning of the project, as the case may be, should be indicated.

(4) In case of development experience, the completion certificate/commissioning certificate issued by the relevant government authority and signed by the executive engineer or an equivalent officer, certifying the date of award of the project, the date of completion/commissioning of the project and that the project has been commissioned and completed (as required under the relevant concession agreement or similar contract) should be provided.
In case of design and construction experience, the completion certificate/commissioning certificate issued by the client and signed by a duly authorized officer, certifying the date of award of the project, the date of completion/commissioning of the project and that the project has been successfully commissioned and completed (as required under the relevant concession agreement or similar contract for the STP) should be provided.

(5) In the event that credit is being taken for the experience of an Associate, the Bidder should also provide a certificate in the format set out at Annexure 1G.

(6) A certificate from the statutory auditor should be furnished stating the shareholding in the entity developing the STP/ ETP/ CETP project in the format set out at Annexure 1F.

(7) Experience for any activity relating to a STP/ ETP/ CETP project shall not be claimed by two or more Members of the Consortium or the Nominated STP Sub-Contractor (if applicable. In other words, no double counting by a Consortium in respect of the same experience shall be permitted in any manner whatsoever.

(8) It may be noted that in the absence of any detail in the above format and/or the certificate(s) issued by the relevant government authority/client, the information would be considered inadequate and could lead to exclusion of the relevant project in determining whether the Bidder meets the Qualification Criteria.

ANNEXURE 1E

PART II

FORMAT OF DETAILS OF THE OPERATION AND MAINTENANCE (O&M) OF ELIGIBLE STP/ ETP/ CETP

Item (1)	**Refer Instruction**	**Details of the Project**
Entity claiming experience		
Title and Nature of the project (STP/ ETP/ CETP)		
Capacity of the project and technology		
Entity for which project being operated and maintained	(2)	
Location		
Duration for which O&M experience is being claimed (From month, year to month, year)	(3)	
Whether credit is being taken for the experience of O&M as an Associate (Yes/No)	(4)	
Whether credit is being taken for the experience of O&M of Nominated STP Sub-Contractor (Yes/No)	(5)	

Instructions:

(1) Bidders are expected to provide information in respect of the STP/ ETP/ CETP for which they are claiming operations and maintenance experience. A separate sheet should be filled for each STP project.

(2) Details such as name, postal address, email address and contact details of the client and/ the relevant government authority (i.e., the implementing agency) should be provided.

(3) The duration of the O&M experience must be at least 12 consecutive months in the 10 years immediately preceding the Bid Due Date.

For each STP/ ETP/ CETP project, a certificate issued by the relevant government authority (i.e., the implementing agency) and signed by the executive engineer or an equivalent officer

certifying the Bidder/Member/Associate that the Bidder/Member/Associate has successfully operated and maintained the STP/ ETP/ CETP for at least 12 consecutive months in the 10 years immediately preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP/ ETP/ CETP should be provided.

(4) In the event that credit is being taken for the experience of an Associate, the Bidder should also provide a certificate in the format set out at Annexure 1G.

(5) It may be noted that in the absence of any detail in the above format and the certificate(s) issued by the relevant government authority, the information would be considered inadequate and could lead to exclusion of the relevant project in determining whether the Bidder meets the Qualification Criteria.

Annexure- 1E Part-III

Technical Capacity of the Bidder[@]

(*Refer to Clauses 4.1 and 3.5 of the RFP*)

Bidder type #	**Proposed Equity Shareholding in Consortium (%)**	**Project Code****	**Cate-gory[$]**	**Experience[≠]** (Equivalent Payments[$$])		
				Payments made/ received for construction of Eligible Projects	Payments made for development of Eligible Projects in Category 1	Revenues appropriated from Eligible Projects in Category 1 and/or
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Single entity Bidder		A				
		B				
		C				
		D……Z				
Consortium Member 1		1a				
		1b				
		1c				
		1d…..1z				
Consortium Member 2		2a				
		2b				
		2c				
		2d…..2z				
Nominated STP Sub-Contractor		3a				
		3b				
		3c				
		3d…..3z				
Threshold Technical Capability						

@ Provide details of only those projects that have been undertaken by the Bidder under its own name and/ or by an Associate and/ or by a project company eligible under Clause 4.1(a)(C)(ii). In case of Category 1, include only those projects which have an estimated capital cost exceeding the amount specified in Clause 4.1(a)(C)(iii) and for Category 2, include only those projects where the payments made/received exceed the amount specified in Clause 4.1(a)(D).

 # A Bidder consisting of a single entity should fill in details as per the row titled Single entity Bidder and ignore the rows titled Consortium Member. In case of a Consortium, the row titled Single entity Bidder may be ignored. In case credit is claimed for an Associate, necessary evidence to establish the relationship of the Bidder with such Associate, in terms of Clause 20.1(g), shall be provided.

*** Refer Annexure-1E Part-IV.*

$ Refer Clause 4.1(a)(B).

¥ In the case of Category 2, construction shall not include supply of goods or equipment except when such goods or equipment form part of a turn-key construction contract/ EPC contract for the project. In no case shall the cost of land be included for submission as an Eligible Project.

$$ For conversion of US Dollars to Rupees, the rate of conversion shall be as per the rate as on date 60 (sixty) days prior to the Bid Due Date. In case of any other currency, the same shall first be converted to US Dollars as on the date 60 (sixty) days prior to the Bid Due Date, and the amount so derived in US Dollars shall be converted into Rupees at the aforesaid rate. The conversion rate of such currencies shall be the daily representative exchange rates published by the International Monetary Fund for the relevant date.

Annexure 1E Part-IV

Details of Eligible Projects

Project Code:

Item (1)	**Refer Instruction**	**Particulars of the Project** (3)
Entity Claiming Experience		
Capacity of the Project & technology		
Title & nature of the project		
Category	3	
Year-wise (a) payments received/ made for construction, (b) payments made for development of PPP	4	**Financial Year** / **Payment (In Cr.)** FY FY FY FY FY **Total**
Entity for which the project was constructed/ developed	5	
Location		
Project cost	6	
Date of award, completion/ commissioning of project/ contract		
Date of completion/ commissioning	7	
Equity shareholding (with period during which	8	
Whether credit is being taken for the Eligible Experience of an Associate (Yes/ No)	13	

Instructions:

1. *Bidders are expected to provide information in respect of each Eligible Projects in this Annex. The projects cited shall comply with the eligibility criteria specified in Clause 4.1(a)(C) and 4,1(a)(D) of the RFP, as the case may be. Information provided in this section is intended to serve as a backup for information provided in the Bid.*

2. *A separate sheet should be filled for each Eligible Project.*
3. *Refer to Clause 4.1(a)(B) of the RFP for category number.*
4. *The total payments received/ made and/or revenues appropriated for each Eligible Project are to be stated in Annexure-1E Part-III. The figures to be provided here should indicate the break-up for the 5 (five) financial years as mentioned in the table. For Category 1, expenditure on development of the project and/or revenues appropriated, as the case may be, should be provided, but only in respect of projects having an estimated capital cost exceeding the amount specified in Clause 4.1(a)(C)(iii). In case of Category 2, payments made/ received only in respect of construction should be provided, but only if the amount paid/received exceeds the minimum specified in Clause 4.1(a)(D). Payment for construction works should only include capital expenditure and should not include expenditure on repairs and maintenance.*
5. *In case of projects in Category 1, particulars such as name, address and contact details of owner/ Authority/ Agency (i.e. concession grantor, counter party to PPA, etc.) may be provided. In case of projects in Category 2, similar particulars of the client need to be provided.*
6. *Provide the estimated capital cost of Eligible Project. Refer to Clauses 4.1(a)(C) and 4.1(a)(D).*
7. *For Category 1, the date of commissioning of the project, upon completion, should be indicated. In case of Category 2, date of completion of construction should be indicated. In the case of projects under construction, the likely date of completion or commissioning, as the case may be, shall be indicated.*
8. *For Category 1, the equity shareholding of the Bidder, in the company owning the Eligible Project, held continuously during the period for which Eligible Experience is claimed, needs to be given (Refer Clause 4.1(a)(C)).*
9. *Experience for any activity relating to an Eligible Project shall not be claimed by two or more Members of the Consortium. In other words, no double counting by a Consortium in respect of the same experience shall be permitted in any manner whatsoever. Further, in case of a Nominated STP Sub-Contractor, the experience for any activity relating to an Eligible Project shall not be claimed by both the Bidder and the Nominated STP Sub-Contractor.*
10. *Certificate from the Bidder's statutory auditor or its respective clients shall be furnished as per formats below for each Eligible Project. In jurisdictions that do not have statutory auditors, the auditors who audit the annual accounts of the Bidder/ Member/Associate/ Nominated STP Sub-Contractor may provide the requisite certification.*

11. *If the Bidder is claiming experience under Category 1, it should provide a certificate from its statutory auditor in the format below:*

Certificate from the Statutory Auditor regarding PPP projects

Based on its books of accounts and other published information authenticated by it, this is to certify that ……. (name of the Bidder/Member/Associate/ Nominated STP Sub-Contractor) is/ was an equity shareholder in (title of the project company) and holds/held Rs……. (Rupees ……...) of equity (which constitutes …… %[40] of the total paid up and subscribed equity capital) of the project company from ……..(date) to …….. (date)[41]. The project was/is likely to be commissioned on …….. (date of commissioning of the project).

We further certify that the total estimated capital cost of the project is Rs. ……

(Rupees ……..……..), of which Rs…….. (Rupees ……..……..) of capital expenditure was incurred during the past five financial years as per year-wise details noted below:

_____

_____

_____

We also certify that the eligible annual revenues collected and appropriated by the aforesaid project company in terms of Clauses 4.1(a)(B) and 4.1(a)(C)(iv) of the RFP during the past five financial years were Rs. ……... as per year-wise details noted below:

Name of the audit firm:

(Signature, name and designation of the authorised signatory)

Seal of the audit firm:

Date:

[40] Refer Instruction 8 to this Annexure.

[41] In case the project is owned by the Bidder company, this language may be suitably modified to read: "It is certified that …….. (name of Bidder) constructed and/ or owned the …….. (name of project) from …….. (date) to …….. (date)."

12. *If the Bidder is claiming experience under Category 2, it should provide a certificate from its statutory auditors or the client in the format below:*

Certificate from the Statutory Auditor/Client regarding Construction Works

Based on its books of accounts and other published information authenticated by it, {this is to certify that ……..……(name of the Bidder/Member/Associate/ Nominated STP Sub-Contractor) is/ was engaged by ……. (title of the project company) to execute …… (name of the project) for ……..…… (nature of project)}[42]. The construction of the project commenced on ……..(date) and the project was/is likely to be commissioned on …….. (date, if any). We further certify that the total estimated capital cost of the project is Rs. ..…… (Rupees ……..……..), of which ……..….. (name of the Bidder/Member/Associate/ Nominated STP Sub-Contractor) received/ paid Rs …….. (Rupees ……..……), in terms of Clauses 4.1(B) and 4.1(a)(D) of the RFP, during the past five financial years as per year-wise details noted below:

_____

_____

{It is further certified that the payments/ receipts indicated above are restricted to the share of the Bidder who undertook these works as a partner or a member of Joint Member/ Consortium.}[43]

Name of the audit firm:

(Signature, name and designation of the authorised signatory)

Seal of the audit firm:

Date:

[42] In case the Bidder owned the Eligible Project and engaged a contractor for undertaking the construction works, this language may be modified to read: " this is to certify that ……..…… (name of Bidder/ Member/ Associate) held 26% or more of the paid up and subscribed share capital in the…….…… (name of Project company) when it undertook construction of the ……..…….. (name of Project) through……..……..…… (name of the contractor).

[43] This certification should only be provided in case of jobs/ contracts, which are executed as part of a partnership/ joint venture/ consortium. The payments indicated in the certificate should be restricted to the share of Bidder in such partnership/ joint venture/ consortium. This portion may be omitted if the contract did not involve a partnership/ joint venture/ consortium. In case where work is not executed by partnership/ joint venture/ consortium, this paragraph may be deleted.

13. *In the event that credit is being taken for the Eligible Experience of an Associate, the Bidder should also provide a certificate in the format provided in Annexure 1G.*

ANNEXURE 1F

FORMAT OF CERTIFICATE FROM THE STATUTORY AUDITOR REGARDING DEVELOPMENT EXPERIENCE

Based on its book of accounts and other published information authenticated by it, this is to certify that …….…….…….. *(name of the Bidder/Member/Associate/ Nominated STP Sub-Contractor)* is/was an equity shareholder in …….. *(title of the project company) which developed an STP/ ETP/ CETP [strikeout whichever is not applicable] of [Insert capacity of STP/ ETP/ CETP] MLD at [Insert location of STP/ ETP/ CETP] for [Insert name of implementing agency/client]* and held/holds Rs. ……cr. (Rupees …….…….…….. crore) of equity (which constitutes ……..% of the total paid up and subscribed equity capital) of [*Insert name of the project company*] as on the [Bid Due Date/commercial operations date/date of issuance of the completion certificate or any other equivalent certificate by the relevant government authority/client.] for such STP/ ETP/ CETP.

Name of the audit firm:

Seal of the audit firm: (Signature, name and designation of the authorised signatory)

Date:

ANNEXURE 1G

FORMAT OF SELF-ATTESTED CERTIFICATE REGARDING ASSOCIATE

Self-Attested Certificate regarding Associate

Based on the authenticated record of [*Insert name of the Company*], this is to certify that [more than 50% (fifty per cent) of the subscribed and paid up voting equity of ……..…….….. (name of the Bidder/Member/ Associate) is held, directly or indirectly, by ….……..…….……... (name of Bidder/Member/Associate)

By virtue of the aforesaid, the latter exercises control over the former, who is an Associate.]

[…….…….. (name of Bidder/Member/Associate) has the power, directly or indirectly, to direct or influence the management and policies of …….…….. (Bidder/Member) by operation of law, contract or otherwise]. By virtue of the aforesaid, the former exercises control over the latter, who is an Associate.]

A brief description of the said equity held, directly or indirectly, is given below:

{Describe the share-holding of the Bidder/Member and the Associate. In the event the Associate is under common Control with the Associate/Consortium Member or the Control is exercised by operation of law, the relationship may be suitably described and similarly certified herein.}

Name of the Bidder/Member: Seal of the Bidder/Member:

(Signature, name and designation of the authorised signatory).

Date:

ANNEXURE 1H

FORMAT OF INFORMATION ON LITIGATION

(To be provided by the Bidder/each Member/ Nominated STP Sub-Contractor)

S. No.	Name	Forum and Counterparty	Brief Description of the matter	Estimated financial liability	Current Status of Litigation	Orders passed Against the Bidder/Member/ Nominated STP Sub-Contractor

ANNEXURE 1I

FORMAT OF BID SECURITY (BANK GUARANTEE)

(On stamp paper)

B.G. No: **Dated:**

WHEREAS, ……(*name of Bidder including names of all Joint Venture Participants*) (hereinafter called "the Bidder") has submitted its Bid (hereinafter called the "Bid") dated (*date*) for the performance of (*name of Contract*).

KNOW ALL PEOPLE by these presents that We ……. (name of Bank) of ……. (name of country) having our registered office at …… (hereinafter called "the Bank") are bound unto…… (hereinafter called "the Owner") in the sum of ……for which payment well and truly to be made to the said Owner, the Bank binds itself, its successors, and assigns by these presents.

[The Bidder should insert the amount of the guarantee in words and in figures. This figure should be the same amount as set out in ITB Section 15.1 and the Bid Data Sheet. The details related to the Bid Security are set out in the same ITB Section 15]

The CONDITIONS of this obligation are:

a. if the Bidder withdraws its Bid during the Bid Validity Period; or

b. if the Bidder, having been notified of the acceptance of its Bid by the Owner during the period of Bid validity,

   1. fails to sign the Form of Contract in accordance with and when required by ITB Section 23; or

   2. fails to provide the performance security to the Owner in accordance with and when required by ITB Section 16.

We undertake to pay to the Owner up to the above amount upon receipt of its first written demand, without the Owner having to substantiate its demand, provided that in its demand the Owner will note that the amount claimed by it is due to it owing to the occurrence of one or more of the conditions set out above, specifying the occurred condition or conditions.

This Guarantee will remain in full force up to and including 45 days after the expiry of the Bid

Validity Period and it may be extended by the Owner in accordance with the Bidding Documents, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date or the extended date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

SEALED with the Common Seal of the said Bank this ……. day of ……., *[Year]*.

WITNESS	SIGNATURE OF THE BANK
(Signature, name and address)	SEAL
	Name: _____
	Position: _____

ANNEXURE 1J

FORMAT OF POWER OF ATTORNEY FOR APPOINTING LEAD MEMBER

(*On requisite stamp paper*)

Whereas the [EXECUTING AGENCY] ([EXECUTING AGENCY]) has invited Bids from interested parties for the **(NAME OF THE STATE /NATIONAL LEVEL AGENCY IF ANY)** – [EXECUTING AGENCY] **[LOCATION] STP PPP Project** (the **Project**).

Whereas, ……..…….…….. and ……..…….…….…….…….. (collectively, the **Consortium**) being Members of the Consortium are interested in submitting a Bid for the Project in accordance with the terms and conditions of the Request for Proposal (**RFP**) issued by [EXECUTING AGENCY] on [*Insert Date*], and

Whereas, it is necessary for the Members of the Consortium to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's Bid for the Project and its implementation.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS

We, ……..…….…….. having our registered office at ……..…….…….., ……..……...having our registered office at ……..……..., and ……..…….……... having our registered office at ….…….…….…..., (hereinafter collectively referred to as the **Principals**) do hereby irrevocably designate, nominate, constitute, appoint and authorise …….…….... having its registered office at ……..…….…….., being one of the Members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the **Attorney**). We hereby irrevocably authorize the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Consortium and any one of us during the Bid Process and, in the event the Consortium is awarded the Project, during the implementation of the Project and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the submission of the Consortium's Bid for the Project, including but not limited to signing and submission of all Bid related documents and other documents and writings, participate in bidders and other conferences, respond to queries, submit information/documents, sign and execute contracts and undertakings consequent to acceptance of the Bid of the Consortium and generally to represent the Consortium in all its dealings with [EXECUTING AGENCY] and the ---------- (Name of the state /national level agency if any)[44], and/or any other government agency or any person, in all matters in connection with or relating to or arising out of the Consortium's Bid for the Project and/or upon award of the Project and/or till the Concession Agreement

[44] Delete if not applicable.

is entered into with [EXECUTING AGENCY] and the ----------(Name of the state /national level agency if any)[45].

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/Consortium.

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS….……DAY OF…….……., 20……..

For…….…….……...
(Signature)

…….……..…
(Name & Title)

For…….…….……...
(Signature)

…….……..…
(Name & Title)

Witnesses:

1.

2.

…….…….…….……

(To be executed by all the Members of the Consortium)

(Notarised)
Accepted

…….…….……...
(Signature)

(Name, Title and Address of the Attorney)

Instructions:

(1) The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it

[45] Delete if not applicable

is so required, the same should be under common seal affixed in accordance with the required procedure.

(2) Also, wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.

(3) For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the power of attorney provided by the Bidders from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.

ANNEXURE 1K

FORMAT OF JOINT BIDDING AGREEMENT

THIS JOINT BIDDING AGREEMENT ("**Agreement**") is entered into on this [●] Day of [●] 201[●] AMONGST

1. [●], with its registered office at (referred to as the **First Part** which expression will, unless repugnant to the context include its successors and permitted assigns);

AND

2. [●], with its registered office at (referred to as the **Second Part** which expression will, unless repugnant to the context include its successors and permitted assigns);

[[AND

3. [●], with its registered office at [●] (referred to as the **Third Part** which expression will, unless repugnant to the context include its successors and permitted assigns).]

The above mentioned parties of the FIRST [and] [,] SECOND, [and] [,] [THIRD] are collectively referred to as the **Parties** and each is individually referred to as a **Party**.

WHEREAS

(A) [EXECUTING AGENCY] (referred to as [EXECUTING AGENCY], which expression will, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited Bids by its Request for Proposal No_____ dated [ ] (the **RFP**) for selection of a

(B) Bidder for the design, finance, construction, completion, operation and maintenance of the Facilities on the relevant Site in [LOCATION], on a hybrid annuity PPP basis in accordance with the Concession Agreement (the **Project**).

(C) The Parties are interested in jointly bidding for the Project as Members of a Consortium and in accordance with the terms and conditions of the RFP.

(D) It is a necessary condition under the RFP that the Members will enter into a Joint Bidding Agreement and furnish a copy of it with the Bid.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and interpretations

In this Agreement, the capitalised terms will, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2. Consortium

2.1 The Parties do hereby irrevocably constitute a consortium (the **Consortium**) for the purposes of jointly participating in the Bid Process for the Project.

2.2 The Parties hereby undertake to participate in the Bid Process only through this Consortium and not individually and or through any other consortium constituted for the Project, either directly or indirectly or through any of their Associates.

3. Covenants

3.1 The Parties hereby undertake that in the event the Consortium is declared the Selected Bidder and awarded the Project, it will incorporate a special purpose vehicle (**SPV**) under the Companies Act for entering into the Concession Agreement with (Name of the state /national level agency if any)[46] and [EXECUTING AGENCY] for undertaking the Project.

3.2 The Members of the Consortium undertake that they shall be jointly and severally responsible and liable for all matters arising out of or in relation to this RFP.

4. Role of the Parties

4.1 The Parties hereby agree that Party of the First Part will be the Lead Member of the Consortium and will have the power of attorney from all Parties and bind all Parties for and in conducting all business for and on behalf of the Consortium during the Bid Process and, if the Consortium is declared as the Selected Bidder, during the execution of the Project.

4.2 Party of the Second Part will be [ ].

4.3 Party of the Third Part will be [ ]

5. Shareholding in the SPV

5.1 The Parties agree that the proportion of shareholding among the Parties in the SPV will be as follows:

First Party:

Second Party:

[Third Party:]

5.2. The Parties undertake that:

(a) the First Party, acting as the Lead Member of the Consortium, will control the SPV and subscribe for and hold a minimum of 26% of the total Capital and voting rights of the SPV from the Effective Date until 3 years after the [LOCATION] Facilities COD, and

[46] Delete if not applicable. In such a case the agreement will be bipartite.

(b) the [Second and/or the Third] Party, whose [Technical Capacity and/or Financial Capacity] is being assessed, will hold at least 26% of the total Capital and voting rights of the SPV from the Effective Date until 3 years after the [LOCATION] Facilities COD.

5.3. The Parties undertake that they will comply with all equity lock-in requirements set out in this Agreement and in the Concession Agreement.

6. Representations of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

(a) such Party is duly organised, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;

(b) the execution, delivery and performance by such Party of this Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:

(i) require any consent or approval not already obtained;

(ii) violate any applicable law presently in effect and having applicability to it;

(iii) violate the memorandum and articles of association, by-laws or other applicable organisational documents;

(iv) violate any clearance, permit, concession, grant, license or other governmental authorisation, approval, judgment, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or

(v) create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;

(c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it;

(d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Associates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement, and

(e) there is no suspension or termination of any contract of any Party and/or calling of any performance security by an employer for reasons related to the non-compliance by such Party with any ESHS requirements or safeguard in the past 5 years that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement.

7. Termination

This Agreement will be effective from the date hereof and will continue in full force for the entire duration of the Project in accordance with the Concession Agreement, in case the Project is awarded to the Consortium. However, in case the Consortium is not selected for award of the Project, the Agreement will stand terminated upon return of the Bid Security as per the RFP.

8. Miscellaneous

8.1 This Agreement will be governed by the laws of India.

8.2 The Parties acknowledge and accept that this Agreement will not be amended by the Parties without the prior written consent of [EXECUTING AGENCY].

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED For and on behalf of the PARTY OF THE FIRST PART by:	SIGNED, SEALED AND DELIVERED For and on behalf of the PARTY OF THE SECOND PART by:
Signature) (Name) (Designation	Signature) (Name) (Designation
SIGNED, SEALED AND DELIVERED For and on behalf of the PARTY OF THE THIRD PART	

Signature) (Name) (Designation	

In the presence of:

1 2.

Instruction:

1. The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

ANNEXURE 1L

FORMAT OF ENVIRONMENTAL, SOCIAL, HEALTH, AND SAFETY PERFORMANCE DECLARATION

[The following table shall be filled by the Bidder or each Member, in case of a Consortium and the Nominated STP Sub-Contractor (if applicable)]

Bidder's Name: *[insert full name]*

Date: *[insert day, month, year]*

Member: *[insert full name]*

RFP No. and title: *[insert RFP number and title]*

Page *[insert page number]* of *[insert total number]* pages

Environmental, Social, Health, and Safety Performance Declaration in accordance with Section II, Eligibility and Qualification Criteria			
☐ **No suspension or termination of contract**: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental, Social, Health, and Safety (ESHS) performance, as specified in Section II, Eligibility and Qualification Criteria, Clause 3.5(d), at any time in the past 5 years preceding the Bid Due Date.			
☐ **Declaration of suspension or termination of contract**: The following contract(s) has/have been suspended or terminated and/or performance security called by an employer(s) for reasons related to Environmental, Social, Health and Safety (ESHS) performance, as specified in Section II, Eligibility and Qualification Criteria, Clause 3.5(d), in the past 5 years preceding the Bid Due Date.			
Year	**Suspended or terminated portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and US$ equivalent)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name, number, and any other identification]* Name of Employer: *[insert full name]*	*[insert amount]*

		Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination: *[indicate main reason(s)]*	
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination: *[indicate main reason(s)]*	*[insert amount]*
…	…	*[list all applicable contracts]*	…

Performance security called by an employer(s) for reasons related to ESHS performance

Year	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US$ equivalent)
[insert year]	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for calling of performance security: *[indicate main reason(s)]*	*[insert amount]*

ANNEXURE 1M

Undertaking for the Nominated STP Sub-Contractor

(*On the Rs. 100 stamp paper and to be duly notarised*)

From

[*insert name of the entity issuing the undertaking*]

[*insert address of the entity issuing the undertaking*]

Date: [*insert date*]

To

[EXECUTING AGENCY]

[ ]

Dear Sir,

Sub: Undertaking from the Nominated STP Sub-Contractor for the *[Name of the Project]*

We, the undersigned ……. [insert name of the entity issuing the undertaking] hereby undertake and confirm that we have [developed]/[designed and constructed][47] and operated and maintained the following [Sewage Treatment Plant/ Effluent Treatment Plant/ Common Effluent Treatment Plant]:

Title and Nature of the Project	**Capacity of the Project**	**Location**	**Entity for which the [STP/ETP/CETP] was developed and/or designed and constructed and/or constructed**	**Date of completion**

The following information and relevant documents are being submitted along with the Bid to satisfactorily meet the RFP conditions:

1. Total payments received/ made and/ or revenues appropriated for each Eligible Project in the format set out in Annexure 1E Part-IV of the RFP document along with the certificate from the statutory auditor, meeting the requirement of 25% of the Threshold Technical Capability as per Clause 4.1(a)(B) of the RFP, amounting to Rs. _____ (Rupees _____);
2. certificate(s) issued by relevant government authorities to demonstrate that the [STP/ETP/CETP], experience for which is being claimed in the Bid, was developed and/or

[47] Delete as applicable.

designed and constructed in the 10 years immediately preceding the Bid Due Date in accordance with the contract executed for the STP/ETP/CETP;

3. certificate(s) issued by relevant government authorities to demonstrate that the STP/ETP/CETP, experience for which is being claimed in the Bid, was operated and maintained for any 12 consecutive months in the 10 years immediately preceding the Bid Due Date in accordance with the contract executed for the [STP/ETP/CETP].

We hereby agree that if [*Insert name of the single Bidder/details of Consortium*] is selected as the Selected Bidder,

1. we shall enter into a contract with the Special Purpose Vehicle incorporated by the Selected Bidder to develop the Sewage Treatment Plant(s) for *[Name of the Project]* in accordance with the Concession Agreement;
2. we shall submit the hard copy of the original contract, as stated above, to the [EXECUTING AGENCY] on or before the Effective Date;
3. we shall submit to [EXECUTING AGENCY], prior to the Appointed Date, an unconditional and irrevocable bank guarantee for an amount corresponding to 50% of the Performance Securities in accordance with the Concession Agreement. We hereby undertake that, as per the conditions stated in the Concession Agreement, the Performance Securities submitted shall be liable to be forfeited as per the Clause 4.1(a)(F)(iii) of the RFP document.
4. we shall submit to [EXECUTING AGENCY], within 60 days of the relevant Construction Completion Date or 30 days before the relevant COD, whichever is earlier, an unconditional and irrevocable bank guarantee for an amount corresponding to 50% of the O&M Securities in accordance with the Concession Agreement. We hereby undertake that, as per the conditions stated in the Concession Agreement, the O&M Securities submitted shall be liable to be forfeited as per the Clause 4.1(b)(iii) of the RFP document.

We hereby confirm that the information provided above is true and correct to the best of our knowledge, and no material fact has been concealed.

WHEREOF WE, …… [insert name of the entity issuing the undertaking], HAVE EXECUTED THIS UNDERTAKING ON THIS ……. DAY OF ……., 20……

For

……..……..

(Signature, name, designation and address)

(Notarised)

Accepted

……..……..…

(Signature)

(Name, Title and Address of the Attorney)

Instructions:

(1) For an undertaking executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the sub-contractor undertaking provided by the Bidders from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.

ANNEXURE 2

EXPERIENCE CERTIFICATE FOR BIOGAS POWER PLANT

(*On the letter head of the Bidder/ Member*)

From

[*insert name of Bidder/Member*]
[*insert address of Bidder/Member*]

Date: [*insert date*]

To

[Designation of the Representative]

[EXECUTING AGENCY]**,**

[LOCATION] (

We, the undersigned[*insert name of the Bidder/ Member*] having read, examined and understood in detail the RFP for development of the Project, hereby confirm that we have [developed]/ [designed and constructed][48] the following biogas power plant based on STP effluent:

Capacity of the biogas power plant	Location	Entity for which biogas plant was set up	Date of completion	Duration for which O&M experience is being claimed (From month, year

The certificate(s) issued by relevant government authorities to demonstrate that (1) the biogas power plant was developed or designed and constructed in the 10 years immediately preceding the Bid Due Date in accordance with the contract executed for the biogas power plant; and (2) the biogas power plant [was/has been] in successful operation for at least 24 months in the 10 years immediately preceding the Bid Due Date; have been attached.

If selected as the Selected Bidder, we undertake that the Concessionaire shall set up a biogas power plant in accordance with the Concession Agreement.

Dated the_____ day of_____ 2019.

[48] Delete as applicable.

……..……

(Name and signature of Authorized Signatory)

ANNEXURE 3

CONSENT LETTER FOR EXPERIENCE OF BIOGAS POWER PLANT

(*On the letter head of the entity issuing the consent letter*)

From

[*insert name of the entity issuing the consent letter*]

[*insert address of the entity issuing the consent letter*]

Date: [*insert date*]

To

[Designation of the Representative]

[EXECUTING AGENCY]**,**

[LOCATION] (

Dear Sir,

Sub: Consent Letter for Experience for Biogas Power Plant for the [LOCATION] STP PPP Project

We, the undersigned [*insert name of the entity issuing the consent letter*] hereby confirm that we have [developed]/ [designed and constructed][49] the following biogas power plant based on STP effluent:

Capacity of the biogas power plant	Location	Entity for which biogas plant was set up	Date of completion	Duration for which O&M experience is being claimed (From month, year to month, year)

The certificate issued by relevant government authorities/clients to demonstrate that (1)the biogas power plant was developed or designed and constructed in the 10 years immediately preceding the Bid Due Date in accordance with the contract executed for the biogas power plant; and (2) the biogas power plant [was/has been] in successful operation for at least 24 months in the 10 years immediately preceding the Bid Due Date; have been attached.

We hereby agree that if [*Insert name of the single Bidder/details of Consortium*] is selected as the Selected Bidder, we shall enter into a contract with the special purpose vehicle incorporated by the Selected Bidder to develop a biogas power plant at the [Location Name] Site in accordance with the Concession Agreement:

Dated the_____ day of_____ 2019.

[49] Delete as applicable.

Thanking you,

Yours truly,

…….……..……...

(Name and signature of Authorized Signatory)

ANNEXURE 4: FORM OF PERFORMANCE SECURITY

FORM OF PERFORMANCE SECURITY

_____*[Bank's Name, and Address of Issuing Branch or Office]*

Beneficiary: *[Name and Address of Owner]*

Date:

PERFORMANCE GUARANTEE NO.: ____

We have been informed that *[name of Operator] (*hereinafter called "the Bidder") has entered into Contract No. *[reference number of the contract]* dated_____with you, concerning a contract to design, build, operate and transfer STP, New/Replace Outfall/Interceptor sewer Line Pumping Stations, all appurtenant structures and allied works in the city of [LOCATION] (hereinafter called "the Contract") [, with _____ *[name of the Nominated STP Sub-Contractor]* (hereinafter called "the Sub-Contractor") *being nominated by the Bidder as the Sub-Contractor for STP construction and operation and maintenance*.][50].

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the [Bidder/Sub-Contractor][51], we___*[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of*[amount in figures]* (_____) *[amount in words]*, upon receipt by us of your first demand in writing accompanied by a written statement stating that the [Bidder/Sub-Contractor][52] is in breach of its obligations under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the earlier of:

(a) six months after the End Date, as defined in the Contract; or

(b) six months after the date of termination of the Contract pursuant to its terms. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

Yours truly,

[50] To be deleted if not applicable

[51] Strikeout whichever is not applicable

[52] Strikeout whichever is not applicable

[Name of Bank]

_____

Authorised Signature

ANNEXURE 5: FORMAT OF ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY (ESHS) PERFORMANCE SECURITY

ESHS Demand Guarantee ESHS Demand Guarantee

[*On requisite stamp paper*]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: [EXECUTING AGENCY] with its registered office – *[insert address]*

Date: *[Insert date of issue]*

ESHS PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ (hereinafter called **the Applicant**) has been selected as the Selected Bidder for award of contract by the Beneficiary for undertaking the Project (hereinafter called the **Contract**).

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee to secure the Concessionaire's ESHS obligations is required to be submitted by the Applicant prior to signing of the Contract.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of INR [] (Rupees []) ((*Insert amount equal to [1%] of the relevant Bid Project Cost*), such sum being payable in the types and proportions of currencies in which the contract price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its Environmental, Social, Health and Safety (ESHS) obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall be valid for the term of the Contract, and any demand for payment under it must be received by us at this office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

ANNEXURE 6

LIST OF PUBLIC FINANCIAL INSTITUTIONS

Presently the following institutions have been declared as Public Financial Institutions:

1. The Industrial Credit and Investment Corporation of India Limited, a company formed and registered under the Indian Companies Act, 1913;
2. The Industrial Finance Corporation of India, established under section 3 of the Industrial Finance Corporation Act, 1948;
3. The Industrial Development Bank of India, established under section 3 of the Industrial Development Bank of India Act, 1964;
4. The Life Insurance Corporation of India, established under section 3 of the Life Insurance Corporation Act, 1956;
5. The Unit Trust of India established under section 3 of the Unit Trust of India Act, 1963.
6. The Infrastructure Development Finance Company Limited, a company formed and registered under the Companies Act, 1956.
7. The Industrial Reconstruction Corporation of India;
8. The General Insurance Corporation of India;
9. The National Insurance Company Limited;
10. The New India Assurance Company Limited;
11. The Oriental Fire and General Insurance Company Limited;
12. The United Fire and General Insurance Company Limited;
13. Tourism Finance Corporation of India Limited;
14. IFCI Venture Capital Funds Limited;
15. Technology Development and Information Company of India Limited;
16. Power Finance Corporation Limited;
17. National Housing Bank;
18. Small Industries Development Bank of India;
19. Rural Electrification Corporation Ltd.;
20. Indian Railway Finance Corpn. Ltd.;
21. Industrial Finance Corporation of India Ltd.;
22. Andhra Pradesh State Financial Corporation;
23. Assam Financial Corporation;
24. Bihar State Financial Corporation;
25. Delhi Financial Corporation;
26. Gujarat State Financial Corporation;

27. Haryana Financial Corporation;
28. Himachal Pradesh Financial Corporation;
29. Jammu & Kashmir State Financial Corporation;
30. Karnataka State Financial Corporation;
31. Kerala Financial Corporation;
32. Madhya Pradesh Financial Corporation;
33. Maharashtra State Financial Corporation;
34. Orissa State Financial Corporation;
35. Punjab Financial Corporation;
36. Rajasthan Financial Corporation;
37. Tamilnadu Industrial Development Corporation Limited;
38. Uttar Pradesh Financial Corporation;
39. West Bengal Financial Corporation;
40. Indian Renewable Energy Development Agency Ltd.;
41. North Eastern Development Finance Corpn. Ltd.;
42. Housing & Urban Development Corpn. Ltd.;
43. Export-Import Bank of India;
44. National Bank for Agriculture & Rural Development (NABARD);
45. National Co-operative Development Corporation (NCDC);
46. National Dairy Development Board;
47. Pradeshiya Industrial and Investment Corporation of U.P. Limited;
48. Rajasthan State Industrial Development and Investment Corporation Limited;
49. SICOM Limited;
50. West Bengal Industrial Development Corporation Limited;
51. Tamil Nadu Industrial Development Corporation Limited;
52. Punjab State Industrial Development Corpn. Ltd. (PSIDC);
53. EDC Limited;
54. Tamil Nadu Power Finance and Infrastructure Development Corporation Ltd.;
55. Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited;
56. Kerala Power Finance Corporation Limited;
57. Kerala State Power & Infrastructure Finance Corporation Limited.

However, Bidders may check the correctness of above list before submitting the bid.

Annexure -7

Declaration regarding customs/excise duty exemption for materials to be purchased for use in building the sewerage network including pumping stations etc.

(Bidder's Name and Address)

To:

Dear Sir:

Ref: ----------[Name of the Project] - Certificate for Import/Procurement of Goods and materials/Construction Equipment.

1. We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Owner will not compensate us.

2. We are furnishing below the information required by the [***EXECUTING AGENCY***] for issue of the necessary certificates in terms of the Government of India Central Excise Notification No. 108/95 along with all subsequent amendments including the amendment dt.01-03-2008 and Customs Notification No. 85/99.

3. The goods, equipment and materials for which certificates are required are as under:

Items	**Make/ Brand Name /Class**	**Capacity [where applicable]**	**Quantity**	**Value**	**State whether it will be procured locally or imported [if so from which country]**	**Remarks regarding justification for the quantity and their usage in setting up Sewerage Network**
Goods						
[a]						
[b]						

Items	**Make/ Brand Name /Class**	**Capacity [where applicable]**	**Quantity**	**Value**	**State whether it will be procured locally or imported [if so from which country]**	**Remarks regarding justification for the quantity and their usage in setting up Sewerage Network**
[c]						
[d]						
[e]						
[f]						
[g]						

4. We agree that no modification to the above list is permitted after bids are opened.

5. We agree that the certificate will be issued only to the extent considered reasonable by the ***EXECUTING AGENCY*** for the work, based on the bid submitted by us, construction programme and methodology furnished along with the bid.

6. We confirm that the above goods will be exclusively used for the construction of the above work. We are aware that exemption will be issued to only goods/material/equipment which form part of the work on permanent basis but not for the goods/material/equipment which are used by the us for execution of project and after completion of the project, the goods remain with the us being owner of such goods for further deployment in other projects.

Date: _____ (Signature) _____

Place: _____ (Printed Name) _____

(Designation) _____

(Common Seal) _____

GUIDELINES

FOR PREPARATION OF DPRs

FOR WORKS OF INTERCEPTION AND DIVERSION OF

DRAINS AND SEWAGE TREATMENT PLANTS

National Mission for Clean Ganga
Ministry of Water Resources,
River Development &Ganga Rejuvenation
Govt. of India, New Delhi

August 2018

DISCLAIMER

The data, information, used in this report has been obtained from different sources. Every care has been taken to ensure that the information is correct, consistent and complete as far as possible.

The constraints of time and resources available to this nature of assignment, however do not preclude the possibility of errors, omissions etc. in the data and consequently in the guideline preparation.

The contents of this guidelines can be used freely with the request that a reference may be made as follows:

"Guideline For preparation of DPRs for works of interception and diversion of drains and sewage treatment plants",National Mission for Clean Ganga, Ministry of Water Resources, River Development &Ganga Rejuvenation, Govt. of India, New Delhi, June 2018.

ACKNOWLEDGEMENT

The National Mission for Clean Ganga (NMCG), Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD & GR) has given the assignment of developing fresh 'Guidelines for Interception, Diversion &Sewage Treatment Plant Works' to the Alternate Hydro Energy Centre, Indian Institute of Technology – Roorkee, which would serve as DPR Template to be used by States & Consultants to prepare specific DPRs.

A workshop was also organized by NMCG at New Delhi where all stakeholders covering state nodal agencies, state project management groups, PSUs, academic institutions and multilateral bodiesparticipated and the matter was deliberated. Observations/ comments received via emails from World Bank, Support for Ganga Rejuvenation (SGR) Project, UP-SPMG, IIT Kharagpur, Tata Consulting Engineers Ltd, Engineers India Ltd (EIL), NBCC, Engineering Projects India Ltd (EPIL) and Aligarh Muslim University (AMU) were considered andafter a series of discussions at NMCG, the guidelines were finalized.

We are especially grateful to Shri Upendra Prasad Singh, Secretary, MoWR, RD& GR and to the group of officials of NMCG led by Shri Rajiv Ranjan Mishra, Director General, NMCG and Shri Hitesh Kumar S. Makwana, Executive Director (Projects)including Dr. Pravin Kumar, Director (Technical) and Shri Rajat Gupta, Sr. Specialist. Suggestions received from Shri Devendra Pratap Mathuria, Executive Director (Technical) are thankfully acknowledged.

Shri Vinay Shankar and Shri V. K. Gupta were other members of the team that prepared the guidelines. Their contributions are thankfully acknowledged.

(ARUN KUMAR)
AHEC, IIT Roorkee

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ABBREVIATIONS

ADB	:	Asian Development Bank
ADP	:	Area Development Plan
AE	:	Assistant Engineer
AHEC	:	Alternate Hydro Energy Centre, IIT Roorkee
AL	:	Aerated Lagoon
AMRUT	:	Atal Mission for Rejuvenation and Urban Transformation
ASP	:	Activated Sludge Process
BCM	:	Billion Cubic Meters
BGL	:	Below Ground Level
BHP	:	Break Horse Power
BIS	:	Bureau of Indian Standards
BOD	:	Biochemical Oxygen Demand
BOOT	:	Build Own Operate Transfer
BOQ	:	Bill of Quantities
BOT	:	Build Operate Transfer
BHP	:	Break Horse Power
BTO	:	Build Transfer Operate
CAD	:	Computer Aided Design
CAG	:	Comptroller and Auditor General of India
CBO	:	Community Based Organisations
CCTV	:	Closed Circuit Television
CD		Compact Disc
CDM	:	Clean Development Mechanism
CDP	:	City Development Plan
CE	:	Chief Engineer
CER	:	Certified Emission Reduction
CETP	:	Common Effluent Treatment Plant
CFL	:	Compact Fluorescent Lamp
CGWB	:	Central Ground Water Board
CI	:	Cast Iron
CMS	:	Cubic Meter Per Second
COD	:	Chemical Oxygen Demand
CPCB	:	Central Pollution Control Board
CPHEEO	:	Central Public Health Environmental Engineering Organisation
CRR	:	Critical Review Report
CSIR	:	Council of Scientific and Industrial Research
CSP	:	City Sanitation Plan
CTE	:	Consultant to Establish

DI	:	Ductile Iron
CMC	:	Citizen's Monitoring Committee
CTC	:	Community Toilet Complex
CW	:	Civil Works
CWC	:	Central Water Commission
CPM	:	Critical Path Method
CUMEC	:	Cubic meter per second
DBO	:	Design, Build & Operate
DBOT	:	Design, Build Operate Transfer
DG	:	Diesel Generator
DJB	:	Delhi Jal Board
DO	:	Dissolved Oxygen
DPR	:	Detailed Project Report
D/S	:	Down Stream
DSR	:	District Schedule of Rates
DSR	:	Delhi Schedule of Rates
DWCPP	:	Double Wall Corrugated Polyethylene Pipe
DWF	:	Dry Weather Flow
EA	:	Executing Agency
EE	:	Executive Engineer
EIA	:	Environmental Impact Assessment
ELCB	:	Earthing Leakage Circuit Breaker
EM	:	Electrical and Mechanical
EMI	:	Equated Monthly Instalment
EPA	:	Environment Protection Agency
ESAMP	:	Environmental Sanitation and Management Plan
ESC	:	Empowered Steering Committee
EWS	:	Economically Weaker Section
FAB	:	Fluidized Aerated Bed
FBAS	:	Fixed Bed Biofilm Activated Sludge
FBR	:	Fed Batch Reactor
FC	:	Faecal Coliform
F/M	:	Food to Microorganism
FR	:	Feasibility Report
FR	:	Frequency rate
GA	:	General Arrangement
GAC	:	Granular Activated Carbon
GAP	:	Ganga Action Plan
GRBMP	:	Ganga River Basin Management Plan
GAAP	:	Governance and Accountability Action Plan

GI	:	Galvanised Iron
GIS	:	Geology Investigation Survey
GIS	:	Geographical Information System
GL	:	Ground Level
GoAP	:	Gomti Action Plan
GoI	:	Government of India
GoS	:	Group of Secretaries
GoUP	:	Government of Uttar Pradesh
GPCU	:	Ganga Pollution Control Unit
GRC		Grievance Redressal Cell
GRP	:	Glass Reinforced Plastic
GWI	:	Ground Water Infiltration
DI	:	Ductile Iron
HDPE	:	High Density Polyethylene
HP	:	Horse Power
HRD	:	Human Resource Development
HRT	:	Hydraulic Retention Time
HT	:	High Tension
HUDCO	:	Housing and Urban Development Corporation Ltd.
IA	:	Impact Assessment
I&D	:	Interception and Diversion
IEC	:	Information, Education and Communication
IIPA	:	Indian Institute of Public Administration
IIT	:	Indian Institute of Technology
IPS	:	Intermediate Pumping Station
IL	:	Invert Level
IRMA	:	Independent Review and Monitoring Agency
IS	:	Indian Standard
ISO	:	International Organisation for Standardisation
ISRO	:	Indian Space Research Organisation
IT	:	Information Technology
ITI		Industrial Training Institutes
IWBC	:	Integrated Wood Based Crematoria
IWWA	:	Indian Water Works Association
JICA	:	Japan International Cooperation Agency
JnNURM	:	Jawaharlal Nehru National Urban Renewable Mission
JE	:	Junior Engineer
JS	:	Jal Sansthan
Kva	:	Kilovolts Ampere
KWH	:	Kilowatt Hours

LCC	:	Life Cycle Cost
LCS	:	Low Cost Sanitation
LIC	:	Life Insurance Corporation
LPCD	:	Litres per Capita per Day
LPM	:	Litres per Minute
LPS	:	Litres per Second
MH	:	Manhole
Mld	:	Million Litres per day
MoA	:	Memorandum of Agreement
MBBR	:	Moving Bed Biofilm Reactor
MBR	:	Membrane Bio Reactor
MGD	:	Million Gallons per Day
MG/L	:	Milligram/litre
MIS	:	Management Information System
MLD	:	Million Litres Per Day
MLSS	:	Mixed Liquor Suspended Solids
MLVSS	:	Mixed Liquor Volatile Suspended Solids
MoEFCC	:	Ministry of Environment, Forest and Climate Change Govt. of India
MNRE	:	Ministry of New and Renewable Energy, Govt. of India
MoUD	:	Ministry of Urban Development, Govt. of India
MP	:	Master Plan
MP	:	Member of Parliament
MPN	:	Most Probable Number
MPS	:	Main Pumping Station
MoWR, RD&GR	:	Ministry of Water Resources, River Development and Ganga Rejuvenation
MSW	:	Municipal Solid Waste
MWW	:	M
NABARD	:	unicipal Waste Water
NDMA	:	National Bank for Agriculture and Rural Development
NEERI	:	Natural Disaster Management Authority
		National Environmental Engineering Research Institute
NGRBA	:	National Ganga River Basin Authority
NGO	:	Non-Governmental Organisation
NIC	:	National Informatics Centre
NICNET	:	Nation-wide Information Network
NIT	:	Notice Inviting Tender
NMCG	:	National Mission for Clean Ganga
NOC	:	No Objection Certificate

NRCD	:	National River Conservation Directorate
NRCP	:	National River Conservation Plan
O&M	:	Operation and Maintenance
OP	:	Oxidation Pond
PC	:	Personal Computer
PDC	:	Permanent Disabilities Fatalities
PF	:	Power Factor
PFR	:	Pre-Feasibility Report
PERT	:	Programme Evaluation and Review Technique
PHED	:	Public Health Engineering Department
PIL	:	Public Interest Litigation
PMC	:	Project Management Consultant
PMU	:	Project Management Unit
PPM	:	Parts Per Million
PPP	:	Public Private Partnership
PMG	:	Project Management Group
PPMU	:	Project Preparation and Management Unit
PS	:	Pumping Station
PSC	:	Pre-stressed Concrete
PVC	:	Poly Vinyl Chloride
R&D	:	Research and Development
RBC	:	Rotating Biological Contactor
RBI	:	Reserve Bank of India
RCC	:	Reinforced Cement Concrete
RCCE	:	Recurring Cost of Capital Expenditure
RTI	:	Right to Information
RWC	:	Restricted Work Capacity
SAFF		Submerged Aeration Fixed Film
SBR	:	Sequencing Batch Reactor
SCADA	:	Supervisory Control and Data Acquisition
SCBA	:	Self-Contained Breathing Apparatus
SFBR	:	Submerged Fixed Bed Reactor
SOR	:	Schedule of Rates
SPCB	:	State Pollution Control Board
SPMG	:	State Project management Group
SPMU	:	State Project Management Unit
SPS	:	Sewage Pumping Station
SR	:	Severity Rate
SRT	:	Solid Retention Time
SS	:	Suspended Solids
STP	:	Sewage Treatment Plant

SWD	:	Side Water Depth
SWM	:	Solid Waste Management
SWM	:	Sewerage Water Management
TDS	:	Total Dissolved Solids
TF	:	Trickling Filter
TKN	:	Total Kjeldahl Nitrogen
TPA	:	Third Party Appraisal
TPI	:	Third Party Inspection
TSS	:	Total Suspended Solids
UA	:	Urban Agglomeration
UASB	:	Up flow Anaerobic Sludge Blanket
UF	:	Ultra-Filtration
UFW	:	Unaccounted for Water
UJS	:	Uttarakhand Jal Sansthan
UPJN	:	UP Jal Nigam
UIDSSMT	:	Urban Information Development Scheme for Small and Medium Towns
UKPJN	:	UttarakhandPeyJal Nigam
UPSVENN	:	UttarakhandPeyjalSansadhanVikasEvamNirman Nigam
ULB	:	Urban Local Body
U/S	:	Up Stream
uPVC	:	Unplasticised Poly Vinyl Chloride
UNICEF	:	United Nations International Children Emergency Fund
USAID	:	United States Agency for International Development
UV	:	Ultra Violet
UWSS	:	Urban Water Supply and Sanitation Sector
VSS	:	Volatile Suspended Solids
YAP	:	Yamuna Action Plan
WB	:	World Bank
WHO	:	World Health Organisation
WQM	:	Water Quality Monitoring
WR, RD&GR	:	Ministry of Water Resources, River Development and Ganga Rejuvenation
WSSB	:	Water Supply and Sewage Board
WSP	:	Waste Stabilisation Pond
WTP	:	Water Treatment Plant
WWTP		Waste Water Treatment Plant
ZLD		Zero Liquid Discharge

EXECUTIVE SUMMARY

National Mission for Clean Ganga (NMCG) was constituted for effective abatement of pollution and rejuvenation, protection and management of the River Ganga and its tributaries. Under the above mission, no untreated municipal sewage and industrial effluent is to be discharged into the River Ganga.

An Integrated Ganga Conservation Mission namely "Namami Gange" has been approved as 'Flagship Programme' set up in June 2015 to accomplish effective abatement of pollution, conservation and rejuvenation of the river.

An ideal approach to achieve the above objective, is to prepare an integrated and comprehensive scheme to intercept and treat the entire quantity of waste water generated in the town and would flow through the drains into the Ganga. To improve the water quality of the Ganga in the immediate term, is to prevent untreated wastewater of drains from joining the river by intercepting those having their outfalls in the Ganga, divert them through sewers to Sewage Treatment Plants (STPs) for treatment and allow only treated sewage to be discharged into the Ganga.

.

The present '*Guidelines for preparation of project reports under NRCP and NGRBA, Ministry of Environment & Forests'* were prepared in Dec 2010. These guide lines provided for preparation of DPRs for pollution abatement of rivers in three steps namely City Sanitation Plan (CSP), Feasibility Report (FR) followed by the Detailed Project Report (DPR).

In view of the need to prevent pollution in the immediate term and the changes that have been introduced, the Guidelines for the preparation ofDPRs for interception and diversion of drains out-falling in to the river and divert them to STPs for treatment need to be revised.

The draft guidelines were circulated by NMCG on Mar 30, 2017 to all stakeholders covering state nodal agencies, state project management groups, PSUs, academic institutions and multilateral bodies. Observations / comments were received from the World Bank, Support for Ganga Rejuvenation (SGR) Project, UP-SGRCA, IIT Kharagpur, Tata Consulting Engineers Ltd, Engineers India Ltd (EIL), NBCC, Engineering Projects India Ltd (EPIL) and Aligarh Muslim University (AMU).

A workshop was also organized on May 18, 2017 by NMCG at New Delhi where all stakeholders participated and matter was deliberated for the whole day. After considering the suggestions / comments received from different stakeholders through emails and during the workshop, the guidelines were finalised. Salient features of the guidelines are as follows:

- The guidelines provide for interception and diversion of drains out-falling in to the river, divert them through sewers to STP (s) for treatment. New CPHEEO Manual on Sewerage and Sewage Treatment Systems has since been published in Nov 2013. Many provisions of the manual have been incorporated into the guidelines.
- Water Quality Monitoring of the river should be done following the "Uniform Protocol on Water Quality Monitoring Order, 2005".
- Design periods for STPs has been increased to 15 years.
- Rate of water supply for users other than domesticsuch as hotels, hostels, schools/colleges, railway stations, offices, factories, cinemas etc. has been included.

- Methodology for measurement of flows in drains / sewers has now been provided in detail. A standard format for recording flow measurements has been prescribed.
- Design Flows for different components of proposed works have been clarified.
- Configuration of sewage pumps, hydraulic retention time, volume of sump, immersible pumps etc. as recommended in CPHEEO Manual Nov 2013 for sewage pumping stations, have been introduced.
- Instead of working out economical size, size of rising mains shall be selected, ensuring velocities between 0.8 to 3 m/sec at any time, to avoid silting.Rising mains must be designed for Water Hammer Head also.
- Trenchless technology may be proposed tobe adopted at major road crossings/junction, railway tracks and highly dense roads for laying of sewers/rising main.
- For STPs, sulphates and emerging contaminants have been included in the list of raw sewage quality parameters. Some upcoming treatment technologies have also been referred. Highest flood levels of drains/river to provide safety and uninterrupted O&M of the STP/SPS are to be taken in to consideration.
- Funds for O&M of the assets created shall now be provided by the center for a period of 15 years, after which the responsibility of O&M will rest with the State Government/ ULB. However, such period shall be subject to policy of GoI in vogue.
- Annual O&M cost beyond 1st year is to be worked out by compounding present cost with general price index/inflation, which may be taken as 5% on Manpower and 2% on Chemicals. However, no escalation is to be considered on Power.
- Provision of quarters for maintenance staffhas been deleted, as O&M shall be carried out by the contractor.
- On line monitoring of water quality at inlet and outlet of STPs has been proposed tobe carried out for which devices shall be installed on STPs for proper monitoring of their performance and taking timely remedial measures when necessary.
- The chapter on Social and Environment Impact Assessment and Environmental Management Plan has been provided.
- Suggestive structure of the DPRs earlier provided in the Guide Lines has been revised.
- A flow chart showing different broad activities for preparation of DPRs has been provided.
- A list of drawings to be provided in DPRs has been provided.
- Reuse of treated water to a minimum extent of 20% shall be mandatorily explored.
- A detailed Sludge Management Plan including the treatment, storage, handling and approvals from ULBs to accept the solid waste generated by the STPs for its safe disposal / effective management is now to be prepared.
- Septage/faecal sludge management practices are to be assessed and appropriate provisions need to be built in while designing the STPs.
- Soil investigation has been proposed to be carried out at all major sites such as deep sewers, SPS, STPs and for locations such as flood plains, landfill sites and locations having dispersive soil characteristics.

GUIDELINES FOR PREPARATION OF DPRS FOR WORKS OF INTERCEPTION &DIVERSIONOF DRAINS AND SEWAGE TREATMENT PLANTS

CHAPTER 1: Introduction

1.1. GANGA BASIN

Ganga basin is the largest of the 12 major river basins of India. The river Ganga passes through the states of Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal. Ganga has many tributaries. Even though the surface water resource potential of Ganga has been assessed as 525 billion cubic meters (BCM), substantial abstraction of water for various purposes from the river has impacted the quantity of flows in the river. A map of the Ganga River Basin, a flow Diagram of the River may be seen in Annexure I and Annexure II.

1.2. STATUS OF WATER QUALITY

Rapidly increasing population, rising standards of living and exponential growth of industrialization and urbanisation have exposed the river to various forms of degradation. The dominant source of pollution is the discharge of untreated wastewater from the towns on thebanks of Ganga.

It is estimated that in the year 2011, the amount of wastewater discharged into the riverby 36 Class I and 14 Class II towns situated along the mainstream of river Ganga, was 2723 Mld. Of this quantity, the capacity to treat it was limited to only 1209Mld*(Source: Pollution Assessment: River Ganga, published by CPCB in July 2013)*. Although there are non-point sources of pollution as well, their contribution is relatively small.

On the basis of the sources that cause pollution of Ganga, the parameters that have been adopted for judging the water quality of the river are Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) and Faecal Coliform (FC). Except in the upper reaches of the Ganga i.e., from its origin up to Rishikesh, the presence of FC is higher than the permissible limit for bathing throughout the river. The BOD levels are much higher than the desired level in the stretch of Ganga from Kannauj to Varanasi. It is therefore a critical stretch. In West Bengal again, the BOD is higher in the stretch from Uluberia to Diamond Harbour.

Thus the water quality of Ganga river is fit for bathing (Class B) except a few locations only, which have already been identified and corrective actions by sanctioning projectshave been taken by NMCG.

1.3. ACTION TAKEN BY AUTHORITIES FOR RIVER GANGA

A beginning towards its restoration was made with the launching of the Ganga Action Plan (GAP) in 1985. Its objective was to improve the water quality in the river. But for a variety of reasons only partial success in the objective of pollution abatement could be achieved.

1.3.1. National Mission for Clean Ganga (NMCG)

National Mission for Clean Ganga (NMCG), a society registered under the Societies Registration Act, 1860 (21 of 1860), is an authority constituted under the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016 of Govt of India. NMCG is a nodal agency for the implementation of the provisions of this Order and for effective abatement of pollution and rejuvenation, protection and management of the River Ganga and its tributaries. It is an empowered arrangementwith two tier management having administrative, appraisal and approval powers and duties, functions and powers for the purpose of effective abatement of pollution and rejuvenation, protection and management of the River Ganga.

The States comprising River Ganga Basin, namely, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand, Haryana, Rajasthan, West Bengal and the National Capital Territory of Delhi and such other States, having major tributaries of the River Ganga are covered under this mission. NMCG shall approve the planning, financing and execution of programmes for abatement of pollution in the River Ganga including augmentation of sewerage and effluent treatment infrastructure, catchment area treatment, protection of flood plains, creating public awareness, conservation of aquatic and riparian life and biodiversity and such other measures for promoting environmentally sustainable river rejuvenation. NMCG shall also coordinate, monitor and review the implementation of various programmes or activities taken up forprevention, control and abatement of pollution and protection and management in the River Ganga and its tributaries.

1.3.2. Ganga River Basin Management Plan

The Ganga River Basin Management Plan (GRBMP) is an integrated river basin management plan for maintenance and restoration of wholesomeness of Ganga system and improvement of its ecological health with due regard to resolution of conflict of interest in water uses in the entire river Basin. This Plan is presumed to have an adequate provision for soil, water and energy conservation to accommodate the growing population, urbanization, industrialization and agriculture while ensuring that the continuous flow (*AviralDhara*), unpolluted flow (*NirmalDhara*), longitudinal and lateral connectivity, fluvial geomorphology and ecology of the river are protected.

1.3.3. Integrated Ganga Conservation Mission Namely "NamamiGange"

An Integrated Ganga Conservation Mission namely "NamamiGange" has been set up. While it seeks to ensure that ultimately i.e. in the long term there is an integrated and comprehensive plan of collection, conveyance and treatment of wastewater in the towns covering both the point and non-point sources of pollution, in the immediate term its objective would be to ensure that the quality of Ganga is improved so that it can be put to its best –designated - use i.e., bathing. A list of 118 important towns, which contribute to the pollution of the Ganga, has been prepared by NMCG. Important drains that carry the wastewater from these towns to the Ganga have been also been identified.

Thus the immediate objective would be to prevent untreated wastewater of drains from joining the river by intercepting the drains that have outfalls in the Ganga, divert them through sewers to Sewage Treatment Plants for treatment and allow only treated sewage to be discharged into the Ganga.

1.3.4. Categorisation of Towns on the Basis of I&D and Treatment Infrastructure

The towns may fall in several categories based on the type of the existing arrangements for the collection, conveyance and treatment of wastewater. In one category of towns / cities there may not be any sewers and the wastewater including that from the septic tanks and toilets would flow in the covered or uncovered drains on the sides of the streets reaching a storm water drain, which in turn would discharge into the Ganga.

In another category of towns/cities, there may be localities where sewers are laid and localities not provided with sewers. The wastewater would be carried through the sewer or the drain to a sewage treatment plant (STP). If a STP has not been installed, the wastewater would be discharged into the Ganga.

In yet another category of towns, I&D and STP schemes may have been constructed. However, the system is unable to handle the entire wastewater and there is need to repair, upgrade and refurbish the existing infrastructure.

1.3.5. Integrated Plan of Management of Wastewater – Measures Involved

A sustainable programme to achieve the improvement in the water quality of Ganga should deal with the issue of pollution in an integrated and comprehensive manner dealing with both point and non-point sources of pollution. It will imply that the following steps be taken

i. Prepare an integrated and comprehensive scheme to intercept and treat the entire quantity of wastewater that would be generated in the town and would flow through the drains into the Ganga. The existing infrastructure, if any, would be integrated with the comprehensive scheme that would be prepared.

ii. If under the GAP, schemes for pollution abatement of the Ganga have been implemented, an assessment of the condition of the prevailing infrastructure that exists in the town for the disposal of wastewater would be required to be made so that it could be repaired, upgraded and refurbished.

1.3.6. Phase wise preparation and implementation of the Pollution Abatement Scheme

A comprehensive approach as outlined above will require resources and considerable time for preparing and implementing schemes. It, therefore, makes sense that the objective of improving the water quality may be achieved in two phases.

Phase 1 will seek to improve the water quality of the Ganga in the immediate term. The wastewater from the towns / cities situated on the bank of river Ganga in five basin states of Uttaranchal, Uttar Pradesh, Bihar, Jharkhand and West Bengal, flowing into the Ganga through the drains may be intercepted, diverted and treated before discharge in to Ganga. The interception, diversion and treatment schemes should be so designed that they take into consideration the wastewater load that will need to be dealt with when the long term integrated comprehensive wastewater management plan is prepared.

Phase 2 will consist of the integrated and comprehensive schemes to deal with the pollution from both point and non-point sources of pollution. The works planned and implemented in Phase 1 will be integral part of the schemes in Phase 2.

Since the formation of existing guide lines, a number of changes such as policy decisions, revision of water quality parameters and design criteria in new CPHEEO Manual on Sewerage and Sewage Treatment Systems in Nov 2013 etc. have taken place. The Guidelines, therefore, need to be revised. These Guidelines, accordingly, deal with the various aspects of schemes in Phase 1.

CHAPTER 2: COLLECTION OF DATA

2.1. INTRODUCTION

This chapter deals with collection of data required for preparing DPRs for works of interception and diversion of drains and sewage treatment plants of the project area.

The DPR should be prepared on the basis of available data that has been generated by the concerned agencies.Additional data(primary data)may be needed. It will have to be generated by undertaking suitable survey and investigation. However, DPR should integrate all the data provided by agencies concerned for pollution abatement.

2.2. PROJECT AREA

As the DPR is for intercepting the drains and treating the diverted sewage, the project area for the purpose of the DPR is only that area of the town which is discharging into drains and contributing to the pollution of river and maynot the whole town within municipal limits.

There may be towns where some areas outside the municipal limits are also discharging into drains of the town under consideration and subsequently polluting the river, but for some or the other reasons are not included withinits municipal limits. These areas must also be considered as a part of the project area.

It is therefore, of utmost importance to precisely demarcate the project area so as to correctly project design population, sewage flows and design proposed works. The project area under consideration should be clearly marked on a key plan of the town so that the area can be measured from the map.

2.3. DATA REQUIRED

The data needs to be gathered for the town whose wastewater is causing pollution of the river and for which the project is to be prepared for abatement of pollution. A town may have to be divided into a number of sewerage districts for getting optimal results and data gathered should meet this need**.**

2.4. TOWN RELATED DATA

2.4.1. General Information of the town

i. Location – Latitude, Longitude
ii. Important features
iii. Climate
iv. Brief history of the city
v. Commercial activities
vi. Industrial activities
vii. Educational activities
viii. Cultural activities
ix. Religious activities
x. City development plan or city sanitation plan, if prepared, should be obtained.
xi. Data on water supply as per para 2.4.6,

xii. Project reports of sewerage and pollution works in the city executed, under execution and proposed for future should be obtained.
xiii. Slum population and their development/rehabilitation plan.
xiv. Community toilets
xv. Present sewerage management including existing or proposed septic tanks, number of septic tanks and their maintenance scenario in the catchment such as septic tank sludge/septage treatment etc.
xvi. Solid Waste Management (SWM) system.
xvii. Areas within and adjoining the town contributing to the pollution of river, its boundary and area
xviii. HFL of the river at the sites of all infrastructure works proposed near the river
xix. Minimum and maximum flow in the river, along with dates.

2.4.2. Maps

Digital maps, as may be available, showing the following features on a scale large enough to understand the physical features may be prepared.

i. Important land marks of the town
ii. Rivers
iii. Other water bodies
iv. River banks where solid waste is dumped
v. Drains, and points of their respective outfalls and catchments (drainage areas)
vi. Surface utilities
vii. Municipal wards
viii. Open spaces
ix. Residential areas
x. Industrial estates
xi. Industrial units outside industrial estates
xii. Points of discharge of industrial effluents
xiii. Slums
xiv. Areas covered with septic tanks
xv. Water supply system – Including intake points and ground water.
xvi. Places used for open defecation
xvii. Community toilets
xviii. Existing sewers in each drainage area of the town with diameters and invert levels, if existing.
xix. STPs and sewage pumping stations, if existing.
xx. Points of discharge of treated effluents into the river and their distance from points of water supply intake works.
xxi. Garbage dumping sites including land fills
xxii. Bio-medical waste treatment facilities
xxiii. Pollution abatement works carried out in the past with details
xxiv. Components of proposed works along with those of existing works, if any, are to be shown on maps with different colours and legends.
xxv. Areas within and adjoining the town contributing to the pollution of river, its boundary and area

2.4.3. Use of State of Art Tools Like Remote Sensing and GIS

Maps of Survey of India may be used. If there are easily accessible facilities with the State Remote Sensing Centre or other specialized agencies, an attempt should be made to use remote sensing to gather spatial information observable from space and present it and other data mentioned above in Geographical Information System (GIS) format. It gives the ability to prepare maps on different themes as required. For cities with a population of one million or more the data must be presented in GIS format. For other cities it is optional.

As expertise of this kind may not be generally available with the implementing agencies, the work may be done by hiring qualified experts for such purposes from outside. A good map depicting all the above features would help in improving decision making and finalizing appropriate sewerage routes without disturbing other civic utilities.

2.4.4. Status of Sewerage Management Works Undertaken in the Past, if any

In the past, some works related to pollution abatement and sewerage may have been planned and implemented, for which the following details may be collected:

a. A note describing in brief history / details of sewer system introduced in the town, works carried out / under progress in different programmes, sanctioned cost, year of sanction, year of commissioning, brief details of works done such as SPS (with their diameters, details of pumps installed, rising mains, year of commissioning etc.), STPs (with their capacity, type, year of commissioning etc.), sewer network, other works, technical studies / condition assessment reports conducted in the past for assessing the condition of existing structures.
b. Photographs of existing works
c. Number of drains out falling into the river(s), nos. intercepted and diverted to STPs, copies of reports on discharge measurement and sewage quality of drains carried out in the past.
d. Designed capacity/performance, present performance & O&M details
e. A plan showing existing major works such as drains, SPS, rising mains, STPs and major trunk sewers etc.
f. A separate plan of existing sewers showing diameters, lengths and RLs etc.
g. Information relating to existing sewage disposal works, Septic tanks, existing STPs and drains intercepted may be presented in tables 2.1, 2.2 and 2.3.
h. Condition assessment of existing works: Condition assessment should invariably be carried out for all existing works. Normally this is carried out by destructive and or non-destructive tests on structures and other works by qualified and experienced test houses and experts. For this draining out of the tanks, if required, may also be done so that the true assessment of life of works can be made. If the performance of the works is less than the designed one or that required at the end of the design period, the causes and remedial measures may be identified component wise
    1. Interception works
    2. Sewers
    3. SPS
    4. STPs
    5. Septic tanks

Table 2.1: Present Sewage Disposal System

S. No.	Waste water disposal works	Quantity				Future Plans	Remarks
		DA_1	DA_2	DAn	Total		
1	Interception works, nos.						

S. No.	Waste water disposal works	Quantity				Future Plans	Remarks
		DA_1	DA_2	DAn	Total		
2	Sewers, kms						
3	SPS						
	Locations						
	Nos.						
4	STPs						
	Locations						
	Technology						
	Mld						
5	Septic tanks						
6	Others						

Note: DA stands for Drainage Area

Table 2.2: Details of existing STPs

S.No		DA_1	DA_2	DAn
1	**Location (DA or ward)**			
2	**Operational Yes or No**			
3	**Process**			
4	**Installed Capacity, Mld**			
5	**Current Capacity, Mld**			
	Desired capacity at the end of the design period			
6	**Raw Sewage Design Parameters**			
	BOD, mg/l			
	COD, mg/l			
	TSS, mg/l			
	NH_4-N mg/l			
	N-total, mg/l			
	Faecal coliform, MPN/100 Ml			
7	**Treated Sewage Design Parameters**			
	BOD, mg/l			
	COD, mg/l			
	TSS, mg/l			
	NH_4-N mg/l			
	N-total, mg/l			
	Faecal coliform, MPN/100 Ml			
8	**Raw Sewage Actual Parameters**			
	BOD, mg/l			
	COD, mg/l			
	TSS, mg/l			
	NH_4-N mg/l			
	N-total, mg/l			
	Faecal coliform, MPN/100 Ml			
	Phosphorus mg/l			
	Sulphate mg/l			
9	**Treated Sewage Actual Parameters**			
	BOD, mg/l			

S.No		DA_1	DA_2	DAn
	COD, mg/l			
	TSS, mg/l			
	NH_4-N mg/l			
	N-total, mg/l			
	Faecal coliform, MPN/100 Ml			
	Additional parameters (if there is a chance of industrial contamination).			
	Overall efficiency of STP			
10	**Date of installation**			
11	**Condition of assets**			
12	**Operating agency and mode of O&M**			
13	**Mode of discharge of effluents**			
14	**Whether sewer tax imposed**			

Table 2.3: Status of interception of drains

S. No.	Drain number	Name of drain	Drain discharging into river--------	Intercepted and diverted to STP at --------on ----	Status of interception works
1	**D1**				
2	**D2**				
↓	↓				
↓	↓				
↓	↓				
↓	↓				
n	**Dn**				

2.4.5. Population of the Town

Past Census Population of the town should be provided in the table 2.4.

Table 2.4: Census Population of the town during the last decades

Year	No of wards	Area of town	No of houses including slums	Population	Growth rate	Density of population no / sq. km
1971						
1981						
1991						
2001						
2011						

2.4.6. Water Supply

Status of present supply of water drain wise should be provided in table 2.5.

Table 2.5: Status of water supply in the town / project area

Items	Installed capacity, Mld	Water supplied, Mld	Remarks
Sources of water supply			
Surface (Describe source wise)			
Tube wells (nos.)			
Hand Pumps (nos.)			
Total, Mld			
Private bore wells (nos.)			
Total including private bore wells, Mld			
Water supply required for the town as per GoI guidelines, lpcd			
lpcd for which present water supplyproject has been designed			
Base year Population of the town			
Water supplied on base year population (excluding bore wells), lpcd			
Water supply on base year population including bore wells, lpcd			
Plans for augmentation of water supply			

2.4.7. Status of River

i. Purposes for which river water is being used

a. Drinking
b. Irrigation
c. Industry
d. Navigation
e. Other uses such as water sports, boating, etc.

(State the location of the above works and show them in a map)

ii. River Water Quality

Central Pollution Control Board (CPCB) has classified all inland waters in five categories according to the designated – best - use class (Table 3.1, Chapter 3). The designated best use as well as actual quality of river water should be reported.

Water quality of the river should be analysed at the following points:

a. upstream of the city,
b. downstream of the city
c. downstream points of outfalls of major drains
d. downstream points of outfalls of treated effluents of STPs
e. upstream of intakes of waterworks.

The programme aims at improving the river water quality to Class B for outdoor bathing. Though, pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), and Total coliform organisms have been prescribed as water quality parameters for Class B, for actual base line data water quality monitoring should be done following the "Uniform Protocol on Water Quality Monitoring Order, 2005". The relevant order is attached as

Annexure III. The towns may be treated as Trend or impact or flux stations. Ideally, there should be a report for every month, in all 12 reports. But for the purpose of this programme, the parameters such as pH, BOD, DO, FC and TC prescribed for water quality of the river for bathing, may be monitored quarterly and the remaining parameters may be monitored pre-monsoon once a year.

Water quality monitoring is necessary to assess the current water quality and the extent of improvement that can be achieved through interventions proposed in the DPR. The sampling for water quality should be from well-mixed section of the river or main stem 30 cm below the water surface to represent accurate impact. Copies of laboratory test reports should be made a part of DPR

Water quality of the river may be presented as given in table 2.6

Table 2.6: Water quality of river

Month:.....

Parameters	**u/s of town**	**d/s of town**	**d/s of outfall of major drain**	***downstream of outfalls of treated effluents of STPs**	***upstream of intakes of waterworks**	**At important ghats**
pH						
Biological Oxygen Demand (BOD)						
Dissolved Oxygen (DO)						
Faecal Coliforms						
Total Coliforms						
Colour						
Odour						
Temperature						
Electrical Conductivity (EC)						
Turbidity						
Total Dissolved Solids (TDS)						
Ammoniacal Nitrogen (NH_4-N)						
Nitrite & Nitrate Nitrogen (NO_2 + NO_3)						
Total Phosphate (Total P)						
Chemical						

Parameters	u/s of town	d/s of town	d/s of outfall of major drain	*downstream of outfalls of treated effluents of STPs	*upstream of intakes of waterworks	At important ghats
Oxygen Demand (COD)						

*Required to view the impact of discharge of treated sewage into surface water to be used as source of drinking water d/s.

In addition to parameters mentioned in the above table, other parameters prescribed under Uniform Protocol (Pesticides, toxic metals, major ions) may be included, if required, depending upon site conditions. If any secondary data is available from the State Pollution Control Board (SPCB) or the Central Pollution Control Board (CPCB), that too should be reported. Report on Pollution Assessment: River Ganga July 2013 published by CPCB carries spatial distribution of water quality data w.r.t. DO, BOD, Faecal coliform, Total Coliform and Conductivity for the period 2011 at various places in the country. Data if available for the town, may also be extracted from the said report and presented in the DPR. Comments on river water flows and quality on the basis of the above shall also be given.

2.4.8. Sewage Generation

Quantity and quality of sewage generated in a town carried by the drains untreated into the river and by sewers to STP(s) for treatment need to be measured and tested.

2.4.8.1.Volume of Sewage Generation

A note and a plan showing the names of drains, discharge carried by them, location points of their outfalls into the water body, points of their interception and STPs into which diverted should be prepared.

Actual present flows should be recorded three times: Pre-monsoon, during monsoon and after monsoon. If this is not feasible, flows may be recorded in dry weather before the point of outfall into the water bodyfor at least one month.Samples should be taken on a day in every week for diurnal variation on hourly basis for twenty four hours. Considering a four-week month, three sample days are to be taken on weekdays, whereas the fourth one on an off day i.e. Sunday.

If the drain has been intercepted for treating the sewage, the discharge diverted to the STP should be measured. Data on the flows measured in the past should also be collected and reported.

Details of the quantity of sewage reaching STPs through sewers may be collected from the records of STPs for the last 3 years. In the absence of records, the same may be measured in dry weather.

Details of flows may be provided as in tables 2.7, 2.8 and 2.9.

Table 2.7: Discharge carried by drains as measured on ----

Drain Name and No.:
Method of Measurement: Float Method/Current Metter/V-notch, Rect. Notch/Other:
Season:
Place/Location of measurement:
Global Positioning:
Name of the outfall point:

Date of measurement	Week of the month	Day of the week (e.g. Monday)	Time													Av. Discharge		Remark
			8:00 am	9:00 am	10:00 am	11:00 am	12:00 noon	1:00 pm	2:00 pm	3:00 pm	4:00 pm	5:00 pm	6:00 pm	7:00 pm	8:00 pm	cusec	mld	
	I	*Mon-Sat.																
	II	*Mon-Sat.																
	III	*Mon-Sat.																
	IV	**Sunday																
														Average				

*Any day between Monday to Saturday
**The last & IV measurement should be taken on Sunday only.

Copies of flow measurement reports need to be made a part of DPR.

Summary of flows carried by drains

Flow carried by each drain be summarized in table 2.8 showing average, peak and non peak flow

Table 2.8: Actual average, peak and non peak flow carried by drains

SN		Name of Drain	Flow carried by drain			
			Date	Average Flow, Mld	Peak Flow, Mld	Non Peak Flow, Mld

Table 2.9: Daily Incoming Discharge at STPs installed and functioning---

No/Name of STP	Daily (Monthly Average) Incoming raw sewage at STP , Mld						Average Inflow, Mld
	Jan					Dec	
1							
n							

Note:
1. The date / method of measurement of incoming flows should specifically be mentioned.
2. Copies of flow measurement reports / log books of STP need to be made a part of DPR.

2.4.8.2.Measurement of Flows in Existing Drains/Sewers

The assessment of the flows in drains can be done by a variety of methods right from the rudimentary crude method to the most sophisticated dye tracer method. The choice of methods presented hereunder is considered to be appropriate to the conditions in the country particularly, away from metropolitan centres.

Measurement of flows may be carried out as described in para 3.10 of CPHEEO Sewerage Manual Nov 2013 and reproduced as below. The float measurement is normally not recommended for discharge measurement due to its large uncertainty. However, it may be adopted in consultation with NMCG under some exceptional situations, justification for which may be provided.

a) **The Float Method**

In this method, surface velocity of flow of the drain is worked out by the time taken by a float like an empty match-box or a plastic box to travel for about 3 m in a straight reach and flow is calculated by measuring the depth and flow in the drain.

b) **The V notch method**

Preferably, V-notch method should be used up to discharge of 20 Mld.This requires the insertion of a V notch plate in the drain at a location where the downstream discharge can be a free fall. These plates can be cut out from stainless steel (SS) or Teflon sheets of nominal thickness of about 2 mm and inserted tightly into the drain and the gaps can be closed by a mixture of clay and cement in equal proportion mixed to a thick consistency and smeared on the downstream side. The V notch is the best chosen such that the angle subtended is 90 degrees. The clearances to be ensured are shown in Figure 1.

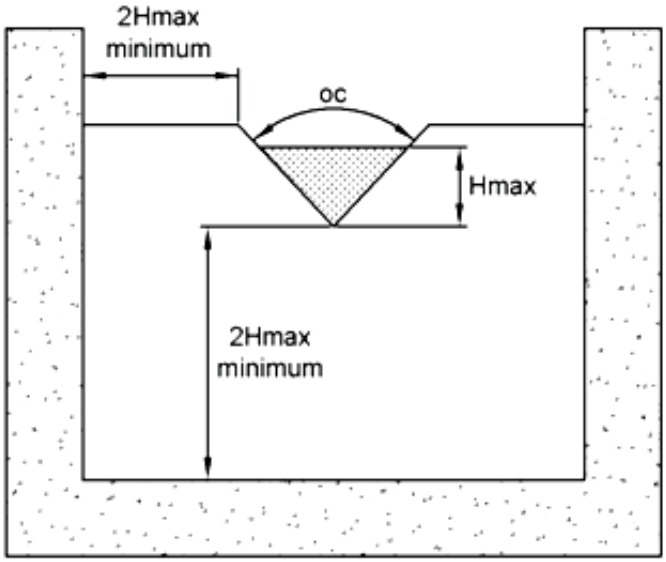


Fig. 1: **Typical mounting of a V Notch in a drain**

The depth of flow is measured over the lower tip of the V bottom and the discharge is

Q = 1.42 × tan of angle of V notch × H power 2.5

As the angle is 90 degrees, the tangent is equal to 1 and hence, the equation simplifies to

Q=1.42× H power 2.5

Where Q is cum/sec and H is in m

c) The rectangular weir method

This can be used if there is already an existing leveled overflow weir like the overflow culverts in irrigation canals. In smaller drains and in places where workmanship of V notch cuts are difficult, these can be used easily by cutting a mild steel or wood sheet as shown in Figure 2.

This method may be used for discharges more than 20 Mld.

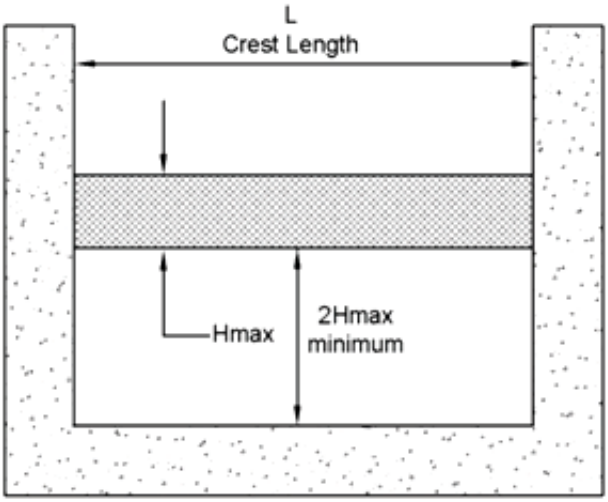


Fig. 2: **Typical mounting of a rectangular weir in a drain**

The depth of flow is measured over the overflow edge of the notch and the discharge is

$$Q = 1.85 \times L \times H \text{ power } 1.5$$

Where,

Q is cum/sec,
H is in m,
L is the length of weir

d) The rectangular weir with end contractions method

These are similar to the rectangular weir except that the length of the weir is smaller than the width of the drain as in Figure 3-3 overleaf.

The depth of flow is measured over the overflow edge of the notch and the discharge is

$$Q = 1.85 \times (L - 0.2H) \times H \text{ power } 1.5$$

Where

Q is cum/sec,
H is in m,
L is the length of weir

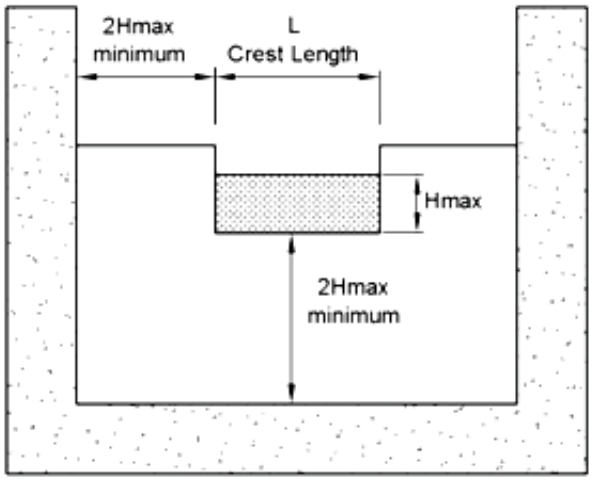


Fig. 3: **Typical mounting of a rectangular weir with end constrictions in a drain**

e) The Palmer-Bowlus Flume

This can be used in case of both the drains and pipes flowing under gravity. Its major advantages are (i) less energy loss; (ii) minimal restriction to flow and (iii) Easy installation in existing conduits. It is a readymade piece for various widths and diameters. The placement in a drain will be as in Figure 4 and that in a sewer pipe will be as in Figure 5 overleaf.

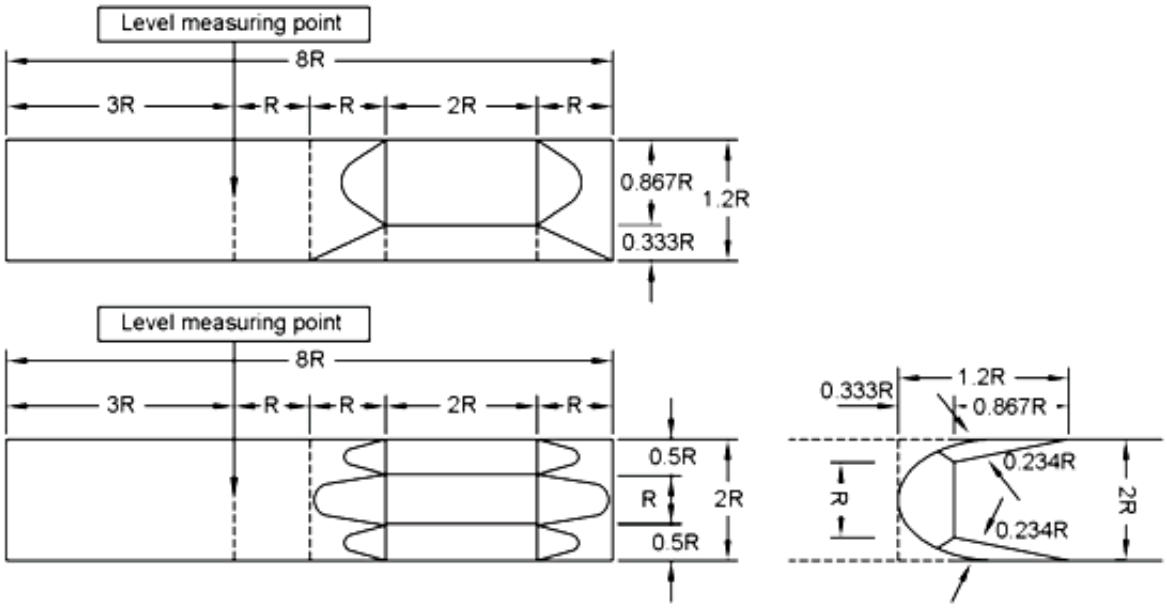


Fig.4: Palmer-Bowlus flume installation in drains

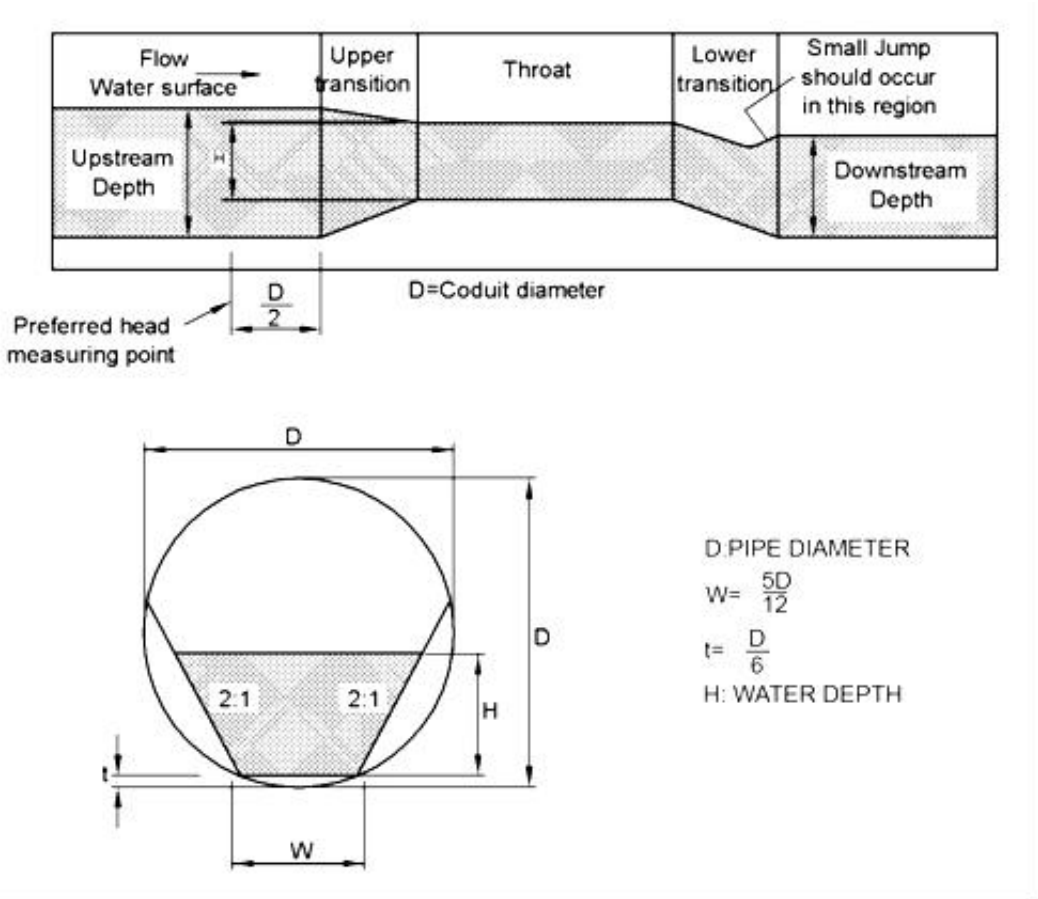


Fig. 5:Palmer-Bowlus flume installation in circular sewer

This has the specific advantage of its ability to be placed in a manhole to measure the sewage flow in the gravity sewer as long as the flow is not exceeding the diameter of the sewer. Typical installation details are seen in Figure 6 overleaf.

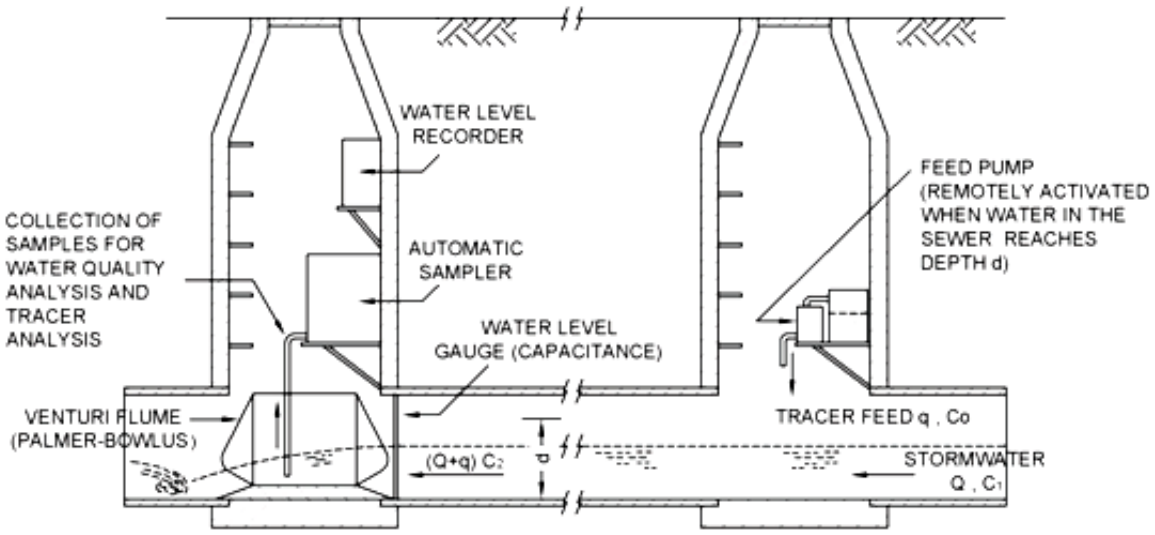
The depth of flow needs to be measured in only one location and thus it is a lot easier. In addition, it can be easily removed after measurement. The only disadvantage is it cannot be used when the depth of flow exceeds the diameter of the sewer and to this extent, it may have limitations in the surcharged condition of sewers in historical cities. This also has the advantage of facilitating a flow measurement in large diameter sewers, which flow under gravity and the flume itself is much simpler as in Figure 7.

The chart for getting at the flow once the depth is measured is obtained by relating to a standard curve supplied by the plume manufacturer depending on the shape of the plume. This is also available as software linked to a personal computer.

The combination of the Palmer-Bowlus and Tracer dye techniques have been reported as early as 1974 as illustrated in Figure 7. It is a system worth inducting in large trunk sewers near the outfalls to have an integrated measurement of the flows and key quality parameters or at least for the flow details and variation patterns.

Top Left and Right- The installation in manholes by inserting the pipe ends into the sewer and measuring the depth of flow by ultrasonic sensor to integrate to a computer as needed.
Bottom left- The Flume, originally invented by Palmer &Bowlus for the Los Angeles County Sanitation District and in use for over three decades, is made by many manufacturers.
Bottom Right- The installation, in a large circular sewer by merely placing the readymade flume at the invert and measurement of the depth, which can be done by ultrasonic sensor.

Fig. 6: Configuration and use of Palmer-Bowlus flume



Source: J. Marsalek, 1974

Fig. 7:Instrumentation for flow measurement and sampling in urban large conduits

f) The Venturi Pipe or the Dall Tube

While dealing with old pumping mains, there is a chance of detecting a venturi pipe fitting in the pipeline, as was the standard practice in those years. The flow through it is a function of the difference in head of the fluid at the mouth and the throat and the formula for a given venturi metre is very simple as

$Q = K \times (a1 \times a2)$ (factor)
factor = SQRT (2gh/(a12-a22))

Where
K = 0.95 to 0.98
a1 = area in sqm at mouth
a2 = area in sqm at throat
h = h1-h2
h1 = piezometric water level in m at mouth
h2 = piezometric water level in m at throat

It is thus clear that once the difference in head is measured between sewage pressure head at mouth and at throat, the square root of the same is directly proportional to the flow. It is possible to connect a differential Mercury manometer to the sampling ports in the metre and open the quarter turn-cock when flow needs to be measured and to note the reading. A simple wall chart relating the difference to the flow will be more than needed. Of course, instrumentation is possible by connecting the two pressures to a differential pressure transmitter and taking its output to a square root extractor and then to a multiplier for the constant for the metre and thereby get a continuous reading of the flow without any interventional systems.

Suffice to say that so far as estimation of flows for design of sewer systems or augmentation of sewer systems are concerned, where an existing pumping station with a venturimeter in the delivery main is available, a simple mercury manometer U tube, connected to the ports of the venturi meter may help in ascertaining the variation of the flow pattern and arrive at peak flow factors etc. more realistically.

A Dall tube is nothing but a venturi pipe-fitting of a reduced length and as otherwise all other properties of flow measurements are the same.

In fact, if possible this can be inserted into an existing pumping main for the evaluation of the above flow patterns.

g) Salt Dilution method

May be used for lower range of flows in the drains up to 6 m^3/s in the hills where flow is highly turbulent and is difficult to measure by other methods. In this method, the tracer i.e. common salt and other chemicals is injected at some point along the stream, and the tracer concentration in streamwater is measured at a downstream point by an electrical conductivity meter, where the tracer has become uniformly mixed with the streamwater.The probe of

conductivity meter should be immersed, close to the bed of the stream or ideally at the mid-depth. After injecting the salted water, the salt starts spreading itself out while travelling downstream. At a certain point downstream it will have filled the width of the stream. For a given volume or rate of injection, greater stream discharges will result in greater tracer dilution and lower concentrations measured at the downstream site. Equations based on the mass balance principle are applied to compute the stream discharge.

The method of flow is easy to accomplish, accurate ($<\pm 7\%$), and reliable for a wide range of stream types. Using this method, stream flow can be measured in less than 10 minutes and very little equipment is needed. The total streamflow, assuming that the streamflow was constant over the test, is

$$Q = \frac{Mass\ of\ Salt}{Conversion\ Factor\ \times Area\ under\ Curve}$$

2.4.8.3.Characteristics of Raw Sewage

The characteristicsof raw sewage carried by the drains / reaching STPs may vary from town to town depending upon rate of water supply, per capital pollution load and prevailing socio-economic conditions. The values should be collected from recent records or tested in dry weather (pre-monsoon).

Samples should be analysed for the parameters prescribed in para 5.1.14 of CPHEEO Manual and the following table.

Samples for testing water quality should be composite and flow proportional, taken on a day in every week for diurnal variation on hourly basis from the existing drain or sewage outfall. Considering a four-week month, three sample days are to be weekdays, whereas the fourth is to be an off day i.e. Sunday.

Sampling for water quality should be conducted for at least one month during dry weather (pre-monsoon) to assess pollution load quantitatively and qualitatively. Water quality of the drain should be monitored just before its outlet into the river. The test report should indicate the time of drawing sample and its testing.

This information may be provided in table 2.10.

Table 2.10: Raw Sewage Characteristics, as measured on ----.

*Parameters	Monitoring Sites of Drains / Inlet to STPs								
	1	2	3	4	5	6	7	8	9
pH									
Temperature									
Colour									
Odour									
Alkalinity, mg/l									
TSS									
Volatile SS									
BOD, Total									

*Parameters	Monitoring Sites of Drains / Inlet to STPs								
	1	2	3	4	5	6	7	8	9
BOD, Filtered									
COD, Total									
COD, Filtered									
Nitrogen, NH_3									
Nitrogen, TKN									
Nitrogen, NO_3									
Phosphorus (Ortho-P)									
Phosphorus (T-P)									
Total Coliform									
Faecal Coliform									
TDS									
Chloride									
Sulphates									
Additional parameters if there is a chance of industrial contamination in the town or the catchment of a drain)									
Heavy metals *(for industries likemetal plating, dying, leather etc.)* The choice of heavy metals to be tested will depend on the kind of industrial units									
Pesticides *(For industries like food processing, pesticide etc.)*									
Organo Chlorines									
Organo Phosphates									
Carbamates									
Detergents *(For industries like soap etc.)*									
Other parameters									
Depending on type of industry									

** Source: Para 5.1.14 of CPHEEO Manual Nov*

2.4.8.4.Pollution from commercial, industrial and agricultural activities.

Broad raw water quality parameters that need to be tested have been listed in table 2.10. However, typical waste compounds produced by commercial, and agricultural activities and specific industrial activities are available in Wastewater Engineering Treatment and Reuse standard text books authored by like Metcalf and Eddy. Depending on the nature of activity that is undertaken in the town, appropriate parameters may be monitored in the water samples drawn from the drain or the river.

Data related to industrial waste water, points of discharge into the sewer network/drainsetc. may also be provided by the CPCB/SPCB/concerned Govt. body.

The effluent from slaughter houses contains high BOD (1000 to 4000 mg/l), COD (2000 to 10,000 mg/l)), SS (200 to 1500 mg/l), total dissolved solids (4000 to 5500 mg/l), high oil and grease, high chloride from skins, etc. If it is suspected that wastewater from any slaughter house may reach a drain or the river, attention should be paid to monitoring of the above water quality parameters and changes in their values should be looked for.

The mixing of industrial effluents with domestic sewage adverselyaffects the sewage treatment process. In such cases, necessary corrective / enabling actions may be adopted and the flow parameters should be measured accordingly before finalizing the STP technology.

2.4.8.5.Raw Sewage Characteristics for newly developed areas and in the absence of drain or outfall

For newly developed areas and in the absence of drain or outfall discharging in to the river, raw sewage characteristics may be adopted from the table 2.11 or preferably actual measurements from nearby town(s) having similar rate of water supply and socioeconomic conditions. Table has been prepared with the rate of water supply as 135 lpcd and may be revised depending on rate of water supply.

Table 2.81: Concentration of various parameters in the absence of drain or outfall

Item	Per capita contribution g/c/d	Water supply lpcd	Sewage Generation 80% of (3)	Concentration mg/l
1	2	3	4	5
BOD	27.0	135*	108	250.0
COD	45.9	135	108	425.0
TSS	40.5	135	108	375.0
VSS	28.4	135	108	262.5
Total Nitrogen	5.4	135	108	50.0
Organic Nitrogen	1.4	135	108	12.5
Ammonia Nitrogen	3.5	135	108	32.5
Nitrate Nitrogen	0.5	135	108	5.0
Total Phosphorous	0.8	135	108	7.1
Ortho Phosphorous	0.5	135	108	5.0

Source: Para 5.1.14 / Table 5.4 of CPHEEO Manual 2013
Table may be revised based on rate of water supply

2.4.9. Soil Investigations

For laying deep sewers, soil investigation and test bores must be made at suitable intervals along the alignment of sewers to ascertain the type of soil at different depths and

behaviour of ground water table and bearing capacity of the soil. For deep sewer laying, wherever required, a mechanical system may be proposed as a safety and speedy measure.

Soil investigation should be carried out at all major sites such as deep sewers, SPS, STPs and for locations such as flood plains, landfill sites and locations having dispersive soil characteristics.

Soil investigation report should include soil description, characteristics, bearing capacity etc.HFL at the disposal point is also to be provided in the DPR.

2.4.10. Ground Water Investigations:

The information about groundwater levels and their fluctuation should be obtained along the river bank where the interception sewer is to be laid. The levels should be recorded pre monsoon and just after the monsoon when the levels are the highest.

2.5. SOURCES OF DATA

The following sources may provide the needed information:

i. State Pollution Control Board and the Central Pollution Control Board.
ii. Executive Engineer of Water Resources department in the District maintains information about drainage basins and rivers in his district.
iii. District planning office
iv. District officers of agriculture, forests etc.
v. Survey of India topographical sheets
vi. India Meteorological Department
vii. State Remote Sensing Agency
viii. District Census Office
ix. For flora and fauna Botanical Survey of India, Zoological Survey of India, State Pollution Control Board / Central Pollution Control Board and (local University in case any research has been done).
x. Urban Local Body
xi. CGWB / State GWBs; State UDD; NIC cell at State / District level; PHED/ Water & Sewerage Board/Authority
xii. CWC / State Water Resources Department about the flows in the river.

CHAPTER 3: PREPARATION OF DETAILED PROJECT REPORT

The DPR shall be prepared to achieve clearly spelt objective and outcome in terms of abatement of pollution from the drains carrying waste water of the town and improving water quality of the river to make it suitable for bathing.

3.1 OBJECTIVES OF DPRAND OUTCOME

The objective is to prepare a project report for constructing Interception and Diversion works of drains including Trunk Sewers and Sewage Pumping Stations and Sewage Treatment Plants in an optimal manner so that the wastewater from the town carried by the drains is treated to the desired standards before it is discharged into the river.

The expected outcome from the implementation of the DPR is that the water quality of the river should be improved to satisfy the standards prescribed for the best designated use of the river as prescribed by the CPCBand thus make it suitable for the best designated use (bathing in this case).

3.2 DESIGNS

Detailed designs and engineering of the works shall be based on extensive survey and investigation and collection of the required data. In data collection, their analysis, design and implementation of the DPR, the relevant provisions of the CPHEEO Manual on Sewerage and Sewage Treatment Systems, Nov 2013(http://moud.gov.in/sewerage) may be followed. In the event of absence of guideline in the manual on a particular aspect, relevant specifications of Bureau of Indian Standards (BIS), standard books, State / CPWD manuals may be followed. Highest Flood Levels (HFL) of drains/Nala/Rivers should be considered for designing the interception works/Sewage pumping stations (SPS)/Sewage treatment plants (STPs).

An integrated and comprehensive scheme of management of wastewater in the town will include other aspects such as covering all the localities with sewers and connecting every household to it, dealing with non-point sources of pollution, solid waste management etc. These Guidelines deal with the preparation of a part, though a major part, of the Integrated Scheme. Thus the interception and diversion sewers, sewage pumping stations and sewage treatment plants proposed under this DPR would ultimately become a part of the town's integrated and comprehensive system of dealing with wastewater. This aspect should be kept in mind while designing the infrastructure works. The sizes and invert levels of different components shall, therefore, be provided accordingly and for the needs of the next 30 years.

For a town that is sewered, even if partly, the existing Master Plan of sewerage of the town, sewerage zones, designs of trunk sewers, locations of sewage pumping stations and STPs will need to be referred to in order to determine the invert levels of Diversion Sewers now being proposed.

In case of towns with no sewerage system and no sewerage plan, ideally it would be desirable to prepare the Master Plan for sewerage, if not prepared earlier and carry out the design of sewerage network of sewers. However, in case it is not feasible or practical for any reason to prepare a master plan of sewerage, it is necessary to ensure that in the future when a comprehensive sewerage plan of the town is prepared and implemented, the proposed works that will come up then will be in consonance with the diversion works that are being planned

now. For this purpose, topography of the area, gradient, obstructions, levels of the localities need to be ascertained and mapping using total station and GIS.

3.3 DEVELOPING OPTIONS FOR THE SCHEMES

3.3.1 Utilising an existing system

In drainage areas and districts where there is an existing system of interception and diversion of waste water from drains, their (existing system's) status may be presented on a plan and in the form of a note stating the components, their details and condition etc.

3.3.2 Condition assessment

The condition of every component of the system should invariably be assessed for theirstatus, designed performance, present performance, designed capacity and present capacity and useful life left, and whether they should be repaired, refurbished, upgraded or modernized. If it is found that the system can be brought to a to a degree that the waste water satisfies the prescribed standards by the time it reaches the river , items of work that are needed should be identified and details worked out and costs estimated. Existing sewerage works should be dovetailed with the proposed scheme.

3.3.3 Alternatives

Alternativesystems if I&D and STPs, keeping in view the location of drains and availability of land for construction of sewage pumping stations and STPs, should be developed so that the optimal system may be adopted and accordingly DPR prepared.

i. Centralised System

The wastewater from all the drains is intercepted in a sewer and conveyed to a centralised STP for treatment from where it could be suitably disposed of into the river or used for irrigation, or, locating the STP further away where land is available at cheaper rates and cheaper technology can be adopted. In this approach the sizes and length of sewers would be relatively large and the STPs also would need to have much larger capacity. Such a system is useful in towns where it is difficult to get the needed land at one place. In this system, the sewers may have to be laid over a long distance involving high costs.

ii. Decentralised System

As opposed to the Centralised System in which all the wastewater of a town is treated at a single point STP, in a decentralised system the entire town is divided in to convenient areas. The wastewater of one area is taken to a point where it is treated in STP. The division of areas is done on the basis of topography and overall cost of I&D including treatment. In such a system, wastewater flowing in one or, sometimes more than one drains, is intercepted and carried in sewer(s) to treatment plant(s) near to their outfalls. In the decentralised approach, sizes of sewers and STPs would be smaller involving lower capital cost. The staff requirement is more and the land required would be at a number of places.

3.3.4 Techno Economic Evaluation

Techno-economic evaluation should be done for each alternative. Economic evaluation should be carried out on life cycle analysis of major components. This analysis should include cost of implementation, capitalised annual O&M cost less revenue from resource recovery, recycling and by-product utilization and cost of mitigation of any adverse environmental impacts, Interest on borrowed capital, debt servicing charges & depreciation provisions should also be taken into consideration to arrive at the Net Present Values (NPV).

Technological evaluation may include ability of the proposed system to achieve the desired outcomes, ease of O&M, time required to implement the project, likely adverse environmental impacts and the feasibility of undertaking measures to mitigate them. The quality of human and physical resources required, electrical and other forms of energy needed, other pros and coins, reliability and long term sustainability should also be given appropriate weightages.

On such an evaluation, the best option should be selected.

3.4 RIVER WATER QUALITY

3.4.1 Water Quality Standards for Rivers as per CPCB

The classification of Designated - Best - Use of inland surface water as stipulated by CPCB is given in table 3.1.

Table 3.1: River Classification Based on Designated Best Use

Designated – Best - Use	Class of Water	Criteria	Prescribed Value
Drinking Water Source without conventional treatment but after disinfection	A	Total coliforms organism pH Dissolved oxygen Biochemical oxygen demand 5 days 20°C	50 MPN/ 100 ml or less Between 6.5 and 8.5 6mg/l or more 2mg/l or less
Outdoor bathing (Organised)	B	Total coliforms organism pH Dissolved oxygen Biochemical oxygen demand 5 days 20°C	500 MPN/ 100 ml or less Between 6.5 and 8.5 5 mg/l or more 3 mg/l or less
Drinking Water source after conventional treatment and disinfection	C	Total coliforms organism pH Dissolved oxygen Biochemical oxygen demand 5 days 20°C	5000 MPN/ 100 ml or less Between 6 to 9 4 mg/l or more 3 mg/l or less
Propagation of Wild life and Fisheries	D	pH Dissolved oxygen Free ammonia (as N)	Between 6.5 and 8.5 4 mg/l or more 1.2mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between Electrical conductivity at 25^{o}C Sodium absorption Ratio Boron	Between 6.0 and 8.5 Max 2250 micro mhos/cm Max 26 Max 2mg/l

Designated – Best - Use	Class of Water	Criteria	Prescribed Value
	Below E	Not meeting A, B, C, D & E Criteria	

Source: CPCB

3.4.2 Actual Water Quality of the River

Data collected on river water quality as discussed in Chapter 2 of these guide lines shall be commented upon and tabulated here.

3.5 DESIGN PERIODS

Design periods for sewerage mains and STPs have been often debated due to cost considerations. Keeping in view the resource constraints and optimum utilization of assets, a modular approach may be followed for the different components of the system.

The year of expected commissioning of the project shall be taken as the base year for design of various components of all projects. The base year may be taken as three (3) years later from the year of preparation of the DPR. Design periods of various components, as prescribed by CPHEEO Sewerage Manual, 2013 are as given below in table 3.2.

Table 3.2: Design Periods

S. No.	Component	Design period, from base year	Design Period* Years (from base year)
1	Land acquisition	30 years or more	Land will be required to add STP modules later. Accordingly land should be acquired.
2	Interceptions	30 Years	
3	Conventional sewers (A)	30 Years	
4	Non - conventional sewers (B)	15 Years	
5	Pumping Mains	30 Years	In case of low velocities, dual pumping mains to be examined
6	Pumping Stations – civil works	30 Years	Cost of civil works is economical for full design period.
7	Pumps & Machineries	15 Years	Considering modular approach
8	Sewage Treatment Plants	15 Years	Construction may be done with a modular approach in a phased manner as the population grows.
9	Effluent disposal	30 Years	Provision of design capacities in the initial stages itself is economical
10	Effluent Utilization	30 Years	15 years or as the case may be

(A) Typical underground sewers with manholes laid in the roads
(B) All types such as small bore, shallow sewers, pressure sewers, vacuum sewers

**Source: Table 2-1 of CPHEEO Manual on Sewerage and Sewage Treatment Systems, Nov 2013and Table 5.1, Guide Lines for preparation of Project Reports under NRCP and NGRBA, Dec 2010.*

3.6 FUTURE POPULATION

Correct and realistic projections of population for design of various components must be done to optimize costs. Floating population in respect of cities having cultural, tourism or religious importance may be considered judiciously and basis for the same be given.

3.6.1 Census Population

Population should be collected from past census records up to the year 2011. In case ULB is established after 1971, respective rural population of the geographical boundary of the ULB should be considered for this purpose.

Data collected on past census population, as discussed in Chapter 2 of these guide lines, shall be commented upon and tabulated here.

There may be towns where the whole area / population with in municipal limits is not contributing to pollution of the river. As the DPR is for intercepting the drains and treating the diverted sewage, it is of utmost importance to precisely consider the population of the area contributing to flows in drains, for projecting design population and sewage flows.

On the other hand, there may be towns where some areas outside the municipal limits are discharging into drains of the town, but for some or the other reasons are not included with in municipal limits. Such areas may also be considered as a part of the project area.

3.6.2 Future Population Projections

The base year shall be taken as year of completion of the projectfor which the DPR is being prepared. Population projections for the base, after 10 years, mid and design years shall be made considering the past decadal growths using different recognized methods such as:

a. Arithmetical increase method
b. Incremental increase method
c. Geometrical increase method
d. Decreasing rate of growth
e. Graphical projection method
f. Logistic method
g. Land use and future density method - This shall be carried out at micro level for individual wards depending upon the growth potential of individual wards in consultation with local body, development authority (if any) and city country planning department.

Future population, which appears to be more realistic and acceptable, shall be adopted by giving proper justification for the same.

3.6.3 Floating population

Floating population should also be considered, which includes number of persons visiting the project area for tourism, pilgrimage or for working. The numbers should be decided in consultation with the tourism departments and specified for water supply and sewerage. Equivalent permanent population shall be worked out in proportion to the rate of water supply required for floating and permanent population.

3.6.4 Unauthorized Population:

In major cities, slum areas, unauthorized colonies, housesand establishments have been generating substantial amount of wastewater. Population ofsuch areas should also be considered during estimation of population andsewage generation.

3.6.5 Design Population adopted (including floating population)

Design population shall be adopted as a sum of permanent and equivalent floating and unauthorized population and shall be given for base year, 10, 15, 30 years. In case the town has been divided into a number of sewerage zones, design population in different years shall also be given zone wise.

3.7 RATE OF WATER SUPPLY

3.7.1 Required rate of water supply, as per CPHEEO Manual

As per CPHEEO Manual on Water Supply and Treatment 1999, the recommended values of water supply for domestic and non-domestic purposes are given in table 3.3.

Table 3.3: Recommended Per Capita Water Supply Levels for Designing Schemes

S. No.	Classification of towns / cities	Recommended Maximum Water Supply Levels (lpcd)
1.	Towns provided with piped water supply but without sewerage system	70
2.	Cities provided with piped water supply where sewerage system is existing/ contemplated	135
3.	Metropolitan and Mega cities provided with piped water supply where sewerage system is existing/ contemplated	150

NOTE:

1. In urban areas, where water is provided through public stand posts, 40 lpcd should be considered.
2. Figures exclude “unaccounted for water (UFW), which should be limited to 15%.
3. Figures include requirements of water for commercial, institutional and minor industries. However, bulk supply to such establishments should be assessed separately with proper justification.

Source: Table 2.1 of CPHEEO Manual on Water Supply and Treatment, May 1999

3.7.2 Rate of water supply required for institutions

The water requirements for institutions should be provided in addition to the provisions indicated in para above, where required, if they are of considerable magnitude and

not covered in the provisions already made. The individual requirements would be as per table 3.4:

Table 3.4: Water Supply Requirements for Institutional Needs

S.No.	Institutions	Litres per head per day
1	Hospital (including laundry)	
	(a) No. of beds exceeding 100	450 (per bed)
	(b) No. of beds not exceeding 100	340 (per bed)
2	Lodging houses / Hotels	180 (per bed)
3	Lodging houses /Hostels	135
4	Nurses' homes and medical quarters	135
5	Boarding schools / colleges	135
6	Restaurants	70 (per seat)
7	Air ports and sea ports, duty staff	70
8	Airports and sea ports, alighting and boarding persons	15
9	Junction stations and intermediate stations where mail or express stoppage (both railways and bus stations) is provided, duty staff	70
10	Terminal stations	45
11	Intermediate stations (excluding mail and express stops)	45 (could be reduced to 25 where bathing facilities are not provided)
12	Train and Bus stations, alighting and boarding persons	15
13	Day schools / colleges	45
14	Offices	45
15	Factories, duty staff	45 (could be reduced to 30 where no bathrooms are provided)
16	Cinema, concert halls and theatre	15

Source:Para 2.2.8.3 of CPHEEO Manual on Water Supply and Treatment, May 1999 and Table 3.4 CPHEEO Sewerage Manual 2013

3.7.3 Status of Existing Water Supply in the project area

Status of existing water supply shall be prepared as stated in para 2.4.6 and table 2.5.

It shall be ensured that the existing water supply or that proposed to be added by projects under execution, has the potential to meet the water demand of the projected design population at the rate specified in the above table. Details of projects (such as estimated cost, source of water, year of sanction/completion, brief details of works, lpcd proposed, design population etc.) which have been taken up or are contemplated for augmentation of water supply should be given.

3.7.4 Rate of water supply adopted

Rate of water supply adopted for design purposes should be mentioned, keeping in view the existing water supply, plans for augmentation and required for the project, giving full justification of the same.

3.8 INTERCEPTION FACTOR

The observed dry weather flow reaching the sewer system is less than that of the per capita water supply due to loss of some water in leakage and evaporation. It varies from 40% of water supplied in arid regions to 90% in well developed areas. For design purposes, interception factor or return factor may be adopted as 0.80 in developed areas. However, conventional sewers shall be designed for a minimum sewage flow of 100 lpcd or higher as the case may be.

3.9 GROUND WATER INFILTRATION

The inflow to sanitary sewers may also include flows due to infiltration of groundwater through joints. As per CPHEEO manual, since sewers are designed for peak discharges, allowances for groundwater infiltration for the worst condition shall be made as per table 3.5and that design infiltration value shall be limited to a maximum of 10% of the design value of sewage flow.

Table 3.5: Ground Water Infiltration

Item	Unit	Minimum	Maximum
Area	Litres/ha/day	5000	50,000
Length	Litres/km/day	500	5,000
Manhole	Litres/day/manhole	250	500

Source: Table 3.3 of CPHEEO Sewerage Manual 2013

The depth of subsoil water in the project area be mentioned. For design purposes, ground water infiltration through sewers may be adopted depending on depth of sewers to be laid and depth of sub soil water.

3.10 PEAK FACTORS

Flow in drains and sewers varies hourly and seasonally. However, for design purposes, peak factors may be adopted as per table 3.6. Minimum flow may vary from 1/3 to ½ of average flow.For population less than 10,000, Babbitt's formula[1] with minimum and maximum limit of 3.0 and 6.0 respectively may be used.

Table 3.6: Peak Factors for contributory population

Contributory Population	Peak Factor
Up to 20,000	3.00

20,001 to 50,000	2.50
50,001 to 750,000	2.25
Above 750,001	2.00

Source: Table 3.2 of CPHEEO Sewerage Manual 2013

[1] Babbitt formula for peak factor = $5\times P^{-02}$, where P is population in thousand.

3.11 DESIGN FLOWS

Sewage flows in design years (base, 10, 15 and 30 years), should be worked out by the following methods:

- Computed flow based on rate of water supply and projected population (including floating) of the catchment, in design years. For calculating sewage flows, ground water drawn through private bores and ground water infiltration through sewers laid below ground water table should also be added.

- Actual flows measured in drains and sewers in dry season projected for design period, taking into consideration the population for the respective design period. In hills, actual flow should be measured during yatra season also.Copies of reports of flow measurements indicating the date / method of measurement should invariably be made a part of DPR. Data collected on actual sewage carried by drains, as discussed in Chapter 2 of these guide lines, shall be commented upon and tabulated here.

Higher values, worked out above, may be adopted as design flow unless justified for the specific city having specific reasons and climatic condition. In some towns, the flow in the drains is many times higher than the computed flow based on the water supply indicating the contribution of ground water or some other sources like back water, canal or springs. In such situation, a judicious and well considered value should be taken for designing the interception/diversion works, SPS and STPs. Efforts should be made to isolate the sewage from such other sources.

In towns, where water supplied is higher than recommended rate of water supply, a programme for gradually decreasing the same to recommended rate of water supply shall be adopted, in view of the National policy of water conservation.

A hydrograph for 24 to 72 hrs. exhibiting the peaks may be plotted against measured flows and area, to make an assessment of volume of accumulated flows. The assessment based on population projection may, quite often, neglect, some areas which are not accounted for or are outside municipal limits, but are actually contributing to flows in drains. The estimated quantity based on hydrograph may therefore be used as reference figures for taking a judicious decision.

Design flows adopted in different years shall be worked out and tabulated sewerage zone wise / drain wise so as to indicate the raw sewage flow to be diverted for treatment.

However, in towns where present water supplied is less than recommended rate and there is no possibility of increasing the same in near future, design sewage flows for STPs and E/M works of SPS may be based on current drain flows projected for the design period instead of on computed flows. Their capacity be increased as and whenthe rate of water

supply and flow in the drains increases. However, suitable provisions in the structure and space be provided in the beginning.

Design flows shall also include the flow reaching STPs from drains flowing into the city from areas outside city boundary limits.

As Per 2.4.9 (CPHEEO Manual) Geographical Information Systems (GIS) should be an integral part of sewage collection system. The spatial modelling capabilities of GIS can be used to estimate current and future sewage flows, evaluate the capacity of the sewers and estimate the condition of the sewers.

Design flows shall be adopted in different components as per table 3.7.

Table 3.7: Design Sewage Flows to be adopted for different components

S. No.	Component	Design capacity based on
1	Interceptions	Projected peak drain flow in 30 years
2	Sewers	Design sewage flow in 30 years @ 135/150 lpcd*
3	Sewage pumping stations CW	Design sewage flow in 30 years @ 135/150 lpcd*
4	Sewage pumping stations EM works	Design sewage flow in 15 years @ 135/150 lpcd*
5	STPs	Design sewage flow in 15 years @ 135/150 lpcd*
6	Effluent sewers	Design sewage flow in 30 years @ 135/150* lpcd*
7	Land	For STPs / SPS on Design sewage flow in 30 years @ 135/150* lpcd*

*Depending upon size of town

3.12 INTERCEPTION WORKS

a. These shall comprise of cross overflow weir, gates, screens, interception channel, diversion drain, grit chamber, proportional flow weir etc.
b. These shall be provided near the outfall of the drains carrying untreated sewage into the river.
c. These shall be provided taking into account the design peak flow, size of the drain and highest flood level (HFL) of the river. These should not be designed using empirical rainfall-runoff formulae's. Data should preferably be obtained from CWC/other government agencies as defined in para 2.5 of this report. In absence of authentic data, proper observations need to be carried out.
d. Some portion of the drain u/s and d/s of the interception works shall be remodelled to suit the site requirement.
e. During the rainy season, the sewage flowing into the drains will be supplemented by storm water. As this happens, the gates provided at the interception chamber shall be raised to allow rain water to pass through and bypass the STP for which suitable arrangements shall be made.

f. Suitable arrangements shall be provided for removal and disposal of solids, floating materials and silt to prevent silting of diversion sewers.
g. There is a wide variation in the discharge in the Indian rivers during dry months and the rainy season. Because of this phenomenon, the flood plain of the rivers especially in Gangetic plains is very wide. The location of the interception works shall take due consideration of the flood plain of the river to provide unobstructed approach for O&M.
h. Anti-corrosive measures like cathode protection and use of anti-corrosive materials shall be taken to prevent corrosion of the works.
i. Hydraulic design shall be provided for every component of I&D works along with hydraulic flow diagram.
j. I&D works to be so provided that they become integral part of the comprehensive sewerage plan of the town.

3.13 DIVERSION / INTERCEPTING SEWERS

(i) The sewers proposed under the DPR should be so designed that they ultimately become a part of the town integrated and comprehensive system dealing with wastewater. The sizes and invert levels of sewers shall therefore, be provided accordingly and for the needs of next 30 years.
(ii) Minimum size of sewers shall be adopted as 200 mm for towns having present/base year population of over 1 lac and 150 mm in smaller towns. In hills, minimum diameter of 100 mm shall be adopted.
(iii) Minimum velocity at initial/ultimate peak flow shall be adopted as 0.6/0.8 m/s and maximum velocity not to be more than 3 m/s. In hills, CI/DI pipes may be adopted along with suitable drop manhole arrangement to reduce the velocity greater than 3 m/s.
(iv) Maximum depth of flow shall be limited to 0.8 of the diameter at ultimate peak flow for ventilation.
(v) Life cycle cost analysis of different pipes shall be done and included in the DPR, if pipes other than RCC are proposed in gravity sewers.
(vi) Condition assessment of existing sewers shall be carried out and the same shall be integrated into the proposed sewers. The report of such condition assessment should be invariably appended with DPR. Hydraulic design of sewers shall show integration of existing sewers with proposed ones.
(vii) The alignment of proposed sewers shall take due consideration of HFL and flood plain of the river to provide safety of works and unobstructed approach for O&M. Measures taken in this regard, shall be stated.
(viii) Trenchless technology method may be adopted at major road crossings, railway tracks and other important junctions for laying of sewers. However, full justification for adopting trenchless technology instead of open excavation will need to be given along with plans showing such stretches.
(ix) Sewers rehabilitation or laying of sewers by trenchless method shall be proposed on technology neutral basis.
(x) The plans should show basic details such as GLs, contours, land marks, major drains, their points of outfall, diameter and invert levels of existing and proposed major sewers, especially at junction points.

3.14 SEWAGE PUMPING STATIONS

a. The civil works of sewage pumping stations proposed under this DPR would be provided for 30 years need and would ultimately become a part of the town's integrated and comprehensive system of dealing with wastewater. The sizes of pumping stations and RLs of different components shall therefore, be provided accordingly. However, considering modular approach, pumping plants shall be provided to cater to next 15 years and further pumps may be provided with a modular approach in a phased manner as the population grows.

b. The configuration of sewage pumps may be adopted as per table 3.8:

Table 3.8:Configuration of Sewage Pumps, based on length of rising mains

Length of rising main	**Pumps**	**No. of pumps**
Where rising main is long and where head losses are the dominant factor	Peak Flow/2 pumps	3 nos. (including 1 standby)
	Non PeakFlow pumps	2 nos. (including 1 standby)
Where rising main is short and static head is dominant	Peak Flow/4 pumps	6 nos. (including 2 standby)

Source: Table 5.1, Guide Lines for preparation of Project Reports under NRCP and NGRBA, Dec 2010

c. Alternatively, pumps may be provided as given in table 3.9.

Table 3.9: Configuration of Sewage Pumps, based on size of sewage pumping station

Size of Sewage Pumping Station	**Pumps**	**No. of pumps**
Small capacity pumping station	1 pump of 1 DWF 1 pump of 2 DWF 1 pump of 3 DWF	3 nos.
Large capacity pumping station	2 pumps of 1/2 DWF 2 pumps of 1 DWF 1 pump of 3 DWF	5 nos.

Source: Para 4.5.4 CPHEEO Manual on Sewerage and Sewage Treatment Systems Nov 2013

d. The number of pumps may be so chosen to provide a 100% standby capacity during peak hours, if the site conditions so warrant. For the purpose, required number of pumps may be kept in reserve in store for use in emergency.
e. Design of pumping stations should take into consideration the lean, average and peak flows. Pumping configuration should be appropriate for effective pumping of sewage in any of these flow conditions.
f. Hydraulic retention time (Volume of wet well below invert of incoming sewer) shall be worked out as below:

Volume of wet well V = T x Q / 4
Where,

V: Effective volume of wet well (in cubic meters)
T: Time for one pump cycle (in minutes)
Q: Pumping rate (cubic meters per minute)

The value of T is related to the number of starts per hour and it is not advisable to exceed 6 starts per hour. Accordingly, the value of T in the design is to be taken as 10 minutes for smaller pumps but 15 minutes is desirable.

Ideally this volume has to be provided below the invert of the lowest incoming sewer. However, it may not always be possible especially in large sized pumping stations. In such cases, volume in the sewers calculated at 0.8 times their total volume can be considered as the extended wet well volume. *(Source: Para 4.6.6 CPHEEO Sewerage Manual(Nov 2013).*

g. Size of sump of the pumping station shall be checked with the pump manufacturer(s) for adequacy and so mentioned in the DPR.
h. Provision of control room shall be made in the DPR as per specifications of the respective Discom.
i. Submersible sewage pumps may be used, which are more economic in terms of both capital and operating cost besides being operation friendly.
j. Recent version to submersible pumps are immersible pumps with a seal of oil around the motor which takes care of its cooling. Thus it is possible to pump out the wet well to almost the mid height of the pump and reduce the height of wet well below the incoming sewer, saving considerable construction cost. *(Chapter 4 of CPHEEO Sewerage Manual(Nov 2013.)*
k. Condition assessment of existing pumping stations shall be carried out and the same shall be integrated into the proposed ones. The report of such assessment should be invariably appended with the DPR.
l. To ensure constant running of pumping stations, diesel operated generating sets may be proposed at each pumping station. Provision should also be made for dedicated feeder line as well, as discussed in para 3.21 of these guide lines.
m. HFL of the river shall be taken into consideration while deciding RLs of different components of the SPS to provide safety and uninterrupted operation and maintenance of SPS.
n. DG set capacity needs to be provided for peak flow requirement.
o. To scale site plans of the proposed pumping stations should be provided, showing land available, layout plan of the proposed works and open space available for future requirement.
p. Hours of power availability in the project area should be mentioned in the project.

3.15 RISING MAINS

In case of water supply works, economical size of the rising main is worked out by trying out various sizes and finding out net present value of the capital costs of pipe line/pumping machinery and capitalised electric energy costs. In case of rising mains carrying sewage it is not possible to calculate the economical size because of complexity of varying pumping rates etc. As such,

a. size of rising main selected should be such that to avoid silting, ensuring velocities not less than 0.8 m/sec (barest minimum) and not exceeding 3 m/secat any time (*Para*

4.20 ofCPHEEO Manual on Sewerage and Sewage Treatment Systems Nov 2013).Suitable provision of rising main accessories, wherever needed, such as thrust blocks, anchor blocks, expansion joints, scour/drain valves, air/vacuum release valves and surge protection devices shall be made in the DPR. Surge/water hammer analysis shall be calculated and made a part of the DPR.

b. Rising mains must be designed for WHH (Water Hammer Head) also: It is important to select the suitable class of the pipe based on clause no. 6.17.3(a), (b) and (c) of CPHEEO manual on water supply. Accordingly, if (a) Pumping Head (PH) + Water Hammer Head (WH) < 1.1 × Allowable Pressure (AP)/Working Pressure (WP) of pipe, then the same class of pipe can be used, if (b) PH + WH > 1.1 × AP/WP < 1.5 ×AP/WP, the same class of pipe can be used with provision of water hammer controlling devices and if (c) PH + WH > 1.5 × AP/WP, then higher class pipe shall be proposed.

3.16 SEWAGE TREATMENT PLANTS

3.16.1 Raw Sewage Quality for STP Design

3.16.1.1 Past experience indicates that normative values of parameters like BOD and SS have been taken for influent sewage despite actual quality characteristics having been established through field investigations. Such considerations result in over design of STPs with higher cost implications. This must be avoided and actual influent quality with an appropriate mark up only be considered for design purposes. For adopting BOD levels above 150 mg/l, proper justification must be provided. Copies of laboratory test reports of waste water incoming at existing SPS/STPs in the town or other towns in the vicinity, under similar situation, shall form part of DPR. The date and time of measurement of raw water quality shall invariably be mentioned in test reports.

3.16.1.2 The raw sewage quality should be ascertained by composite sampling once a week for diurnal variation on hourly basis from the drain or nearby existing sewage outfall (SPS/STP). Considering a 4-week month, 3 samples are to be collected on weekdays and the fourth on an off day i.e. Sunday. Sampling for water quality should be conducted for at least one month during dry weather to assess pollution load quantitatively and qualitatively.

3.16.1.3 The samples should be analysed for the parameters:pH, temperature, colour, odour, alkalinity, TSS, VSS, BOD (Total & filtered), COD (Total & filtered), N (NH3, TKN, NO3), Phosphorus (Ortho-P, T-P), TC, FC, TDS, Cl, Sulphates. For chances of industrial contamination - Heavy metals, Pesticides (Organo Chlorides, Organo Phosphates, Carbonates), Detergents, other parameters as per type of industry. One or two samples may also be tested for emerging contaminants involving presence of pesticides, personal care products and antibiotics etc. as these are becoming important in future treatment processes. Such tests shall provide a good baseline data.

3.16.1.4 In the absence of existing SPS / STP(s), actual measurements of raw sewage quality,from nearby town(s) having same rate of water supply and similar socioeconomic conditions,should be carried out as stated above.

3.16.1.5 Copies of raw sewage quality being monitored at the influent of existing STPs should also becollected for the last 2 years and shall be made a part of DPR.

3.16.1.6 Summary of above laboratory water quality test reports should be provided along with their copies and shall be made a part of DPR.

3.16.1.7 Raw sewage quality for design of STPs should be adopted accordingly. Basis of raw sewage quality adopted should be given

3.16.2 Treated effluent Quality

MoEFCC,vide Gazette notification, 843 dated 13th October,2017 under Environment (Protection) Rules, has prescribed theeffluent discharge standards for Sewage Treatment Plants (STPs) as given in table 3.10.

Table 3.10: Effluent Standards for Sewage treatment plants

S. No.	Industry	Parameters	Standards	
1	2	3	4	5
		Effluent discharge standards (applicable to all mode of disposal)		
105”	Sewage Treatment Plants (STPs)		Location	Concentration not to exceed
			(a)	(b)
		pH	Anywhere in the country	6.5 – 9.0
		Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	20
			Areas/regions other than mentioned above	30
		Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	<50
			Areas/regions other than	<100

			mentioned above	
		Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml	Anywhere in the country	<1000

*Metro Cities are Mumbai, Delhi, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune.

Note :

(i) All values in mg/l except for pH and Fecal Coliform.

(ii) These standards shall be applicable for discharge into water bodies as well as for land disposal/applications.

(iii) The standards for Fecal Coliform shall not apply in respect of use of treated effluent for industrial purposes.

(iv) These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.

(v) In case of discharge of treated effluent into sea, it shall be through proper marine outfall and the existing shore discharge shall be converted to marine outfalls, and in cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500 times at a point 100 meters away from discharge point, then, the existing norms shall apply as specified in the general discharge standards.

(vi) Reuse/Recycling of treated effluent shall be encouraged and in cases where part of the treated effluent is reused and recycled involving possibility of human contact, standards as specified above shall apply.

(vii) Central Pollution Control Board/State Pollution Control Boards/Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986".

These standards should be followed. However, if is felt that more stringent norms are required, they may be adopted after giving justification

3.16.3 Sewage Treatment Technology

Sewage treatment plants are based on the technology which may have the natural, chemical, powered or non-powered based processes.The choice of technology option for sewage treatment is of great importance. In the NRCD MOEFCC document "Compendium of Treatment Technologies" published in 2009, (http://moef.nic.in/modules/recent-initiatives/NGRBA/Final%20Compendium.pdf) technologies have been evaluated on basis of

i. Performance,
ii. Energy requirement,
iii. Resource requirements and associated costs,
iv. Land requirements.
v. Annualized cost has also been worked out.

This compendium may be referred for selection of an appropriate sewage treatment technology. It implies that depending on the desired water quality of the effluent of the STP,

land requirement, availability of electricity and funds available, the technology that appears feasible should be selected using the matrix given in Compendium of Technologies. Graph showing annualised cost (as in 2008) of treatment and corresponding land requirement for various treatment technologies, as given in the above compendium, is placed as Fig 8.Constructed wetland technology may also be included in the sewage treatment plant technology options as it offers one of the most promising methods to treat sewage with low capital expenditure (CAPEX) and operation expenditure (OPEX) subject to the availability of land. This option may also be studied for improving the performance ofexisting oxidation and stabilization ponds to the desired level.

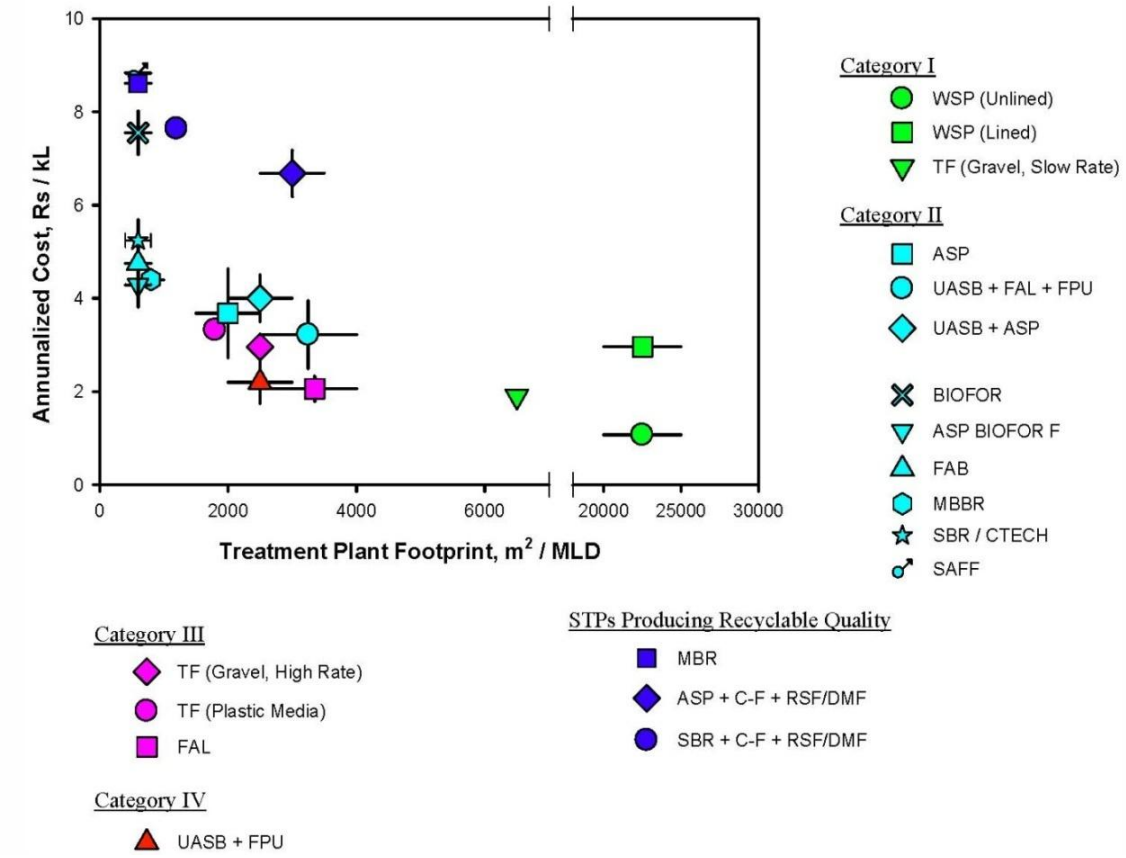


Fig. 8: Annualised cost (as in 2008) of treatment and corresponding land requirement for various treatment technologies
(*Source: Compendium of Treatment Technologies – MoEF 2009)*

Description of these technologies has been given in the Compendium, which may be referred to. Since the publication of the Compendium, more technologies have been developed and used. Up-coming technologies like A2O process, MLE (modified ASP) may also be included as these address exclusively Nitrogen and Phosphorus, apart from conventional pollutants.

Bioremediation technique has also been developed involving the use of organisms to neutralize pollutants from a drain itself. .However, most of the work on Bioremediation has been done on laboratory scale or limited pilot instances. A State-of-the-Art report on 'Bioremediation, its Applications to Contaminated Sites in India' has been published by the MoEF, Govt. of India (http://www.moef.nic.in/downloads/public-information/BioremediationBook.pdf). This report gives a list of institutions having expertise

in bioremediation. Appropriate institution may be consulted if bioremediation appears to be a feasible solution to the problem in the circumstances of a town.

The CPHEEO Manualon Sewage Treatment Nov 2013 (para 5.8) makes the following observation:

"It covers such of those technologies for which validated design guidelines are available in India over the past many decades. There are more recent technologies with each of them having their own design guidelines by the respective equipment vendors and for which obviously there are proprietary issues in procurement out of public funds. No doubt, unless these are tried out at some point in time, there is no way of inheriting these forever, but at the same time, the proprietary issue has to be got over. Hence, these technologies will be addressed later in this chapter under the title "Recent Technologies". Accordingly, the technologies to be considered in this chapter will be the Activated Sludge Processes, Attached Growth Systems, Treatment Methods Using Immobilization Carrier, Stabilization Ponds and Anaerobic Treatment. It is decided to phase out the stone mediatrickling filter technology considering the difficulties of upkeep of its rotary distributor, Psychodaflies nuisance and the recent light weight media which give much more surface area for unit volume of the media as compared to the stone media."

NRCD has, in the year 2011, sanctioned 4 (four) demonstration/pilot project of "In-situ treatment of sewage through bio-remediation" at (i) BudhaNala, Ludhiana, Punjab (ii) BakarganjNala at Patna, Bihar (iii) MorigateNala, Allahabad, UP and City Drain, Farukabad, UPunder NRCP/NGRBA with CPCB as the nodal agency for project implementation. The results of the project are not published yet. However, expected BOD from the pilot projects is limited to only 30 to 50 and TSS 80 to 130 only which are not in conformity to the new effluent parameters.

Hence those technologies should be considered for selection in respect of which reliable information is available along with those mentioned in the compendium of Treatment Technologies (2009)and the Manual of CPHEEOon Sewage Treatment Nov (2013).

3.16.4 Life Cycle Cost Analysis

The most cost effective and feasible option may be selected through their life cycle cost analysis of various technologies. The cost components that should be included are the following:

a) Capital (One time cost)
   i. Land
   ii. Cost of various components of the system.

b) Recurring (Annual)
   i. Energy (electricity & diesel)
   ii. Manpower cost in operation and maintenance
   iii. Consumables
   iv. Repair and maintenance
   v. Resource recovery (negative cost.)

c) Water quality parameters – Influent quality, effluent quality standards, effluent quality for reuse.

This analysis should include capitalized costs, less revenue from resource recovery, recycling, by-product utilization etc. Ease of O & M, time required to construct and for achieving the desired objectives and costs of mitigation of any adverse environmental impacts must be considered on the costs assigned for the alternatives. Best option arrived from the LCC analysis should be selected and details should be presented in the DPR.

Standard methodology for calculating life cycle costs should be adopted.

3.16.5 Provision for STPs on technology neutral basis

Provision for STPs should be made on technology neutral basis. The technology provider may be asked to quote the rates based on the criteria such as raw sewage quality, effluent quality for reuse of effluent, availability of land and O&M cost and ease in maintenance of the STPs etc.

Costs of STPs constructed elsewhere on latest effluent parameters should be given in support of estimated cost adopted in the DPR.

3.16.6 Capacity / location of STP

a. Present Capacity of STP shall be provided to cater to the needs of the next 15 years and construction may be done with a modular approach in a phased manner as the population grows. Condition assessment of existing STPs shall be carried out and the same shall be integrated into the proposed ones.
b. The DPR is for intercepting the drains and treating the diverted wastewater. It is presumed that in the dry months the drains will carry mainly the wastewater from the town and there will be negligible storm water. Therefore, the entire flow in the drain should be diverted to the STP and treated. The STPs will, therefore, need to be designed based on the flow in the drains for the flow in the dry months and the sewage generation based on the population, whichever is higher.
c. Proposed STP shall take due consideration of HFL (Highest Flood Level) of drain / nala / river to provide safety and uninterrupted operationand maintenance of the STP.

3.16.7 Condition assessment of existing STPs

Condition assessment and integration of existing STPs with the proposed one should invariably be carried out. Non Destructive tests on RCC structures should be done to provide confirmation of the stability and integrity of civil structures. The report of such condition assessment should be appended with the DPR

3.16.8 Resource Recovery

Following methods of resource recovery are:

i. Sale of sludge as manure or fuel
ii. Sale of treated water for irrigation, horticulture
iii. Fisheries etc.
iv. Generation of electricity
v. Carbon credit

All key parameters should be explained with detailed justification in the DPR.

3.16.9 Sludge Management

The DPR should have provision for a detailed Sludge Management Plan including the treatment, storage, handling facilities at site and approvals from ULBs to accept the solid waste generated by the STPs for its safe disposal / effective management.

Chapter 6 of CPHEEO Sewerage Manual (2013) has laid down detailed Guiding Principles on sludge treatment and its uses. These need to be followed. Disposal of sludge shall have to be as per the hazardous waste (handling and management) rules of MoEF if ceiling concentration of heavy metals and faecal coliform limits are violated. Every effort should be made to go eco-friendly in dealing with biological sludge from STPs. They need to be dried to about 20% moisture and then integrated with the agriculture and farm forestry. If needed to be applied on sensitive lawn, Gamma ray radiation of the sludge is mandatory before such application. The advancement in anaerobic sludge digestion in the coming years may address these processes

3.16.10Septage / Faecal Sludge Management

In areas where the sewerage network coverage is low, there has been reported tendencies of the septage being dumped at the receiving chambers or the drains to the STPs causing shock loads and leading to failure of the STP's performance. Hence Septage / Faecal Sludge management practices are to be assessed and appropriate provisions need to be built in while designing the STPs.

3.16.11Reuse of treated sewage

Paragraph 2.12.1.7 of CPHEEO Manual recommends that reuse of treated water to a minimum extent of 20% shall be mandatorily explored. This should be kept in mind. In view of higher treated effluent quality, concerted efforts will have to be made to explore and sell all the treated effluent to the potential buyers, 1st in industrial application, 2nd in domestic purpose and 3rd in agriculture sector. These may include laying new pipe lines for reusing the treated water by industries, domestic (toilet, cleaning) and horticulture.For the purpose, the end users will need to be identified, user agreement finalized and provision for recycled water network need to be established to ensure the recycling of treated sewage.

3.16.12Instrumentation and Data Acquisition

The process instruments of proven technology may be provided for efficient continuous online monitoring at inlet and outlet of STPs, measurement of flows / water

quality parameters and safety of operating staff and equipment as per prevailing norms. The instruments should show compliance to agencies such as ISO, BIS, EPA etc. as applicable.

The SCADA system should be capable of taking care of the complete Data Monitoring and Data Logging facility and should be based on latest version of SCADA system.

3.17 LAND REQUIREMENT

Sewers are laid on the road side on publicly owned land. Hence no land is required to be acquired for sewers. However, land is required for sewage pumping stations and sewage treatment plants. In the above referred Compendium i.e., "Compendium of Treatment Technologies" published in 2009, (http://moef.nic.in/modules/recent-initiatives/NGRBA/Final%20Compendium.pdf)", the land required per unit of wastewater treated in treatment plants has been given. It should be used to estimate the land required for STPs.

3.17.1 Land for Sewage Pumping Stations and STPs should be arranged to meet the requirementfor next 30 years.

3.17.2 To scale site plan should be provided in the DPR showing the layout of proposed works, land required for proposed works and open space for future requirement.

3.17.3 Status of availability of land to be given on a statement showing land required for ultimate needs (of Interception works, SPS, STP, other works), land available, balance required, funds required for acquisition, provision made in DPR.

3.17.4 Land for construction of various structures / sewage pumping stations / STPs shall be in possession of executing agencies and land documents shall be attached to the DPRs.

3.17.5 Photographs of the existing and the proposed land sites be attached with the DPR.

3.18 FACTORS IN SELECTION OF SYSTEM OF WASTE WATER MANAGEMENT

Sewerage Districts – Configuration of STPs.

Depending on the availability of land especially for STPs, the locations of STPs may be determined. At one location where wastewater will be treated will receive wastewater from areas covered by one drain or more. This area will be the Sewerage area or Sewerage district of the STP.

Factors which affect the selection of system are given below:

i. Feasibility of utilising an existing interception & diversion system with necessary repairs, renovation, up gradation and modernisation.

ii. Where new systems are to be established, availability of land is a critical factor. In a district if suitable land of the required size is not available for installing STP, waste water must be carried to a place where land for the STP is available.

iii. Availability of electricity. It is crucial as a centralised system usually involves a long interception sewer necessitating laying of sewers at considerable depth and installation of intermediate pumping stations. These require power and since in most states there is shortage of power, standby arrangements in the form of DG sets have to

be provided for. Thus centralised system involves high capital cost and high O&M cost.

iv. There are pros and cons of centralised and decentralised systems. They should be carefully analysed and compared. Life cycle costs of different systems should be compared.

v. The ability and willingness of the people to meet their obligations to sustain the system etc.

vi. Over the life cycle of the system, the net present value of annual costs and revenues should be worked out of systems that are considered feasible and on that basis the system found to cost the least should be selected.

Based on the above factors the most suitable system may be selected.

3.19 PREPARING DRAWINGS

Drawings of works proposed should be incorporated in the project report. The DPR should be prepared in the Geographical Information System (GIS) format if it is feasible.

Following drawings should be provided in DPRs:

Sl.No.	Drawing Title
	General Drawings
1.	Map of the Country and State Showing the Location of the Town
2.	Map Showing Ganga River Basin and Location of Town
3.	Base map of Town (Road, Railway track, Wards, Slum and important landmarks etc.)
4:	Satellite lmagery of Town
5.	Land use Map/ Master Plan of Town (if any)
6.	Catchment Area of the town.
7.	Map Showing overall drainage and their Outfall Point related to Town
8.	Map of Town showing locations of industries, CETPs and points of, untreated/ treated effluent outfalls of industries, etc.
9.	Map Showing Contours for Town
10.	Map Showing Existing Sewer Network for Town
	Proposed Drawings
11.	Key Plan of Proposed Scheme integrated with existing system along with Gls and ILs at criticalpoints,drains,their points of outfall, proposed SPS, STPs (Capacity in MLD)
12.	L-sections of sewers to show GLs/ ILs/ dia / length / type of sewers,profile of ground and sewers.
13.	Plan and section for the outflow channel up to its merger with the river including outfall structure. All plans may invariably show the NSLs and HFL duly certified from the line deptts viz., CWC/State Irrigation/ Water Resources deptts.
14.	Location Map of Interception & Diversion of drain
15.	Map Showing Proposed Drains Interception and Diversion (I & D) Works
16.	Map Showing Proposed Fencing Stretches on various Drains (if considered)

Sl.No.	Drawing Title
17.	Location Map of SPSs/STPs as per actual site layout (showing lat/long, important landmarks and site surroundings).
18.	General Arrangement Drawing for Sewage Pumping Station
19.	Layout Plan of Proposed/Existing STP with unit sizing, specific modification requirement (if any), Road, Guardroom, Staff quarter, Solar Panel, Plantation etc.
20.	Hydraulic Flow Diagram for Proposed/Existing STP.
21.	Plan and Profile of Treated Effluent Reuse Pipe Line
22.	Typical Details of Manhole (Various Sizes)
23.	Typical House Connecting Chamber
24.	Typical Sewer Bedding Details
25.	Typical Boundary Wall
26.	Typical Single line Diagram for STP integrated with Solar Power (Electrical)
27.	Typical Single Line Diagram for SPS and MPS. (Electrical)
28.	Typical Process and Instrumentation Diagram integrating with SCADA system
29.	Typical cross-sectional drawing of drains (Existing & Proposed)
30.	Excavation plans and sections utilized for cost estimates towards excavation works.

Note: All drawings shall be in appropriate scale to ensure the legibility and easy handling of drawings.

a. A design memorandum providing the design calculations, assumptions and specifications adopted to be provided in the report.
b. Details of water hammer pressure in form of calculation sheet indicating that the pressurized pipe system pipe system viz. rising main is safe against water hammer needs to be provided.

3.20 DEDICATED ELECTRICITY FEEDERS AND GENERATORS

3.20.1 Sewage pumping and treatment need uninterrupted electricity supply. Therefore, average duration of supply of electricity should be ascertained so that the number of hours during which the Diesel generation (DG) sets will need to be operated can be known. Diesel generation sets will need to be provided to ensure constant running of the same. However, provision of dedicated electricity feeders for SPSs and STPs is also essential to meet programme objectives. DPR should contain details of such feeders like the length of the cable from the source of power, specifications of transformers, and estimated cost. However, capacity is to be determined on the basis of requirement.

3.20.2 Hrs. of availability of power at the sites of existing and proposed works in the project area should be given.

3.21 OBJECTIVES, PERFORMANCE PARAMETERS AND RISK FACTORS

The objectives and outcome of the project, in terms of abatement of pollution of the river and improvement of water quality and of environment improvement, should be clearly spelt. There should be performance parameters of the system as a whole and of each component so that the effectiveness can be monitored and evaluated.

3.22 PERFORMANCE PARAMETERS

There should be performance parameters of each project component and the system as a whole so that the effectiveness can be monitored and evaluated. Sub-system alternatives for major components such as sewage should include the alternatives of centralised systems and decentralised systems.

Since the systems consisting of sewers involving pumping stations, and STPs are complex and are energy and capital intensive, the guidelines may be followed for designing the components of the system.

3.23 COST ESTIMATES

Based on survey and investigation, data collection and design criteria, detailed estimates may be prepared, and abstract of cost may be presented as per Table 13.1.

3.24 STRUCTURE OF DPRs

Suggestive structure of DPRs is placed at Annexure IV.

3.25 FLOW CHART OF ACTIVITIES FOR PREPARATION OF DPRS

A flow Chart showing different broad activities for preparation of DPRsis shown in Fig 9.

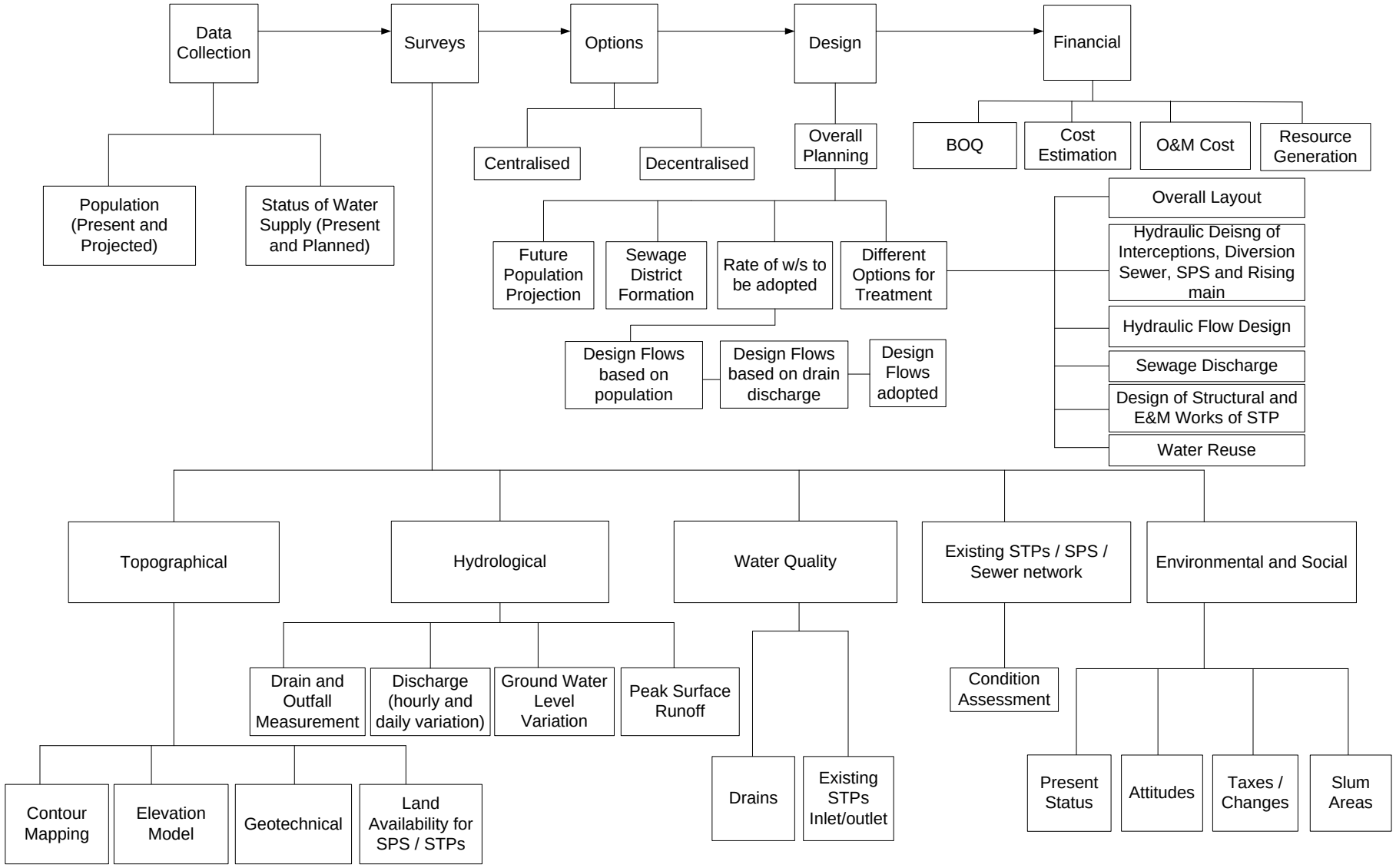


Fig. 9: Flow chart of Activities for Preparation of DPR

CHAPTER 4: OPERATION AND MAINTENANCE

4.1 CRITICALITY OF O&M

Operation and maintenance of assets has emerged as a major concern in the success of this programme. NGRBA has now decided that funds for O&M for a period of 15years initially, would be funded by the center. The O & M responsibility beyond the 15thyear will rest with the State Government/ ULB.

Tripartite MoA amongst MoEF, State Government and the local body is also to be signed. State governments are expected to take all necessary measures available at their control to address this problem in a sustainable manner.

A centralized and computerized monitoring of performance of the system is also required to be established by state for all STPs to monitor the performance and take necessary remedial actions as required. Directions have been issued by CPCB vide notification dated Mar 02, 2015 for online monitoring of influent and effluents of highly polluting industries, CETPs etc. Copy of notification dated Mar 02, 2015 may be seen as Annexure V. Accordingly, devices may be installed on STPs dealing with domestic waste also for their proper monitoring of the performance and taking timely remedial measures when necessary.

It is necessary to accurately work out O&M cost. The records of O&M of assets created under GAP/NRCP may be examined carefully and updated to the current levels as well as the periods when new facilities would be ready for operation. Cost of electricity is the major component of O&M accounting singly for 65-70%. These as well as other components like manpower, consumables, etc. should be calculated on a realistic basis to arrive at the total annual cost to operate an asset. Continuous availability of electricity for both STPs and PSs must be ensured on round the clock basis by the implementing agency.

Preventive maintenance or repairs needed after a few year's initial operations are often lost sight of. This is an important element of overall O&M cost and must be provided for appropriately.

The DPR must clearly reflect the component-wise and total funds needed for O&M and how and wherefrom these would be provided.

The O&M should be optimized by adopting tools like SCADA etc. and as per CPHEEO Sewerage Manual. Manpower required for maintenance need to be assessed considering optimization using SCADA and centralized automation.

Given the provision of 15years O&M expenditure in the project cost, outsourcing of O&M for this period would seem to be obvious. The contractor must be asked to offer performance guarantees through proper O&M to achieve the outcomes. If O&M is outsourced, effort should also be made to build O&M capacity within the organization also. The contractor must also provide operation manual with answers to FAQs, identification to sensitive locations, risk involved and preventive measures with Dos and Don'ts properly listed

As part of capacity building programme, operation and maintenance manuals have to be made available to the ULB's staff by the DBO contractor.

4.2 RESOURCE RECOVERY AND REVENUE GENERATION

With little additional and dedicated efforts, sewage treatment could be converted into a resource generation activity to partly meet the O&M costs. Treated sewage and sludge are both rich in nutrients and, therefore, can be suitably marketed as biological manure. With the increasing health consciousness, people prefer to eat food grown with such manure. It is, therefore, necessary to exploit this potential to the extent possible as a source of revenue generation.

Biogas rich in methane is available from ASP based plants and much more from anaerobic treatment of sludge and also from anaerobic treatment process like UASB. It is necessary to fully exploit the potential of biogas through cogeneration of power. A well-designed treatment system may produce electricity from biogas to meet the entire in-house requirement. Anaerobic process like UASB, which is energy effective, may even produce extra power to supply to the grid after meeting the in-house requirement.

Additionally, a cogeneration project can be converted into a CDM (Clean Development Mechanism-of Kyoto Protocol) activity, which would provide additional revenue through generation and sale of CER (Certified Emission Reduction) certificates. Given the global warming potential of methane as 21 times that of CO_2, a well-designed CDM project could help generate considerable revenue through the sale of CERs.

Given the fact that electricity alone accounts for nearly 65% to 70% of the O&M cost, a cogeneration project with CDM benefits could help in offsetting the expenditure on this account to a large extent. Therefore, STPs proposed on treatment processes like ASP, UASB etc. may include the cogeneration component depending upon economic viability. The project team must study well operating plants in the country in this regard. In this connection reference is invited to the Ministry of New and renewable Energy, GoI publication. "Guidebook – Power from Biogas as Sewerage treatment Plants" available on their website.

It is necessary for the local bodies to enlarge the property tax base and utilize the additional revenue so generated to meet the O&M cost. There could be several other innovative ways for local bodies to raise revenue towards O&M costs e.g. taxes from pilgrim/tourist/floating population visiting the city, undertaking plantation on municipal lands and generating revenue there from etc. The underlying need is to explore all avenues to raise matching resources for O&M to achieve sustainability.

- Net O&M cost to be worked out after considering recovery of resources from treated sewage, bio gas, power generation, sewage sludge etc.
- Present tariff, annual revenue/ expenditure, revenue collection efficiency, sewer connection ratio be intimated.

4.3 COST ESTIMATES FOR O&M

The abstract of cost of annual O&M expenditure may be presented as per table 4.1. The estimates of costs of each component and the abstract shall form a part of DPR. If it is

proposed to install the STP on a turnkey basis, the O&M may be made a part of the work of turnkey contract of the STP. The O&M cost of each component shall be supported by its details. O&M cost shall be worked out for 15 years of commissioning of works

Table 4.1: Abstract of Annual O&M Cost

Rs. In Lakhs

Components	**Interception Works**	**Diversion / Interception sewers**	**SPS (s)**	**Rising Mains**	**STP(s)**	**Others (specify)**	**Total**
Manpower							
Power from grid and other sources as available							
Chemicals							
DG sets							
*Repairs and Maintenance							
On line Monitoring System							
Others (specify)							
Total Annual O&M Cost							
****O&M Cost during**							
1st year							
2nd year							
15th year							
Total O&M cost for 15 years							

*Average annual repairs and maintenance costmay be taken as1%of the capital works.

**Annual O&M cost beyond 1st year to be worked out by compounding present cost with general price index/inflation which may be taken as 5% on Manpower and 2% on Chemicals. However, no escalation may be considered on Power.

CHAPTER 5: PUBLIC PARTICIPATION & PUBLIC AWARENESS ANDSTAKE HOLDERS CONSULTATION

5.1 INTRODUCTION

The programme is for the preservation of natural resources and these are necessary for the benefit and welfare of public. The benefits of involving public in the decision making process are immense. It greatly helps in increasing public understanding of pollution abatement and subsequently defusing conflicts on government action by generating support of beneficiaries. The river cannot be conserved without the cooperation of the public and also they must have a sense of ownership with the programme. With a small investment public awareness, public ownership and public participation can be generated and many complex problems can be resolved.

It is necessary to formulate an effective **public education, awareness and participation**programme as part of DPR so as to make them socially inclusive. The programme must take into consideration the following issues.

An expert agency with right kind of background and experience may be engaged to formulate public participation strategy. Two types of outcomes are expected from this activity. The first one is public participation and through it agreement on complex issues like house connections, water conservation at household levels, proper collection of garbage so that it does not choke sewers/drains, sharing increased burden of O&M cost, proper layout of sewerage systems and location of STPs, diffusing conflicts, if any, on programme components etc. This can be best achieved through consultation at various stages of project formulation and implementation. The second one is increasing public understanding about the programmes through awareness. This should be achieved through workshops, seminars, street plays, city runs and riverside walks. Active involvement of students and teacher's community in schools and colleges can greatly help in achieving the objectives. Public can also play the role of a watchdog in supervising project implementation and operation and maintenance which would help improve the quality of the programme.

Emphasis may be placed on increasing public participation for the projects/schemes supported by NMCG or NamamiGange. Apart from hiring expert agencies for this purpose, arrangements to involve active non-governmental organisations should also be made.

In the above background, a comprehensive programme giving details of the activities with timetable and cost involved should be prepared and presented in the DPR. This should be taken as a continuous activity right from the beginning of the programme and must continue in post commissioning stages also.

5.2 OBJECTIVE

The objective of public education, awareness and participation programmeshould be to ensure that

i. The communities are aware that -
   a. There is a need for the programme to intercept the drains that carry the wastewater of the town into Ganga and treat it before it is finally discharged and that they will derive multiple benefits from it. The benefits need to be specified.

b. Though there will be recoveries in the form of compost and nutrient rich water and electricity, still there would be additional costs in O&M and these costs may have to be borne by them,

ii. The communities are effectively involved in all stages of the project cycle from conceptualisation, to preparation, to finalisation, to implementation and finally O & M. Such involvement will generate a sense of ownership of the programme among the stakeholders.

iii. To keep the stakeholders and citizens informed of the progress of the project at all stages, a website with updated information about important features of the project may be created and arrangement made to send replies to project related queries.

5.3 PUBLIC AWARENESS AND PUBLIC PARTICIPATION AS FRONT ENDACTIVITY

Public Awareness & Public Participation should be a front-end activity of the project. The entire programme of conservation should be conceived, formulated, implemented, monitored and evaluated in close consultation with the stake holding communities following the approach of 'Participatory Appraisal'.

The agency that will plan, implement and coordinate the awareness campaign should be identified. With a view to focus on issues relating to protection and improvement and cleaning of rivers, a massive program of environment education and awareness is imperative. Centre and states may launch this campaign through a program of volunteers called **GREEN VOLUNTEERS.**

5.4 TARGET GROUPS

i. Local influential/Community leaders,
ii. Local NGOs,
iii. School teachers and students,
iv. Elite groups and organisations like Rotary Club, Lions club, Associations and forums of writers and artists, doctors, lawyers and other professional bodies etc.,
v. Religious leaders and priests,
vi. Representatives of industry and commerce,
vii. Leaders of trade unions and organisations like safaikaramcharisanghs,
viii. Leaders of teachers and students associations,
ix. Representatives of political parties including the elected office bearers and members of local bodies,
x. Members of legislative assemblies, legislative councils and parliament representative of local constituencies,
xi. Representatives of media viz. editors/correspondents of local press and key functionaries of local radio and TV stations,
xii. Grassroot level functionaries of Municipalities and state government departments like public health, forestry, Jal Nigam, PWD, etc.,

5.5 ACTION POINTS FOR COMMUNITY AWARENESS

i. Action be taken to get the Urban Local Body (ULB) to discuss the issue of river pollution – causes and effect and the need to take conservation measures.

ii. Request the ULB to set up a Committee on Awareness Generation and Public Participation for the entire city. Members of the Lok Sabha and the Vidhan Sabha may be co-opted as special invitees. In turn, the Committee should invite civil society

organisations in the city that are active to participate in the Awareness Generation and Public Participation Programme.

iii. With the involvement and help of the ULB, or otherwise, for each ward identify an active NGO or promote a group of interested and committed people to be involved in Ganga Pollution Abatement Project.

iv. The agency preparing the Pollution Abatement Project should prepare a plan of awareness generation and public participation and submit it to the Committee on Awareness Generation and Public Participation for approval. The plan could consider including the following activities, among others:-

a) Print and electronic media including the local news papers should be invited and supported in covering the issue of pollution of rivers.

b) A website may be created to provide facts about the state of sanitation, in particular, the degradation of the river. It should be regularly updated.

c) Holding locality wise meetings and group discussions with influential people, whereby the extent of river pollution, the related physical and human factors, the consequent health hazards and the possible remedial measures are highlighted through talks and technical presentations by the experts and social workers (Action: Identified NGO of reputation).

d) Motivating influential group to play a leading role in promoting environmental sanitation and community health, particularly prevention of river pollution (Action: Identified NGO of reputation).

e) Motivating and advising local NGOs to participate in outlining execution and follow up efforts of community action plans for ensuring a clean and healthy community life in general and protection of river water quality in particular (Action: Identified NGO of reputation).

f) Promoting schools as models of clean living and healthy environments and training school teachers and students as motivators and informal change agents for involving families and communities in clean river programmes in general and maintenance of toilets/bathing ghats/crematoria in particular (Action: Identified NGO with excellent track record of having rendered specialised services in the area).

g) Motivating school management, administrative and teaching faculty to organize events and special programmes for checking river pollution and plantation of trees on river banks (Action: Identified NGO and functionaries of the Department of Forestry).

h) Motivate the local influential trade, business, professional, social service, religious associations/chambers/Clubs and individuals to participate in awareness generation programme.

i) Inform, educate and invite potential investors to associate themselves in activities such as solid and liquid waste management services through an effective strategy of public-private partnership. They can also sponsor plantations on river banks and adopting a certain planted area for protection and preservation.

j) Inform, educate, organise and motivate religious leaders and priests to participate actively in river pollution control through such efforts as educating the masses, checking the dumping of temple waste on the river bank and immersing half burnt or unburnt dead bodies into the river (Action: NGO of reputation).

k) Motivate the office bearers of trade unions and other professional organisations like teachers and students associated to win public support for their cause by rendering some fruitful service to the society. While doing so they may give highest priority to community health promotional measures like river pollution control and conservation of the quality of river water (Action: NGO of reputation).

l) Motivate local MLAs and MPs and leaders of political parties to participate actively in the promotional efforts of community involvement for protecting river against the hazards of pollution-an effort, which shall pay them abundantly through the building of positive public opinions. They should also be motivated to form local level all party organisations/ forums to promote the measures of river pollution control. In addition, they should be motivated to take keen interest in the proper utilisation of the funds provided for river pollution. In addition, they should be persuaded to play effective liaison between the government and the people to ensure the timely completion of different programmes and activities undertaken by the Directorate of National River Conservation Programme (Action: NGO having a sound background of linkages with the legislative and political leaders).

m) Motivate leading persons representing local press and electronic media. They need to be encouraged to be conscious of their social commitment and social obligations. They should also be convinced that socially conscious media shall always be aptly recognised and enormously rewarded through the creation of a sound base of enlightened clientele group which in the long run will help them through the image building process. Accordingly, the editors and correspondents of local press, the officers and key functionaries of the programmeof river pollution control measures through the active involvement of the people need to be associated with creation of public awareness and participation. (Action: NGOs of repute having a sound organisation infrastructure of public relations unit).

n) Awaken, educate and encourage the grassroot level functionaries belonging to Urban local bodies,offices and agencies dealing with public health, sewerage, forestry, water supply, public works, electricity, industry, tourism etc. to take special interest in the activities which are directly related to the aspect of river pollution control. They should be particularly motivated to be more conscious of their commitment and obligation to ensure the purity of river water so that the future of the present and coming generations of the society and so also the members of their own community is safe-guarded against health hazards. (Action: NGO having the background of specialised contribution to the area concerned).

o) Organise campaigns to encourage the use of community toilets and discourage open defecation, especially on open land near river banks.

p) In areas where there are sewers, encourage people to connect their houses to the sewer.

q) Organise, for different sections, events such as essay, debates, posters, slogan, painting, script etc.

r) Send information sought by the stake holders about the project during different phases beginning with preparation of the project to its implementation, commissioning, operation and management.

5.6 IMPORTANT STAGES OF STAKEHOLDER CONSULTATION AWARENESS GENERATION AND SECURING PUBLIC PARTICIPATION

i. Preparation of DPR
ii. Submission of the project to the State Government
iii. Stage of sanction by the NRCD
iv. During implementation
v. Any stage when obstacle if faced, say in identification of land needed for works.
vi. Implementation of DPR
vii. Commissioning and evaluation

5.7 COST ESTIMATE

A provision of 2%-3% of the project cost may be made for generation of public awareness and securing public participation. Various items of cost for which provision should be made are illustrated in the table 5.1.

Table 5.1: Cost Estimate for Public Awareness and Public Participation

S. No.	Item	Basis of Calculation (Amount in Lakhs of Rs.)	Total Amount Rs. In Lakhs
A	**Mass Media**		
1 (a)	Television (films and promotional for TV Advertisement) (Professional grade digital recording)		
(b)	Advertisement of local Cable Network		
2 (a)	Radio talks (preparation and subject expert charges)		
(b)	Advertisement in Local F.M.		
3	Print Media publicity in local papers, magazines etc. Advertisement in the tourist guide books etc., Special features and commissioned articles		
4	Print material for Distribution including publicity on match boxes, stationary, stickers, etc.		
5	Hoarding at strategic points in the city and on buses, rickshaws etc.		
6	Website Development with hosting and updation for three years		
B.	**Events**		
7	Sponsoring / Organising Events like Puja, Local Festivals etc.		
8	Preparation of Exhibition Material, Posters and Organising these events- river festival and run for the river events		
9	Special Cultural Events, Performances of Folk Media: (Folk theatre, Folk Music, Folk Stories) Street Plays **(performances specially for slum localities)**		
C.	**Groups and Meetings**		
10	Environmental Awareness at Schools Level		

S. No.	Item	Basis of Calculation (Amount in Lakhs of Rs.)	Total Amount Rs. In Lakhs
	(Talks, Essay, painting competitions, debates, other activities 5 per ward per year for 3 years		
11	Formation of Action Groups, Self help groups and support to social groups/clubs for awareness generation activities		
12	Other Awareness activities like public meetings, public debates, Meetings with different Unions, felicitation of best workers etc.		
	Total for Public Awareness and Public Participation Activities		
	Grand Total		

CHAPTER 6: TRAINING, HRD AND CAPACITY BUILDING

6.1 PHASES OF POLLUTION ABATEMENT PROJECT

A project passes through the following phases:

1. Project preparation
2. Project implementation,
3. Operation and maintenance
4. Monitoring and evaluation
5. Management of the completed project

6.2 DOMAINS OF KNOWLEDGE INVOLVED

1. Scientific and technical – water quality, aquatic biology, civil engineering, electrical engineering, mechanical engineering, remote sensing and GIS
2. Social sciences– stakeholders analysis; social survey,
3. Communication science: awareness generation and public participation
4. Financial & economic: financial evaluation of projects, raising of financial resources
5. Institutional: institutional effectiveness in performing its functions
6. Administrative: administrative aspects
7. Legal and regulatory: developing suitable laws and regulations for effective functioning of the ULB

6.3 HUMAN RESOURCE REQUIRED

Successful project preparation, implementation and management need the manpower with diverse expertise in the above domains of knowledge with relevant experience in similar works. Skill acquisition is achieved through education, training and experience.

6.4 EDUCATION NEEDS

The table 6.1 the required educational attainments of manpower.

Table 6.1: Educational Requirement of Staff Required for Pollution Abatement projects

Stage of Project	Requirement of Manpower			
	Highly educated Master's Degree	Degree Level	Diploma Level	Certificate Level
Problem Identification	√	√		
Conceptualization	√	√		
Project Planning	√	√		
Project Preparation	√	√	√	
Project Implementation		√	√	√
O&M		√	√	√
Monitoring, creating data base and its analysis for corrective action	√	√	√	

Stage of Project	Requirement of Manpower			
	Highly educated Master's Degree	Degree Level	Diploma Level	Certificate Level
Evaluation	√	√		
Management - regulatory	√	√		

6.5 TRAINING NEEDS

Training needs of skilled manpower are met through short term training programmes of duration of a few days, weeks and months. But training can be imparted only if the trainee has the necessary educational attainment. Regarding a project that is under execution, after it has been commissioned, it is necessary that staff with proper training and experience is in place for O&M of assets. The responsibility of operation and maintenance of STPs and main pumping stations should rest with the contractor who supplied the plant, for 10years after commissioning of the project. It should be ensured that the contractors/suppliers of equipments deploy properly trained and experienced staff for this work. Even if contractors and suppliers are bound by the contract to operate and maintain the equipment they supplied or erected, they should be required to

i. Impart training to the identified personnel of the agency that owns the project and has the responsibility for its proper functioning.
ii. Provide operating manuals of the equipment installed.

6.6 EXPERIENCE NEEDS

These needs are met by the personnel working on real assignments. Those in charge of personnel management need to ensure that the needed experience is available to them within the organization.

6.7 FULFILLING MANPOWER NEEDS –MANPOWER DEVELOPMENT PLAN

The State Government, in the light of the state of degradation of their water resources, in particular of their rivers, should prepare a plan of capacity building and manpower development, in addition to their normal plan for capacity building, for deployment in the 118 towns where the I&D and STP projects are to be taken up.

An assessment of the personnel needed for various functions, their training needs and availability of persons who can be trained should be prepared. Academic disciplines in which personnel with postgraduate degree, undergraduate degree, diploma and certificate are needed and the numbers in each need to be identified. The personnel that would, after education and training constitute, a pool of human resource that is equipped to handle the items of work, mentioned in these guidelines including O&M should be identified. They should be sent to undergo suitable educational programmes and training programmes. . The O&Mpersonnel are mandated to acquire the certification of Waste water treatment plant technicians and Helpers by Skill Council for Green Jobs (SKGJ), M/o Skill Development & Entrepreneurship, GOI.Two National Occupational Standards SGJ/Q6601 and SGJ/Q6602 have been developed by SCGJ for waste water treatment plant technicians and helpers respectively.

A list of institutions of higher education with the academic disciplines where the personnel can be sent for education should be prepared.

Training need identification is a continuous process and in the identified subject areas training institutions can be requested to develop training programmes.

It is the responsibility of those in charge of human resource development in the States – in the government and local bodies – to ensure that they have the necessary manpower resources with needed educational attainments, training and experience for undertaking the work arising out of the programme of pollution abatement of rivers.

Standing arrangement with institutions engaged in education and training can help the States to ensure that they are not short of the needed manpower.

In case of shortage of manpower in specific disciplines, suitable persons can be obtained on loan or on contract or the work can be assigned to an agency that has the capability to deliver.

6.8 CAPACITY BUILDING

Capacity is a function of two aspects, namely human resource and physical and financial resources. Human resource has been dealt with above. Physical resources imply equipping the staff deployed for this work with necessary financial resources and physical resources such as space, laboratory, tools etc. The DPR should incorporate the requirement of these resources for proper operation and maintenance and management of the project.

6.9 COST ESTIMATES

Various activities involved in HRD and capacity building are mentioned in the table 6.2.

Table 6.2: Cost Estimate of HRD and capacity building

S. No.	Items	Cost (Rs. Lakhs)
1.	Project Implementation Secretariat	
1.1	Office building, equipment and infrastructure for project Implementation Secretariat and design cell	
1.2	Hiring of professional for design, management, technology, monitoring	
1.3	Establishment expenses during the project implementation, audits, inspection including Staff salary	
2	Motivational Training, study tour and Skill development for supervisors, safaikaramchari, sanitary inspectors, officers, design cell etc	
3	Monitoring Stations at different locations of air and water quality in the city, STPs, rivers, bathing ponds	
4	EIA assessment of works and evaluation after commissioning of the	

	project	
	Total	

CHAPTER 7: PROJECT IMPLEMENTATION MECHANISM

The State Nodal Department and the state PMG must explore the possibility of promoting joint ventures in Public Private Partnership (PPP), departmental implementation of projects, existing state/central governmental undertakings or setting up a special purpose vehicle to implement these projects.

The State Government may employ a number of project executing agencies for different types of projects. For the preparation of DPR reputed professional consultants may be engaged by the State Government.

CHAPTER 8: PROJECT MANAGEMENT & INSTITUTIONAL ISSUES

The institutional arrangement for the implementation of this programmeat the Central and State levels is visualized as below.

8.1 NATIONAL MISSION FOR CLEAN GANGA (NMCG)

It has been established as a registered society that is responsible for effective implementation of the overall NGRBA program at the national level with well-defined functions, powers, resources and autonomy. It has (i) formal devolution of powers to ensure appropriate level of operational autonomy; (ii) single-point responsibility for planning and execution of the NGRBA program; (iii) powers to manage its human resources, with the objective of attracting and retaining well-qualified staff; and (iv) institutional sustainability as the permanent entity responsible for the conservation and health of the river Ganga in the long term. The Program Management Group (PMG) is headed by the Director General.

8.1.1 State Program Management Group (SPMG)

Each state has a State (SGRCA) Program Management Group (SPMG) as a registered society, to ensure effective implementation at state level with the exception of Jharkhand, which has a dedicated cell within the UD Department, as a very small stretch of the Ganga main stem passes through the state.

The SPMGs are the respective state level counterparts of the PMG and have state level responsibilities for management and implementation of the NGRBA Program in accordance with the agreed NGRBA program framework. They are also responsible for capacity building of Executing Agencies (EAs); managing state level IEC campaigns, stakeholder consultations and community participation; and other state level activities in the Institutional Development Component (Component One) of the project;

The SPMG is headed by a Project Director and includes specialists in basin planning, wastewater engineering and management, ecology, environment and social management, finance & economics, operations, procurement, knowledge management, IT, communications, human resources management, and monitoring and evaluation.

8.1.2 Executing Agencies

Execution of the infrastructure investments is done by the Executing Agencies (EAs), selected for each investment. The choice of EAs includes the existing state-level technical agencies, which have the mandate of urban infrastructure (especially wastewater) management in their respective states.

8.1.3 Program Management Consultancy

This consultant is to provide program management support to PMG, including planning, technical support for investments review and appraisals, portfolio management, procurement, financial, management, monitoring and evaluation, and reporting

8.1.4 Technical Support Consultancy

This consultant is to provide technical support to SPMGs and EAs, for upgrading the process and practice of preparation of schemes of investments and their execution to global standards.

8.1.5 Other Partner Agencies

The PMG and SPMGs are to collaborate with and seek support from and partnership with a range of other agencies, to draw upon their specialized expertise and supplement the capacity of main implementing agencies. These will include international, national and local knowledge institutions, private sector business houses and industries, and civil society groups.

8.1.6 Tiered Implementation Structure

Thus the programme implementation at various levels is envisaged as follows: (a) National Level: PMG, (b) State level: SPMG, and (c) Activity level: Executing Agencies (EAs) selected for specific activities with local coordination for planning and implementation provided by Urban Local Bodies (ULBs) where needed.

8.1.7 Programme Framework

NGRBA has prepared a Programme Framework containing provisions in detail that will govern this programme. These include

- Implementation Arrangement
- Detailed Investment Framework
- Financial Management Manual
- Environmental and Social Management Framework
- Communications and Public Outreach Framework
- Governance and Accountability Action Plan
- Memorandum of Agreement – Programme
- Memorandum of Agreement – Investment
- Procurement Manual

8.1.8 Preparation of DPR Component Scheme Wise and Integrated Summary

Works are sanctioned only on the basis of a DPR. Each component scheme will have a DPR. Therefore, a pollution abatement project in respect of a city may have as many DPRs as the number of component schemes so that it is convenient to submit it to the funding agency. However, there should be a consolidated summary of all DPRs that gives an overall view of the project, its components and costs.

DPR is very crucial and forms the foundation for the success of efforts to improve the water quality of rivers and to achieve the objectives of the NRCP. Every care should be taken to ensure that it is of high quality and, therefore, preparation of DPR deserves to be treated as a project in itself. A suggestive structure of DPR is given in Annexure IV.

8.1.9 Appointment of Team to Prepare DPR Departmentally

Every agency that is assigned a component scheme should appoint a team of competent staff to undertake different activities that are required to be performed at different stages of the scheme. The project reports can either be prepared departmentally if there is in-house capacity or through a competent consultant.

8.1.10 Appointment of Consultants to Prepare DPR

If it is felt that circumstances are such that it will be difficult to departmentally undertake all the activities involved in the preparation of the DPR, an outside agency can be appointed to undertake identified activities or prepare the entire DPR. However, care has to be exercised in selecting the agency. For selecting the agency Expression of Interest (EOI) may be invited from agencies and then selecting agencies that have the manpower, financial and physical resources to prepare the DPR. Papers for submitting the EOI have to be prepared carefully so that it can be ensured that all the information needed to evaluate the capacity, competence and suitability of the agencies is provided by the interested parties. Technical and financial offers may then be invited from the selected parties.

8.1.11 ULB participation

The participation of the concerned Urban Local Body (Municipality / Municipal Corporation) in the project should be ensured by getting their concurrence to the DPR and including MOM of the meetings with the ULB in the DPR. They should be encouraged to build technical capacity to undertake O&M the assets and to manage the system.

8.1.12 Responsibility for activities and schemes

Table 8.1 suggests the agencies that can be given responsibility for schemes

Table 8. 1: Planning and Implementing Agencies

Type of Schemes	Item of work	Planning and Implementing Agency
	Study of River and its basin	State Project management Group (SPMG) or Pollution Abatement Cell (Jharkhand)
	Selection of cities	SPMG with the approval of Central PMG
Sewerage Schemes	Sewerage Works & STPs	Institutions like Jal Nigam, Sewage Boards, PHEDsetc where they exist. In other places, the State Level Agency will decide who should do the work.
Non Sewerage Schemes	Solid Waste	ULB
	CSS / CTC	ULB
	Crematoria	ULB
	Carcass disposal	ULB
	Cattle Wallowing	ULB
	Dairies	ULB
	Dhobi ghats	ULB

Type of Schemes	Item of work	Planning and Implementing Agency
	Motor Garages	ULB
	River Front Development	Water Resources / Irrigation Department
Plantation	Plantation	Respective Implementing Agencies in whose schemes plantation is to be done

8.2 MONITORING, SUPERVISION, GUIDANCE AND QUALITY CONTROL

Whether the DPR is prepared departmentally or by a Consultant, it is necessary for the implementing agency to arrange regular monitoring, supervision of activities involved in preparation of the DPR and provide guidance from time to time and exercise quality control. This should be done by the State PMG's own staff or, if there is shortage of suitable expertise, help of suitable consultants can be taken.

8.3 IMPLEMENTATION OF DPR – EXECUTION OF WORKS PROPOSED IN THE DPR

8.3.1 Mode of Implementation:

For implementing the works in the DPR, there are a number of options available as described below:

i. Departmental supervision,
ii. Project management agency
iii. Combination of above

8.4 INSTITUTIONAL ISSUES IN MANAGEMENT

8.4.1 Activities

In conservation and management there are a number of institutions dealing with activities including:

i. Policy, strategy and programme formulation and their implementation
ii. Supply of services
iii. Development,
iv. Management,
v. Regulation and enforcement,
vi. Coordination with national, state and local organizations.

8.4.2 Overlap in roles of institutions:

The role of three bodies is very crucial. These are:

i. Municipality which is responsible for sanitation in the city,
ii. City Development Authority which regulates the new colonies.
iii. State Pollution Control Board, which is responsible for ensuring compliance by industry and other institutions of the standards, prescribed under the Environmental Protection Act for effluent, solid waste and air emissions.
iv. State Agencies - performing functions of municipal bodies relating to water and waste water.
v. District administration.

Many times there is an overlap in roles of several bodies with the result that the efficiency with which the function should be performed suffers. The State PMG should identify such areas of overlap and move the state Government to resolve such overlaps. The role of each institution involved needs to be very clearly specified.

In the chapter on collection of secondary data it has been mentioned which data should be collected so that the strengths and weaknesses of the ULB and other institutions working in the city are reflected. This needs to be analysed to identify the areas where remedial measures are needed.

The SPMG should solve any issues that may arise.

8.5 COST ESTIMATE OF PROJECT MANAGEMENT AND INSTITUTIONAL ARRANGEMENTS

The SPMG, which is the state implementing agency, may need financial support. Illustrative items for which funds may be required are mentioned in table 8.2 and table 8.3.

Table 8.2: Cost Estimate of Project Management and Institutional arrangements - State Level Implementing Agency

S. No.	Items	Cost (Rs. in Lakhs)
1.1	Infrastructure and equipment such as computers, CAD	
1.2	Hiring of professional	
1.3	Establishment expenses	
1.4	Project related expenses	
1.5	Miscellaneous items	
	Total	

Table 8.3: Cost Estimate of Project Management and Institutional Arrangements District/City Level Unit

S. No.	Items	Cost (Rs. in Lakhs)
2.1	Infrastructure and equipment such as computers, CAD	
2.2	Hiring of services	
2.3	Establishment expenses	
2.4	Data collection	
2.5	Survey & investigation	
2.6	Miscellaneous items	
	Total	

Project preparation and implementation cell for specific projects agency wise

An estimate of expenses required for each component on the above lines should be prepared.

CHAPTER 9: PERFORMANCE MONITORING

9.1 The programme aims at improving the water quality of river and sanitary conditions in the city. Benchmarks of water quality are already available for the designated best use. The success of the programme would be established if the benchmark water quality is achieved.

9.2 THIRD PARTY INSPECTION SYSTEM

A monitoring mechanism is to be put in place to monitor the performance of STPs and pumping stations and their impact on water quality of the river. A Third Party Inspection (TPI) system should be established for the project in each town. It will review and monitor the performance of the project through the entire life cycle of implementation on the basis of detailed onsite review, examination of appropriate documents and discussions with the EAs and other key stakeholders.

Engineering educational institutions available in the city or in the State or office of the State Pollution Control Board may be considered as appropriate agencies for this purpose.

9.3 MONITORING PERFORMANCE OF ASSETS AND OUTCOME OF THE PROJECT

A detailed plan of monitoring the performance of assets as well as the outcome of project, which is reflected in the river water quality, must be prepared covering, among other things, the name of the monitoring agency, parameters to be monitored and their frequencies and presented in the DPR. The NMCG will assign this work to reputed academic / R&D institutions and will bears the expenses. However, there is a need for a dedicated person to collect data from the monitoring institution, create data bases, study and analyse it to see if any corrective measure is required to be taken at the local level. Expenditure on this dedicated cell should be included in the cost estimates.

Directions have been issued by CPCB vide notification dated Mar 02, 2015 (Annexure V) for online monitoring of influent and effluents of highly polluting industries, CETPs etc. Such similar / suitable devices if installed on STPs dealing with municipal sewage as well would be helpful in proper interpretation of results and taking timely remedial measures on their performance.

CHAPTER 10: COMPLETION SCHEDULE

Completion schedule for every component scheme of the project should be prepared and should be watched by the executing agency. Generally completion schedules are prepared without considering the odds that would be faced during its implementation and hence most projects are delayed. Completion schedule should, therefore, be prepared on a realistic basis. It should be presented in the form of a PERT/CPM and Gantt chart for monitoring purposes.

Completion schedule should be accompanied by a quarterly physical and financial progress schedule. This should form the basis of monitoring of expenditure and obtaining grants from MoEF on a quarterly basis. Upon completion of the project, a completion report is submitted in a standard format. This format should be presented in the DPR and is given as Annexure –VI. Utilization certificates for the funds released by NMCG/MoWR, RD&GR shall be submitted in the formats given as Annexure VII.

CHAPTER 11: ENVIRONMENT IMPACT ASSESSMENTAND ENVIRONMENTAL MANAGEMENT PLAN

This chapter deals with the assessment of impact on Environment of l&D and STP schemes proposed and preparation of Impact Management Plan to minimize environmental impacts. For making such an assessment, baseline (pre-project) information about the components. that are expected to be affected either negatively or positively has to be gathered.

11.1 Components of Environment Affected

The baseline situation is that the drains carry sewage to the river thus adversely affecting its physical, chemical and biological parameters and adding, among other things, pathogens.

Thus drains carrying sewage potentially affects the environment. If the drains are intercepted and the water is treated in Sewage Treatment Plants to the desired standards before it is discharged into the river, the adverse impacts of these wastewaters on the river is eliminated and water becomes suitable for the uses corresponding to the water quality of the river achieved as a result of implementation of the project of I&D and Treatment of the sewage carried in the drains.

The following components are likely to be affected and the impact on them should be assessed:

i. Air
ii. Ground/ Surface water
iii. Soil

Methodology

The steps in studying environmental impacts of proposed project shall be:

- Phase-I Environmental Site Assessment of proposed project sites
- Alternative site assessment study
- Project feasibility study

From above studies, environmental issues of the related work can be known. The project feasibility report can come up with various kinds of pollution sources, nature and pathways of pollutants.

Data collection of secondary data OR baseline study for primary data can be carried out. Then environmental impact assessment on present baseline environment can be studied. The mitigation measures can be planned to minimize the impacts.

11.2 Impact Management Plan:

The I&D and STP projects have generally favourable impact on the components of social environment. If, however, some components are assessed to be adversely affected,a management plan must be prepared to keep the values of the component within acceptable limits. The following steps to be considered for impact management plan.

i. Baseline study of environmental parameters: Brief description of baseline environmental conditions (ambient air quality, surface and ground water quality, noise quality, ecological setting based on secondary data sources of recent origin of last 1-2 years or so). The baseline data for one week or so may be generated as site by appointing a NABL accredited laboratory

ii. Environmental impacts (a brief description) of the envisaged project on the present baseline environment during construction and operational period

iii. Environmental Management Plan (EMP) to be prepared to minimize the impacts and bring them to acceptable levels.

iv. EMP costs to be estimated for environment protection and safety principally during construction and operation period.

CHAPTER 12: GOVERNANCE AND ACCOUNTABILITY ACTION PLAN (GAAP)

The Governance and Accountability Action Plan (GAAP) is to minimize accountability risks to the NMCG Program. Specific arrangements shall be proposed to mitigate these risks and to ensure that funds are used effectively and efficiently. The main purpose of the GAAP is to ensure that the NMCG Program's objectives are achieved with avoidance of all kinds of internal/external risks. This GAAP summarizes the mitigation measures being taken as a part of program. The mitigation measures are grouped into three categories: (i) Implementation Arrangements; (ii) Transparency and Citizen Voice; and (iii) Grievance Redressal.

Following needs to be done for the GAAP:

i. **Disclosure and dissemination of information:** As per theMunicipality Disclosure Act, RTI and NGRBA guidelines on stakeholders' consultation would be adhered for the purpose of information dissemination. The disclosure of information should be made on a regular basis to the public. This is to be carried out in close coordination with communication and public outreach activities.

ii. **Under RTI Act**, the disclosure applies to all public project related documents, including but not limited to project components and sub-components, cost estimates, procurement plans, details of tender notices, details of award of contracts and contract amounts, selection of consultants/contractors, and details of officials implementing the project.

iii. **Use of Social Audits**. Social Audit, a viable instrument of sustainable program delivery, is in fact People's Audit, which provides a succinct view of performance based on society's perceptions and analysis at large. Citizen's Monitoring Committee will perform Social Audit in a manner prescribed by the Government of India.

iv. **Adherence to the RTI Act.** In addition, in compliance with the requirements of the Right to Information (RTI) Act (2005), the project shall provide information voluntarily and on demand as prescribed by law. As per the RTI Act, the project will ensure proactive disclosure and sharing of information with key stakeholders, including with communities and beneficiaries.

v. **Grievance Redressal System:** The purpose of a robust and responsive grievance redressal system is to ensure that any query or complaint with regard to any aspect of project implementation and management is fairly heard and promptly addressed. The development of an integrated system will enable the integration of feedback from the public, effective handling of complaints, and immediate automatic updates on the status of response. A GR system will be established with Grievance Redressal Cells (GRCs), with necessary officers, officials and systems at the local EA level which will be integrated with other levels. Grievances may be submitted through various media, including in person, in written form to a noted address, through a toll free phone line or through direct calls to concerned officials, and online. All local contact information and options for complaint submission will be available on site on local information boards.

The estimated cost for the GAAP arrangements would be worked out to cover the following expenses during construction and O&M:

- On CMC's Social Audits, Information Cell
- Running the Grievance Redressal Cell

CHAPTER 13: COST ESTIMATES

Estimation of Cost of Some Items

Each of the following items has been treated as a component scheme of the project in the town. These items take care of the requirements of all the component schemes in the town.

i. Awareness generation and public participation
ii. Training, human resources development and capacity building
iii. Institutional development & strengthening
iv. Monitoring & evaluation

Based on survey and investigation, data collection and design criteria, detailed estimates may be prepared, as given in the respective chapter. The project cost may be provided in the format given in the table 13.1, under the following subheads for each scheme:

Table 13.1: Abstract of Cost of Works Proposed

(CW = Civil Works; EM = Electrical and Mechanical Works)

SN	Items	Quantities	Estimated Cost, Rs. lakh			Remarks
			CW	EM	Total	
1	2	3	4	5	6	7
A	**Items on which centage is admissible**					
1	**Interception of drains**					
2	**Diversion Sewers,**					
	Sewers by open trench method,					
	Sewers by trenchless method,					
	Sub Total Sewers,					
3	**Sewage Pumping Stations (SPS)**					
	MPS at -----					
	IPS at ----					
	Sub Total SPS					
4	**Rising Mains,**					
	From SPS at ----					
	From SPS at ----					
	Sub Total Rising Mains					
5	**STPs ,** including office building, lab & equipment, campus development, boundary wall, water supply, drainage, sewerage, internal & external electrification, SCADA and Online monitoring system etc.					
	----Mld, at -----					
	----Mld, at -----					
	Sub Total STPs					
6	Treated effluent disposal					

SN	Items	Quantities	Estimated Cost, Rs. lakh			Remarks
			CW	EM	Total	
7	Reuse of treated effluent					
8	Approach road and protection works, if any					
9	Special T&P					
10	Others (specify)					
	Sub Total (A) Basic Capital Cost					
B	**Centage**					
	Cost of project preparation @ 4% as per NGRBA guidelines (maximum)					
	Cost of project supervision @ 4% as per NGRBA guidelines (maximum)					
	Sub Total B					
C	**Items on which no centage is admissible**					
	O&M cost for 1st 15 years					
	Power connection					
	Land acquisition					To be provided by State government
	Environmental Sanitation and Management Plan (ESAMP)					
	Communication & Public Outreach					
	Governance and Accountability Plan (GAPP)					
	Monitoring and Evaluation					
	Third Party Assurance and Quality Check					
	Cost of environmental clearances / permissions					
	Cost of annual fee for water and royalty on silt as applicable					
	Others (specify)					
	Sub Total C					
	Total Cost of project A+B+C					

On many occasions, land is to be acquired involving an elaborate procedure under the land acquisition act. Projects are often delayed on this account. Such situations must be avoided.As per the present policy, the cost of land for SPS/STP works is to be borne by the State Govt.

Cost estimates of other components should be based on the detailed bill of quantities, specifications of materials structures and rates as per the latest SORs. It is generally seen that latest and updated SORs are always not available for the city. This results in underestimation of cost involving revision in cost. It is necessary to note that NMCG does not entertain any revised cost estimate after the project is approved and revision in cost, if any, would have to be borne by the implementing agency only. Care should, therefore, be taken that estimates are prepared taking the following into consideration.

Non-schedule items should be estimated on the basis of the prevailing market cost and budgetary offers from 2 or 3 reputed firms. In case some sewers are proposed to be laid by trenchless technology, latest SOR approved by the respective state agency or Indian Society for Trenchless Technology may be adopted for working out estimates. Copies of quotations of Electro-Mechanical items should be provided in the DPR

Estimated cost of STP may also be worked out based on recently awarded cost of similar capacities of STPs (average cost of different STPs) based on conventional technologies in the concerned State. If the awarded cost is not available in the concerned State, the awarded cost in the neighbouring State may be adopted. Costs of STPs constructed elsewhere on latest effluent parameters should be given in support of estimated cost adopted in the DPR.

Contingencies are not permissible as a separate item and is covered under centage

The estimates should mention specifications of all proposed works and reference of SOR used for adopting the rates. All applicable cess / taxes / GST should be included in estimated costs of items.

It takes some time to complete the DPR and then submit it to NMCG through State Government and finally appraisal and approval of DPR in NMCG. Sometimes, when the project cost is high, the proposal may require approvals at higher levels in Government which is a time consuming process. Therefore, implementing agency should be able to foresee escalation, if any, in the cost on this account and should make appropriate provisions in the project cost accordingly.

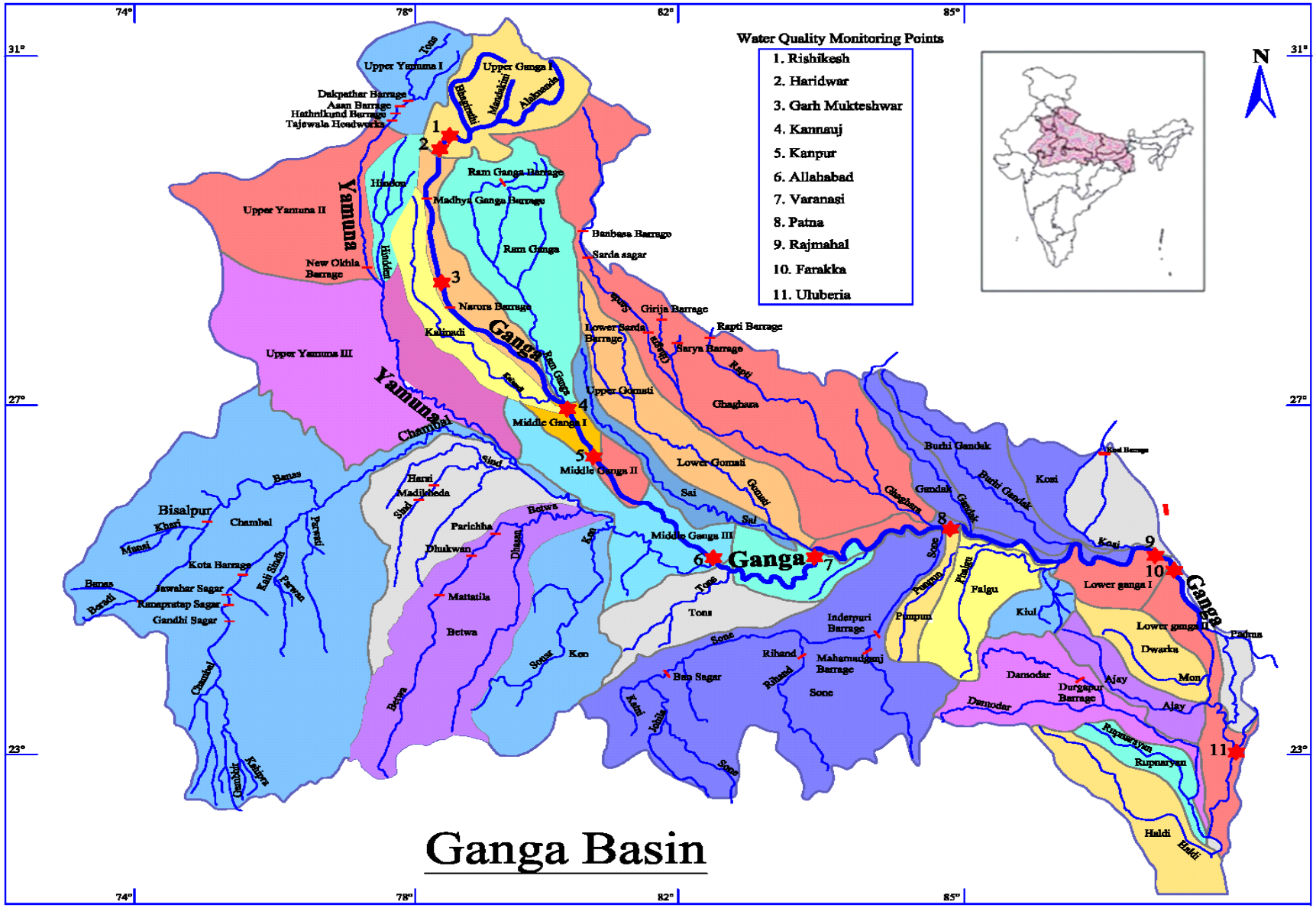
Bills of quantities and specifications must be presented in a separate volume.

For each major component, the estimated cost needs to be justified. For this purpose, it would be advisable to compare the cost estimate with that of a similar one approved earlier after necessary updating. This would help expediting approval in NMCG.

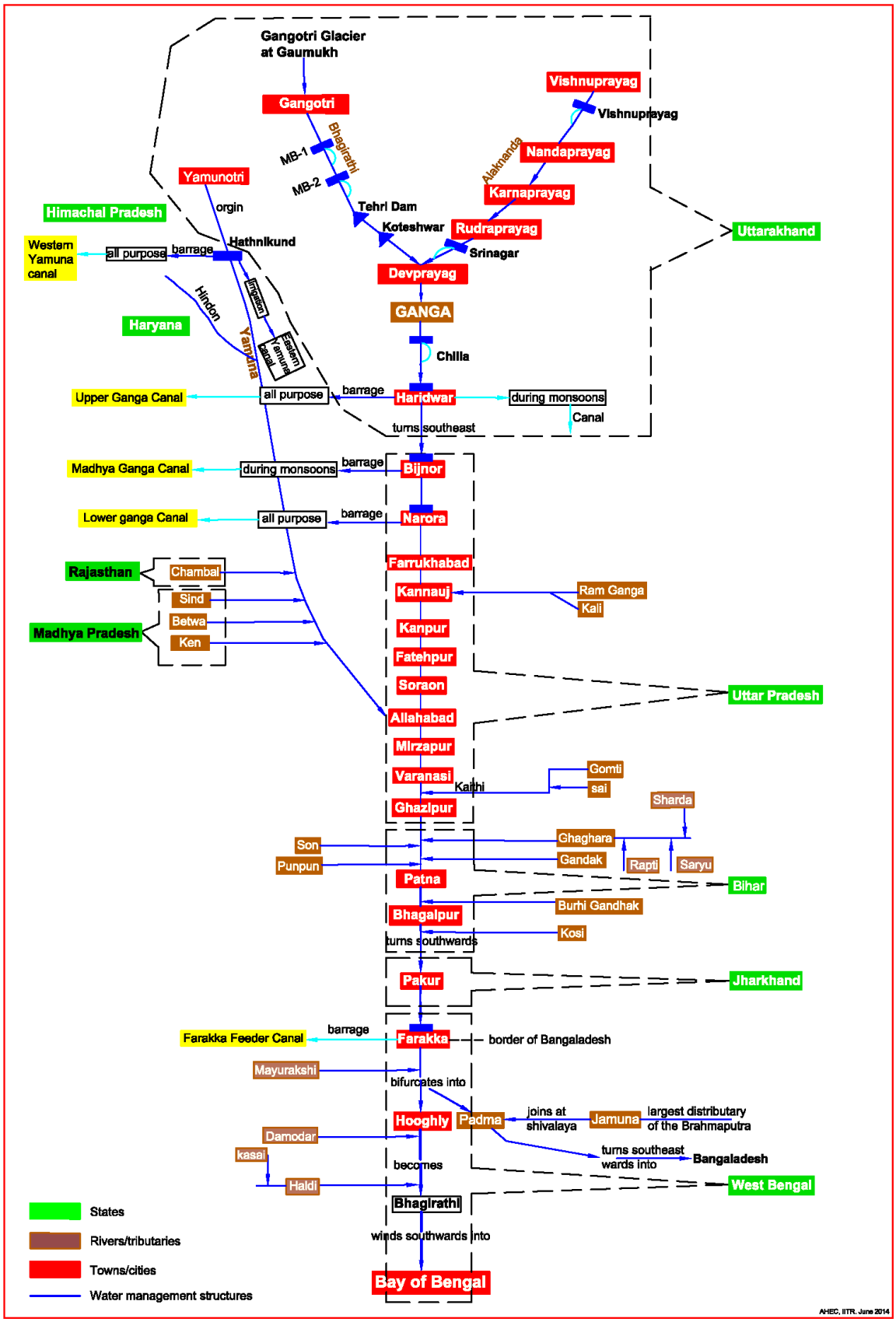
Necessary provision may be made in the estimate for Centage as approved by NMCG.

The DPR would also be used for preparation of Notice Inviting Tender (NIT) and tendering the project. It should, therefore, contain complete engineering drawings, longitudinal sections etc. of the proposal that would be needed for NIT as well as monitoring of project implementation.

Annexure – I: Map of the Ganga River Basin



Annexure – II: Line diagram of Ganga River



Annexure – III: Uniform Protocol on Water Quality Monitoring Order, 2005

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION
New Delhi, the 17th June, 2005

S.O. 2151 – WHEREAS the Water Quality Assessment Authority (WQAA) was constituted by the Central Government vide Order No. S.O. 583 (E) dated the 29th May, 2001 and No. S.O. 635 (E) dated the 27th October, 2004 to exercise powers under section 5 of the Environment (Protection) Act, 1986 (29 of 1986) for issuing directions and for taking measures with respect to matters referred to in clauses (ix), (xi), (xii) and (xiii) of sub-section (2) of section 3 of the said Act and to standardize method(s) for water quality monitoring and to ensure quality of data generation for utilization thereof and certain other purposes;

AND WHEREAS it is necessary and expedient to evolve water quality assessment and monitoring protocol as directed by the Water Quality Assessment Authority in order to maintain uniformity in the procedure for water quality monitoring mechanism by all monitoring agencies, departments, Pollution Control Boards and such other agencies so that water related action plans may be drawn up on the basis of reliable data;

AND WHEREAS the uniform process on water quality monitoring shall provide frequency of monitoring, procedure for sampling, parameters for analysis, analytical techniques, quality assurance and quality control system, infrastructure requirement for laboratories, procedure for data processing, reporting and dissemination and such other matters as the Central Government deems necessary for the said purpose, both for surface and ground water;

AND WHEREAS due to the deterioration of the river water quality, health and livelihood of the downstream people are being severely affected and concerns are raised time and again;

AND WHEREAS the immediate maintenance and restoration of 'wholesomeness' of the river water quality is the mandate under the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and that of maintenance of the ground water quality by the Central Ground Water Authority constituted under the provisions of the Environment (Protection) Act, 1986;

AND WHEREAS sub-rule (4) of rule 5 of the Environment (Protection) Rules, 1986, provides that whenever it appears to the Central Government that it is in public interest to do so, it may dispense with the requirement of notice under clause(a) of sub-rule(3) of the said rule",

AND WHEREAS the Central Government is of the opinion that it is in public interest to dispense with the requirement of notice under clause (a) of sub-rule (3) of rule 5 of the said rules to issue the Order.

NOW, THEREFORE, in exercise of the powers conferred by section 3 of the Environment (Protection) Act, 1986, the Central Government hereby makes the following order, namely:-

1. Short title and commencement:-

a) This order may be called the Uniform Protocol on Water Quality Monitoring Order, 2005".
b) It shall come into force on the date of its publication in the Official Gazette.

2. Application:- It shall apply to all organizations, agencies and any other body monitoring surface and ground water quality for observance of uniform protocol on water quality monitoring.
3. Definitions:-

In this Order, unless the context otherwise requires –

I. "Agencies" means water quality monitoring agencies (government or non-government, local bodies) and other organizations including research and academic institutions involved in water quality monitoring of surface and ground waters;
II. "Authority" means the Water Quality Assessment Authority (WQAA) constituted under sub-sections (1) and (2) of section 3 of the Environment (Protection) Act, 1986;
III. "Baseline stations" means the monitoring location where there is no influence of human activities on water quality;
IV. "Flux stations or Impact stations" means the location for measuring the mass of particular pollutant on main river stem for measuring the extent of pollution due to human interference or geological feature at any point of time and is necessary for measuring impact of pollution control measures adopted;
V. "Monitoring" means standardized measurement of identified parameters in order to define status and trends of water quality;
VI. "Protocol" means a system of uniform water quality monitoring mechanism developed by the Water Quality Assessment Authority constituted under sub-sections (1) and (3) of section 3 of the Environment (Protection) Act, 1986;
VII. "Quality Assurance Programme" means a programme described in paragraph 12 of this Order.
VIII. "Trend station" means the monitoring location designed to show how a particular point on a watercourse varies over time due, normally, to the influence of man's activities.
IX. "Water quality monitoring network" means a systematic planning for collection, preservation and transportation, storage, analysis of water samples and dissemination of data for national water bodies restricted to surface and ground water in the country.

4. Monitoring station and frequency of sampling:-

1) The frequency of sampling in respect of surface water shall be as follows:-
a) all the stations shall be a combination of Baseline, Trend and Flux or Impact stations
b) the Baseline stations shall be monitored four times a year for perennial rivers and lakes and three to four times a year for seasonal rivers. Trend stations shall be monitored with an increased frequency of once in a month i.e. twelve times in a year. Flux or Impact stations shall be monitored twelve or twenty-four times in a year depending upon pollution potential or importance of water use.

c) all agencies shall follow the sampling frequency and parameters for analysis of surface water as mentioned in the Table – I given below:

Table – I Frequencies and parameters for analysis of surface water samples

1	2	3
Type of Station	**Frequency**	**Parameters**
Baseline	**Perennial rivers and lakes:** Four times a year (seasonal) **Seasonal rivers:** 3-4 times (at equal spacing) during flow period **Lakes:** 4 times a year (seasonal**)**	**A. Pre-monsoon: Once a year** Analyse 25 parameters as listed below: **a) General:** Colour, Odour, Temperature, pH, Electrical Conductivity (EC), Dissolved Oxygen (DO), Turbidity, Total Dissolved Solid (TDS) **b) Nutrients:** Ammoniacal Nitrogen (NH_4-N), Nitrite & Nitrate Nitrogen (NO_2 + NO_3) Total Phosphate (Total P) **c) Demand parameters:** Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) **d) Major ions:** Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Carbonate (CO_3) Bicarbonate (HCO_3 Chloride (CL), Sulphate (SO_4) **e) Other inorganic:** Fluoride (F), Boron (B) and other location specific parameter, if any **f) Microbiological:** Total coliform and Faecal Coliform B. **Rest of the year** (after the pre-monsoon sampling) at every three months interval Analyse 10 parameters: Colour, Odour, Temperature, pH, EC, DO, NO_2 + NO_3, BOD, Total coliform and Faecal Coliform

Trend or impact or flux	Once every month starting April-May (pre-monsoon) i.e. 12 times a year	**A. Pre-monsoon:** Analyse 25 parameters as listed for baseline monitoring **B. Other months:** Analyse 15 parameters as listed below **(a) General :** Colour, Odour, Temp, pH, EC, DO and Turbidity **(b) Nutrients :** NH_3 - N, NO_2 + NO_3, Total P **(c) Organic Matter :** BOD, COD **(d) Major ions :** Cl **(e) Microbiological:** Total and Faecal coliforms **C. Micropollutant:** Once in a year/pre monsoon. **a) Pesticides –** Alpha Benzenehexachloride (BHC), Beta BHC, Gama BHC (Lindane), OP-Dichlorodiphenyltrichloroethane (OP-DDT), PP-DDT, Alpha Endosulphan, Beta Endosulphan, Aldrin, Diedrin, Carbaryl (Carbamate), Malathian, Methyl Parathian, Anilophos, Chloropyriphos **b) Toxic Metals:-** Arsenic (As), Cadmium (Cd), Mercury (Hg), Zinc (Zn), Chromium (Cr), Lead (Pb) Nickel (Ni), Iron (Fe) (The parameters may be selected based on local needs)

Note:

I. The parameters mentioned in the above Table shall be the minimal requirement. This does not, however, restrict analysis of more parameters depending upon the specific requirements of the analyzing agency and its manpower availability.

II. For lakes or reservoirs, monitoring of additional parameters, like total Kjeldhal Nitrogen, Chlorophyll, total Plankton count and productivity, shall be included in the list of parameters.

III. If biomonitoring is done in river or lakes or reservoirs, additional specific parameters are to be considered.

2) Ground Water

The frequency of sampling in respect of ground water shall be as follows:

a. All stations shall be classified as Baseline stations
b. 20-25% of Baseline stations shall be classified as Trend stations where there is a perceived problem.
c. All agencies shall follow the sampling frequency and parameters for analysis of ground water as mentioned in the Table-2 given below:

5. Sample Collection

(1) The procedure for sample collection in respect of surface water shall be as under:

a. Samples for Baseline and Trend stations shall be collected from well-mixed section of the river or main stem 30 cm below the water surface using a Dissolved Oxygen (DO) sampler or weighted bottle.

b. Samples for impact stations shall be collected from the point of interest, such as bathing ghat, downstream of point discharge, water supply intakes and other sources.
c. The Dissolved Oxygen (DO) in the sample shall be fixed immediately after collection and Dissolved Oxygen (DO) analysis shall be done either in the field or in laboratory.

(2) The procedure for sample collection in respect of ground water shall be as under:

a) Open dug wells, which are not in use or have been abandoned, shall not be considered as water quality monitoring station. However, such well could be considered for water level monitoring.
b) Weighted sample bottle to collect sample from an open well about 30 cm below the surface of water may be used. The plastic bucket, which is likely to skim the surface layer only, shall not be used.
c) samples from the production tube wells shall be collected after running the well for about five minutes.
d) Non-production piezometers shall be purged using a submersible pump. The purged water volume shall equal 4 to 5 times the standing water volume, before sample is collected.
e) for bacteriological samples, when collected from tube wells or hand pump, the spout or outlet of the pump shall be sterilized under flame by spirit lamp before collection of sample in container.

Table – 2 Frequencies and parameters for analysis of Ground Water samples

1	2	3
Type of Station	**Frequency**	**Parameters**
Baseline	**Twice a year** (Pre and post monsoon season)	A. Pre and Post Monsoon Season: Analyse 20 parameters as listed below: a. General: Colour, Odour, Temperature, pH, EC, TDS b. Nutrients: NO_2 + NO_3, orthophosphate c. Demand Parameter: COD d. Major Ions: NA+, K +, Ca++, Mg++, CO_3^{--}, HCO_3^{-}; Cl, SO_4,$^{--}$%Na & SAR e. Other inorganics: F, B and other location-specific parameters, if any
Trend	**Twice a year (Pre and post monsoon)**	A. April-May: Analyse 20 parameters as listed for Baseline monitoring B. Other times: Analyse 14 parameters as listed below:- a) General: Colour, Odour, Temperature, EC, pH, TDS, %Na & SAR b) Nutrients: NO_2 + NO_3, orthophosphate c) Demand parameter: COD d) Major ions: Cl e) Other inorganics: F,B f) Microbiological: Total coliform and Faecal coliform C. Micropollutant (parameters may be selected based on local needs): a. Pesticides- Alpha BHC, Beta BHC, Gama BHC (Lindane), OP-DDT, PP-DDT, Alpha Endosulphan, Beta Endosulphan, Aldrin, Dieldrin, Carbaryl (Carbamate), Malathian, Methyl, Parathian, Anilophos, Chloropyriphos. b. Toxic Metals – As, Cd, Hg, Zn, Cr, Pb, Ni, Fe (Pesticides and Toxic metals may be analysed once a year in pre monsoon on selected locations)

Note:-

I. The parameters mentioned in the above Table shall be the minimal requirement. This does not, however, restrict analysis of more parameters depending upon the specific requirements of the analyzing agency and its manpower availability.

II. If chemical Oxygen Demand (COD) value exceeds 20 mg/l, the sample shall be analysed for Biochemical Oxygen Demand (BOD) also.

6. Sample preservation and transportation

1) The type of containers and sample preservation to be adopted shall be as mentioned in the Table-3 below:

Table – 3

1	2	3

Analysis	Container	Preservation
General	Glass, PE	4^0C, dark
BOD	Glass, PE	4^0C, dark
COD, NH_3, NO_2, NO_3	Glass, PE	H_2SO_4, PH<2
Coliform	Glass, PE, Sterilised	4^0C, dark
DO	BOD bottle	DO fixing chemicals
Fluoride	PE	None
P	Glass	None
Pesticides	Glass, Teflon	4^0C, dark
Toxic metals	Glass, PE	HNO_3, PH<2

2) Samples shall be transported to concerned laboratory as soon as possible, preferably within forty-eight hours of collection
3) Analysis for coliforms shall be started within twenty-four hours of collection of sample. If time is exceeded, it should be recorded with the result
4) Samples containing microgram / 1 metal level should be stored at 4^0C and analyzed as soon as possible. If the concentration is of mg /1 level, it can be stored for up to 6 months, except mercury, for which the limit is 5 weeks.
5) Sample Identification for the water sample analysis for surface and ground water samples shall be as mentioned in the Form-I and Form-II.

7. Sample records

1) Each laboratory shall have a bound register, which shall be used for registering samples as they are received. A format for sample receipt register is annexed as Form-III.
2) The Laboratory In-charge shall maintain a register for assignment of work to specific analyst.

8. Analytical techniques

Each agency shall follow the analytical techniques prescribed in the Standard Methods for Analysis of Water and Wastewater published by American Public Health Association (Latest Edition) or Bureau of Indian Standard(BIS) Methods for Testing Water and Wastewater-methods of sampling and testing (physical and chemical) (IS:3025)

9. Analysis records and data validation

A recommended format for recording data including all parameters except toxic metals and trace organics is enclosed as Form – IV. Report of heavy metals and trace organics as per Table 2 may be recorded separately. Validation check should be performed in the laboratory on completion of the analysis. The results of laboratory analyses shall be entered in the format provided in Form – II for validation.

10. Manpower requirements in laboratories

The manpower requirements shall be optimized by the concerned monitoring agencies in order to get the maximum utilization of mandays, for timely completion of analysis**.**

11. Data Processing, Reporting and Dissemination

Each monitoring agency shall process the analytical data and report the data after validation to the Data Centre at the Central Pollution Control Board. The Central Pollution Control Board shall store the data and disseminate through website or electronic mail to various users on demand.

12. Quality Assurance and Accreditation of Laboratories

The Quality Assurance Programme for the laboratories of various agencies shall contain a set of operating principles, written down and agreed upon by the organization, delineating specific functions and responsibilities of each person involved. Each laboratory of water quality monitoring agencies shall follow the guidelines of Quality Assurance Programme prescribed by their respective Central Laboratory or Headquarters and shall participate in Inter Laboratory Quality Assurance Programme like Proficiency Testing (PT) organized by them or any other agency on regular basis. The water quality laboratories shall seek recognition from the ministry of Environment and Forests, Government of India or accreditation from National Accreditation Board for Testing and Calibration Laboratories (NABL) under the Ministry of Science and Technology, Government of India

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 16th December, 2005

S.O.1799 (E) – Whereas by the notification of the Government of India in the Ministry of Environment and Forests, number S.O. 133 (E), dated the 4th February, 2003 (hereinafter referred to as the said notification), the Central Government notified Matheran and surrounding region in the State of Maharashtra as an Eco-sensitive Zone and imposed restrictions on industries, operations, processes and other developmental activities in the said region;

Now, therefore, in exercise of the powers conferred by Sub-section (1) read with clause (v) of Sub-section (2) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986) and rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the said notification, namely:-

In the said notification-

in paragraph 4, in sub-paragraph (n), after the words "in addition, one ambulance and one fire engine as stand by", the words "railways and ropeways" shall be inserted;

1. in Annexure – A, for the brackets, words and figure " (see section 2)", the brackets, words and figure "(see paragraph 2)", shall be substituted;
2. in Annexure – B, for the brackets, words and figure "(see section 2)", the brackets, words and figure "(see paragraph 2)", shall be substituted;
3. in Annexure – C, for the brackets, words and figure "(see section 2)", the brackets, words and figure "(see paragraph 2)", shall be substituted;
4. in Annexure – D
    a) for the brackets, words, figures and letters "[see Section 4(a)(iv)(c)]" the bracket, words, figures and letters "[see paragraph 4(a)(iv)(3)]" shall be substituted;
    b) in sub-heading 3, relating to Green Zone – 1, in item (j) of entry 3.1, after the words "small check dams for watershed management", the word "ropeways" shall be inserted;
    c) in sub-heading 4, relating to Urbanisable Zone-2,-
        I. in item (n) of entry 4.1, after the words "small check dams for watershed management", the word "ropeways." shall inserted;
        II. in entry 4.2, for the word "paragraph", the word 'entry' shall be substituted.

[F.No. J-20011/1/99-LA-III]
R. CHANDRAMOHAN, Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, vide Number S.O.133(E) dated the 4th February, 2003, and subsequently amended vide Numbers S.O. 83 (E) dated the 16th January, 2004.

Annexure –IV: Suggestive Structure of the DPRs

Chapters	Description
i.	Table of Contents
Ii	List of Abbreviations
Iii	Salient Features of the Project
Iv	Executive Summary / General Abstract of Cost
	PROJECT REPORT
1.1	**Authority for preparation of project**
1.2	**Brief Description of the project area**
	Brief history of the town
	Geographical location
	Climate
	Topography
	Administrative divisions
	Commercial aspects
	Industrial activities
	Educational activities
	Cultural activities
	Religious activities
	Socio –Economic status
	Town Management
	Soil characteristics and sub soil water level
	Drains – Total nos., nos. discharging into river(s), nos. intercepted
	City Sanitation Plan, if any – Date of preparation/sanction, copy of Executive Summary and abstract of cost estimate to be attached
	Master plan of development of the city, if any - Date of preparation/sanction, copy of Executive Summary and abstract of cost estimate to be attached
	Sewerage Master Plan, if any - Date of preparation/sanction, copy of Executive Summary and abstract of cost estimate to be attached
	Feasibility Report, if any - Date of preparation/sanction, copy of Executive Summary and abstract of cost estimate to be attached
	Agency responsible for execution and O&M of works, brief note on agencies
	Hrs. of availability of power at the sites of SPS / STPs
1.3	**Existing sewerage works**
	Existing, under execution, sanctioned but not yet started.
	Condition assessment report of existing sewers, SPS & STPs with details of CC TV survey, stating dia/length of sewers to be desilted, rehabilitated, abandoned (with reasons) etc.
	Proposed renovation, up gradation, augmentation etc. of the existing sewerage works
1.4	**River water quality**
	Water quality standards of river water quality

	Actual river water quality u/s, d/s, u/s of water supply intakes, other important places along with copies of test reports
1.5	**Population**
	Census population of the last 5 decades, area, no. of households, growth rate, density of population, slum population
	Past floating population data
	Population projections as per the City Master Plan
	Population projections for base year, 10, 15, 30 years – For permanent and floating population, along with basis of projected floating population
	Population Projections of each district in design years
1.6	**Water Supply**
	Recommended rates of water supply as per CPHEEO Manual on water supply
	Status of water supply
	Proposals for augmentation of water supply system
1.7	**Volume of Sewage Generation**
	Interception Factor
	Peak Factors
	Sewage flow calculations based on rate of water supply and projected population (including floating) in base, 10, 15, 30 years, including flow from private bore wells and infiltration of sub soil water
	Sewage flow actually measured in drains/sewers along with copies of reports of measurements
	Design sewage flows adopted along with comments on its normative and actual values
	Design sewage flows in each sewerage district as adopted
1.8	**Raw Sewage Quality**
	Test reports of raw sewage in drains for parameters as per guide lines
	Test reports of raw sewage in sewers for parameters as per guide lines
	Test reports of sewage flow in sewers from nearby town(s) having same rate of water supply and similar socioeconomic conditions
	Raw sewage quality assumed for design of STP(s) along with basis
1.9	**Treated Sewage Quality**
	Standards for treated sewage
	Summary of treated effluent quality of existing STPs for the last 2 years
2.0	**Interception Works of Drains**
2.1	**Sewer Network**
	Hydraulic Design of Sewer Network, District wise
	Design of sewer Bedding
	Life cycle cost analysis of pipes proposed in gravity sewers, as per NRCD, MoEF letter dt. July 8, 2002
	Report on condition assessment and integration of existing works

	Sewers by trenchless method
2.2	**Sewage Pumping Stations**
	Hydraulic Designs of Sewage Pumping Stations
	Design of capacities of Pumping Plants of sewage pumping stations
	Design of capacities of Generators
	Condition assessment and integration of existing SPS
2.3	**Rising Mains**
	Design of Economical sizes of Rising Mains
2.4	**Sewage Treatment Plants**
	Details of existing STPs – Capacities, year of construction, type, status
	Capacities of proposed STPs
	Characteristics of raw sewage on existing and proposed STPs
	Characteristics of treated effluent on existing and proposed STPs
	Disposal of treated effluent
	Existing and future plan of reuse / recycling of treated waste water from STPs to be given.
	Life Cycle Cost analysis for different technologies of treatment of waste
	Land available and required for STPs
	Electrical Load List of S.T.Ps
	Condition assessment and integration of existing STPs
	Production of biogas and its use for power generation
2.5	**Other provisions**
	Land available and required for various components
	Staff Quarters
	Permission from Forest, Railways, Telephone etc departments
	Special T&P
	Land cost in and around the town - copy of rates be attached
2.9	Electricity from solar and micro hydro
3.0	**Cost estimates**
3.1	**Operation and Maintenance**
	O&M cost for 15 years
	Annual O&M Cost of Works (component wise)
	Annual manpower cost
	Annual cost of power
	Annual expenditure on repairs and maintenance
	Staff required for maintenance
	Power required for maintenance
	O&M Recovery Plan for 15 years
	Economics
4.0	**Implementation Programme**
	PERT Chart
	Schedule of demand of funds
5.0	**Miscellaneous**

5.1	Environmental Sanitation and Management Plan (ESAMP)
5.2	Communication & Public Outreach
5.3	Governance and Accountability Action Plan (GAAP) and Grievance Redressal Mechanism (GRM)
5.4	Training, Human Resources Development and Capacity Building
5.6	Project Management and Institutional Development
5.7	Capacity of ULB – financial, material, human resources related to implement, operate and maintain the WWMS
	Proposed strengthening plan
5.8	Monitoring and Evaluation
5.9	Third Party Assurance and Quality Check
	ANNEXURES
	Data collected as mentioned in chapter 2
	Executive Summary of City Development Plan, as approved
	Executive Summary of City Sanitation Plan, as approved
	Executive Summary of FR of sewerage, as approved
	Approval of City Sanitation Plan by the State Government
	Approval of City Sanitation Plan by NMCG
	Approval of Feasibility Report of sewerage by the State Government
	Approval of Feasibility Report by NMCG
	Test Reports of River Water Quality, including those by CPCB, SPCB and other agencies
	Discharge measurement reports of discharge of drains
	Test reports of raw sewage in drains
	Test reports of raw sewage in sewers
	Test reports of sewage flow in sewers from nearby town(s)
	Test reports of treated effluent from existing STPs
	Rates of Land Acquisition in and around the town (copy of rates be attached in support)
	Sub Soil characteristics and sub soil water data
	Rates of PWD for reinstatement of roads
	Budgetary Offers of various components (separate cover, if voluminous)
9	**ESTIMATES**
	Drains
	Interception of drains and allied works
	Sewers
	Civil works of SPS
	EM works of SPS
	Rising mains
	STPs
	Electric Power Sub Station
	Staff Quarters
	Approach road
	Permission from Departments
	Shifting of Electric Cables, Lines etc./ Telephone Poles, Cables etc.
	Special T&P

	Land Acquisition
	Environmental Sanitation and Management Plan (ESAMP)
	Communication & Public Outreach
	Governance and Accountability Action Plan (GAAP) and Grievance Redressal Mechanism (GRM)
	Training, Human Resources Development and Capacity Building
	Project Management and Institutional Development
	Monitoring and Evaluation
	Third Party Assurance and Quality Check
	Unit Estimates
	Manhole, size wise
	Boundary Wall
	Steel Gate
	Gully Pits
	Roads
10	**DRAWINGS**
	General Drawings
1.	Map of the Country and State Showing the Location of the Town
2.	Map Showing Ganga River Basin and Location of Town
3.	Base map of Town (Road, Railway track, Wards, Slum and important landmarks etc.)
4.	Satellite Imagery of Town
5.	Land use Map/ Master Plan of Town (if any)
6.	Map Showing overall drainage and their Outfall Point related to Town
7.	Map of Town showing locations of industries, CETPs and points of, untreated / treated effluent outfalls of industries, etc.
8.	Map Showing Contours for Town
9.	Map Showing Existing Sewer Network for Town
	Proposed Drawings
10.	Key Plan of Proposed Scheme integrated with existing system along with GLs and ILs at critical points, drains, their points of outfall, proposed SPS, STPs (Capacity in MLD)
11.	L-sections of sewers to show GLs/ ILs/ dia / length / type of sewers, profile of ground and sewers.
12.	Location Map of Interception & Diversion of drain
13.	Map Showing Proposed Drains Interception and Diversion (I & D) Works
14.	Map Showing Proposed Fencing Stretches on various Drains (if considered)
15.	Location Map of SPSs/STPs as per actual site layout (showing lat/long, important landmarks and site surroundings).
16.	General Arrangement Drawing for Sewage Pumping Station
17.	Layout Plan of Proposed/Existing STP with unit sizing, specific modification requirement (if any), Road, Guardroom, Staff quarter, Solar Panel, Plantation etc.
18.	Hydraulic Flow Diagram for Proposed/Existing STP
19.	Plan and Profile of Treated Effluent Reuse Pipe Line
20.	Typical Details of Manhole (Various Sizes)
21.	Typical House Connecting Chamber
22.	Typical Sewer Bedding Details
23.	Typical Boundary Wall

24.	Typical Single Line Diagram for STP integrated with Solar Power (Electrical)
25.	Typical Single Line Diagram for SPS and MPS (Electrical)
26.	Typical Process and Instrumentation Diagram integrating with SCADA system
27.	Typical cross-sectional drawing of drains (Existing & Proposed)

Annexure – V: Directions issued by CPCB vide notification dated Mar 02, 2015 For On Line Monitoring of Influent and Effluent Quality of Highly Polluting Industries

SPEED POST

B-29016/04/06/PCI-I/ 7176-7216 March 02, 2015

To

The Chairman
(All SPCBs/PCCs)

SUB: DIRECTIONS UNDER SECTION 18(1)(b) OF THE WATER (PREVENTION & CONTROL OF POLLUTION) ACT, 1974 and THE AIR (PREVENTION & CONTROL OF POLLUTION) ACT, 1981 IN THE MATTER OF POLLUTION CONTROL IN 17 CATEGORY OF HIGHLY POLLUTING INDUSTRIES , CETPs AND COMMON HAZRDOUS WASTE & BIOMEDICAL WASTE INCINERATORS-REGARDING SELF MONITORING OF COMPLIANCE

WHEREAS, under Section 17 of the Water (Prevention & Control of Pollution) Act, 1974, and under Section 17 of the Air (Prevention & Control of Pollution) Act, 1981, one of the function of the State Pollution Control Boards(SPCBs)/Pollution Control Committees(PCCs) is to plan a comprehensive programme for the prevention, control or abatement of pollution of streams, wells and air pollution in the State/Union territory and to secure the execution thereof; and

WHEREAS, under section 16 of the Water (Prevention and Control of Pollution) Act, 1974 and under Section 16 of the Air (Prevention & Control of Pollution) Act, 1981, one of the functions of the Central Pollution Control Board (CPCB), constituted under Water (Prevention and Control of Pollution) Act, 1974 is to coordinate activities of the State Pollution Control Boards and Pollution Control Committees and to provide technical assistance and guidance to SPCBs / PCCs; and

WHEREAS, the SPCBs and PCCs are empowered to stipulate standards for discharge of environmental pollutants for various categories of industries and common effluent treatment plants (CETPs) , Common Hazardous waste and Biomedical waste incinerators even more stringent than those notified by the Central Government, under the Environmental (Protection) Act, 1986 and rules framed there under; and

WHEREAS, Pharmaceuticals, Chlor Alkali, Fertilizers, Oil Refinery, Dye and dye intermediate, Pesticides, Petrochemical, Large Power plants, Cement, Aluminium, Zinc, Copper, Iron & steel, Large Pulp & paper, Distillery, Sugar and Tannery industries located in States/UTs have been discharging environmental

pollutants directly or indirectly into the ambient air and water, which pose constant threat to cause adverse effect on the water and air quality ; and

WHEREAS, Common Hazardous waste and Biomedical waste incinerators and Common Effluent Treatment Plants(CETPs) located in States/UTs have been discharging environmental pollutants directly or indirectly into the ambient air and water; and

WHEREAS, the SPCBs and PCCs are also required to ensure installation and regular operation of the requisite pollution control facilities in the polluting industries; and

WHEREAS, there is need to inculcate habit of self monitoring mechanism within the industries for complying the prescribed standards and this can be achieved by the methods like installing online effluent and emission monitoring devices; and

WHEREAS, number of industries under 17 category which are operating in the state/UT have been identified can be suitably directed for installation and commissioning of online monitoring systems (emission and or effluent); and

WHEREAS, number of Common Hazardous waste and Biomedical waste incinerators and CETPs operating in the state/UT can also be considered for installation and commissioning of online monitoring systems (emission and or effluent);and

WHEREAS, for strengthening the monitoring and compliance through self regulatory mechanism ,online source and effluent monitoring systems need to be installed and operated by the developers and the industries on 'polluter pays principle' ;and

WHEREAS, some of the SPCBs have already given specific conditions in consent to operate of 17 categories of highly polluting industries/ and Common

Hazardous waste and Biomedical waste incinerators to install continuous emission and effluent monitoring systems; and

WHEREAS, it is envisaged in "National Environment Policy- 2006" that to strengthen the testing infrastructure and network for monitoring ambient environmental quality and progressively ensure real-time, and online availability of the monitoring data; and

WHEREAS, CPCB had earlier issued letter dated January 12,2011 to SPCBs /PCCs to direct all the 17 categories of highly polluting industries to install automatic air and water quality stations to monitor the ambient quality; and

WHEREAS ,it is becoming a need and necessity to regulate and minimize inspection of industries on routine basis and instead efforts need to be made to bring self discipline in the industries to exercise self monitoring & compliance and transmit data of effluent and emission compliance to SPCBs/PCCs and to CPCB on continuous basis; and

WHEREAS, there could be some time needed for getting such devices standardised and requiring confidence on data generated but needless to emphasize that efforts towards setting up to continuous monitoring devices is essential; and

WHEREAS, the ground truthing of the values indicated by the online devices need to be done before bringing them in public domain for proper interpretation and such measures need to be taken at the level of SPCBs/PCCs .And whereas for regulatory purposes and for purposes of actions to be taken against non complying industries /facilities, the existing methods of sampling, analysis and related procedures under the existing statutes need to be continued; and

WHEREAS, SPCBs and PCCS have prescribed standards for various parameters as per the notified standards under Environment(Protection) Act,1986

and the State Boards may refer to the parameters which should be monitored by installing continuous effluent and emission monitoring devices(Annexure -II);and

WHEREAS, continuous effluent and emission monitoring devices can be installed in those industries which are continuously letting out effluents and emissions out of their premises: and

WHEREAS following direction under Section 18(1)(b) of the Water (Prevention & Control of Pollution) Act, 1974, and 18(1)(b) of the Air (Prevention & Control of Pollution) Act, 1981 have been issued to all SPCBs/PCCs on 05.2014;

a) To Install online continuous Stack Emission Monitoring Systems (CSEMS) in 17 categories of highly polluting industries and in Common Hazardous waste and Biomedical waste incinerators for the parameters(industry/sector specific parameter) mentioned in the consent to operate/authorisation not later than by March 31,2015;
b) To install online effluent quality monitoring system at the outlet of effluent treatment plants of the 17 category industries and in CETPs for the measurement of the parameters(industry/sector specific parameter) like flow, pH, COD, BOD, TSS and for other consented parameters as per the guidelines provided; not later than by March 31, 2015;
c) To connect and upload the online emission and effluent monitoring data at SPCBs/PCCs and CPCB server in a time bound manner but not later than by March 31,2015;
d) To ensure regular maintenance and operation of the online system with temper proof mechanism having facilities for online calibration;
e) To submit bank guarantee of 25 % of the cost of online monitoring systems (emission and effluent whichever applicable) for ensuring timely installation of online monitoring systems within 90 days from the date of receipt of directions issued by SPCBs/PCCs to the industries;

WHEREAS In order to sensitize the issues among SPCBs/PCCs ,CPCB also highlighted the status of compliance of setting up online monitoring system in the conference of Chairman and Member Secretaries(February 21-22,2014 at

Bangalore and January 09,2015 at Chandigarh) at the National as well as Regional level on online monitoring system; and

WHEREAS CPCB has organized five interaction meets on 06/8/2014,19/09/2014,29/09/2014,8/10/2014 and 16/10/2014 respectively to have an interaction with SPCBs, representative of industries, industrial associations and instrument suppliers on online monitoring system; and

WHEREAS CPCB has already published a guidelines for online continuous monitoring system for effluents on 07.11.2014; and

WHEREAS a letter has been issued to all SPCBs/PCCs on October 31, 2014 and subsequent reminder sent on December 24,2014 to provide action taken report to CPCB in the format before January 10, 2015; and

Now, therefore, in exercise of the powers conferred under Section 18 (1) (b) of the Water (Prevention & Control of Pollution) Act, 1974, and 18 (1) (b) of the Air (Prevention & Control of Pollution) Act, 1981 and keeping in view strengthening of the monitoring mechanism for effective compliance through self regulatory mechanism, you are directed to

(i) All the industries will submit bank guarantee of 100 % of the cost of online monitoring systems (emission and effluent whichever applicable) for ensuring timely installation of online monitoring systems by 30.06.2015 and such bank guarantee will be discharged if they install the system before June 30,2015.

(ii) If the industries will not install the online monitoring system by June 30, 2015 their consent to operate of the industry shall be withdrawn and bank guarantee shall be forfeited.

(Shashi Shekhar)
Chairman

Copy to:

1. The Advisor(CP Division)
   Ministry of Environment, Forests and Climate Change
   Prithvi Wing, 2nd Floor, Room No. 216
   Indira Paryavaran Bhawan
   Aliganj, Jor Bagh Road
   New Delhi - 110003

2. I/C PCI-I,II,III and HWMD
3. All Zonal Officer ,CPCB
4. I/c IT Division, CPCB
5. I/c. ESS, CPCB

(A.B. Akolkar)
Member Secretary

Annexure – VI: Completion Report
(Part A)

(General Abstract of Cost)

1. Name of the scheme:
2. Sanctioned Amount:
3. Date of sanction:
4. Date of Scheduled start:
5. Date of actual start:
6. Date of Scheduled Completion:
7. Date of actual completion
8. Actual Expr.

Sl. No	Sub-head/ component	As per sanctioned Estimate			As executed			Variation		Reasons for Variation	Cost as per executed quantity & Rates as per sanctioned Estimate	Escalation Due to variation in quantity Col. 12 Col. 5	Escalation Due to price variation Col. 8-Col.5-Col. 13	Remarks
		Item	Qty	Amt.	Item	Qty	Amt.	Saving (+)	Excess (-)					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Certified (1) That there has been no material deviations from the sanctioned plans and specifications other than those approved by the competent authority.

(2) That the works have been completed as per specifications and completion drawings enclosed

(3) That the site has been cleared of all malba, rubbish and surplus materials, contractors' hutments and his materials etc.

COMPLETION REPORT (Part B)

Name of the Scheme: Details of variations in the scope of work

Component/Sub-head:

Sl. No	Description of item of work	As per sanctioned Estimate				As executed				Variation		Reasons for Variation	Cost as per executed quantity & Rates as per sanctioned Estimate	Escalation Due to variation in quantities col. 14- Col. 6.	Escalation Due to price variation Col. 10 - Col. 6 - Col. 15	Remarks
		Qty	Unit	Rate	Amt.	Qty	Unit	Rate	Amt.	Saving (+)	Excess (-)					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Annexure –VII: Utilisation Certificate

Ministry of Water Resources, River Development & Ganga Rejuvenation

UTILISATION CERTIFICATE

(To be sent in duplicate to the Ministry of Environment & Forests)
for the financial year (Form_____ to _____)

1. Title of the Project/Scheme:
2. Name of the Organisation:
3. Principal Investigator:

4. Ministry Of Environment And Forests letter No. and date of sanctioning the project :
5. Amount brought forward from the previous financial year quoting Ministry of Environment and Forests letter no. and date on which the authority to carry forward the said amount was given :
6. Amount received from Ministry of Environment & Forests, during the financial year (please give No. and date of sanctions Showing the amount paid)
7. Total amount that was available for expenditure (including commitment) incurred during the Financial Year (S. No. 5+S. No. 6)
8. Actual Expenditure (Excluding commitments) incurred during the financial year:
9. Unspent balance refunded if any (Please give details of cheque no. etc.)
10. Balance amount available at the end of the financial year:
11. Amount allowed to be carried forward to the next financial year vide letter no. and date:

Certified that the expenditure of Rs. _____ (Rupees _____) mentioned against column 8 was actually incurred on the Project / Scheme for the purpose for which it was sanctioned and balance amount is available on _____ .

(Signature of Principal Investigator)	(Signature of Registrar/ Accounts Officer)	(Signature of Head of the Organisation)

ACCEPTED AND COUNTERSIGNED
COMPETENT AUTHORITY
MINISTRY OF ENVIRONMENT AND FORESTS

Form of Utilisation Certificate

(Form GFR 19-A)
[See Rule 212(1)]

Name of the Organisation :

Financial Year :

S. No.	Ministry of Environment and Forests Sanction for Released Amount		
	Letter No.	Date	Amount (Rs. in Lakhs)
1.			

1. Certified that out of Rs. --------- of grants-in-aid sanctioned during the year ---------- in favour of ---------- under Ministry of Environment and Forests letter No. ---------- dated ---------- ,and Rs.----------on account of unspent balance of the previous year, a sum of Rs.---------- has been utilized during the period for purpose of "----------." for which it was sanctioned and that the balance of Rs—---------- remaining unutilized at the end of the year will be adjusted during ---------- towards the grants-in-aid payable during the next year ----------

2. Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been duly fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of checks exercised

1.

2.

3.

4.

Signature ……..
Designation ……... Date ……..
Operating

Countersigned _____

T-03/2014-15/662/NMCG/112
National Mission for Clean Ganga
National Ganga River Basin Authority
MoWR, RD&GR

1st Floor,
Major Dhyanchand National Stadium
Opposite: India Gate
New Delhi-110002
Dated: 23th June, 2017

OFFICE MEMORANDUM

Subject: Utilization of Services of Empaneled list under the MoEF&CC for Third Party Appraisal (TPA) evaluation of DPRs for project related to NGRBA/NMCG.

The undersigned is directed to refer letters of offers of empanelment conveyed to independent institute for evaluation of DPRs for projects on the subject mentioned above. The term and condition/TOR for the task of evaluation and payment to empaneled Institute will adhere to the office memorandum no. A-12011/34/2009/NRCD, dated 29.11.2010. The validity of empanelment has been extended for a period of one year from 13.02.2017 with reference no. T-03/2014-15/662/NMCG. To escalate the TPA process, few new Institutes (last enclosed) also have been included in the empaneled list with same term and conditions for utilization there services for Third Party Appraisal (TPA) evaluation of DPRs for project related to NGRBA/NMCG. The empanel list will remain in operation till further order and can be modified/changes in accordance to any changes in the empaneled list of NMCG, MoWR,RD&GR.

This issues with the approval of the Competent Authority.

Pravin 23/06/17
(Dr. Pravin Kumar)
Director T-III, NMCG

Enclosure:-

1) List of Consultants/institutions
2) Office Memorandum dated 29.11.2010 of MoEF & CC.

Copy to: for information please

I. PS to Hon'ble Minister of WR, RD & GR
II. PS to Secretary, WR, RD & GR
III. PS to DG,NMCG
IV. PS to EDs (All)

List of Empaneled Institutions/agencies

Sl. No.	Name of Institute	Name of representative whose concent have been received	Contact details
1	Civil Engineering Department Indian Institute of Technology Guwahati Guwahati – 781039	Dr. Subashisa Dutta	Tel: 361- 2582401, 2415 Mob: subashis@iitg.ernet.in, hodcivil@iitg.ernet.in
2	Motilal Nehru National Institute of Technology Allahabad Teliarganj Allahabad - 211004	Prof. Rajiv Tripathi	Tel: 532-2545190/2271002 Mob: 9415014473 director@mnnit.ac.in rt@mnnit.ac.in
3	Engineering & Technology Jamia Millia Islamia Jamia Nagar New Delhi – 110025	Prof. Gauhar Mahmood Dr. Abid Ali Khan	Mob: 9810670782 gmehmood@jmi.ac.in Mob: 9650191192 akhan@jmi.ac.in dee.abid@gmail.com
4	ENVIS Centre Centre of Mining Environment Department of Environmental Science and Engineering Indian Institute of Technology (ISM) Dhanbad- 826004	Prof. A.K. Singh	Tel: 923-2296624/2235285/2296625 Fax: 326-2296624 cme@ismdhanbad.ac.in
5	Indian Institute of Technology Delhi Hauz Khas New Delhi - 11 00 16	Prof. A.K. Nema Dr. Arun Kumar	aknema[at]civil.iitd.ac.in *akumar[at]civil.iitd.ac.in*
6	Harcourt Butler Technical University Nawabganj Kanpur - 208 002		
7	University School of Environmental Management Guru Gobind Singh Indraprastha University Sector - 16C Dwarka Delhi – 110078	Prof. Anubha Kaushik	Tel: 011-25302360, 25302362 Fax: 28035243 Aks.es.10@gmail.com
8	Delhi Technological University Shahbad Daulatpur Main Bawana Road Delhi-110042	Prof.S.K. Singh Dr. Anil Kumar Haritash	Singhsk@gmail.com, sksinghdce@gmail.com
9	Faculty Offices Building, Doon University Mothrowala Road, Kedarpur P.O. Ajabpur, Dehradun Uttarakhand – 248001	Dr. Surendra Singh Suthar	suthariitd@gmail.com
10	Centre for Environmental Science and Technology Central University of Punjab City Campus, Mansa Road Bathinda Punjab – 151001	Prof. V.K Garg	Tel: 164-2864106 registrar@cup.ac.in

11	Environment and Sustainability Department CSIR- Institute of Minerals and Materials Technology Council of Scientific & Industrial Research Bhubaneswar Odisha - 751 013	Dr. Asheesh Kumar Yadav	Mob: 9439914320 asheesh@immt.res.in
12	Institute of Environment & Sustainable Development 109, Central Office Banaras Hindu University Varanasi	Prof. Kavita Shah Dr. Rajeev Pratap Singh	Tel: 0542-6307225 Mob: 9450955423 kavitashah@ghu.ac.in Mob: 9935912997 rajeevprataps@gmail.com rps.iesd@bhu.ac.in
13	National Institute of Technology Patna Ashok Rajpath Patna – 800005	Dr. N.S. Maurya Prof. Vivekanand Singh	nsmaurya@nitp.ac.in vsingh@nitp.ac.in
14	National Institute of Technology Delhi A-7, Institutional Area Near Satyawadi Raja Harish Chandra Hospital Narela Delhi-110040	Dr. Kapil Sharma	+91 8755604422 kapilkumar@nitdelhi.ac.in
15	National Institute of Technology Campus Hanamkonda Telangana 506004		
16	Department of Civil Engineering Department Z H College of Engineering Technology Aligarh Muslim University Aligarh – 202002	Dr. Nadeem Khalil	Tel: 0571-6555657 Mob: 9358258350 krnadeemkhalil@gmail.com nkhalil.cv@amu.ac.in
17	Civil Engineering Department Indian Institute of Engineering Science and Technology, Shibpur (Formerly Bengal Engineering and Science University, Shibpur) P.O. - Botanic Garden, Howrah- 711103	Dr. Debabrata Mazumder	Tel: 033-26683223, 26684561 (Ext 281) Fax: 033-26682916 e-mail:
18	Housing and Urban Development Corporation HUDCO Bhawan, core & A India Habitat Centre Lodhi Road New Delhi	Dr. R. K Singh	
19	Director Development Environment Protection Training and Research Institute (EPTRI) 9174 Gachibowli Hyderabad Andhra Pradesh – 500032	Shri S.D. Mukherji Shri Venkat R. Puranam Shri Sudhanshu Goel	Tel: 40-23180112/23180132 Fax: 40-23180135 Mob: 9885236493 sdmukherji@gmail.com
20	Civil Engineering Department IIT - Banaras Hindu University Varanasi – 221005 Uttar Pradesh - India	Prof. Prabhat Kumar Singh Prof. Goutam Banerjee	Tel: 0542-2366711 Mob: 08004930558 headesdbhu@gmail.com
21	Deptt. of Civil Engineering IIT Khargpur Kharagpur	Prof. M.M. Ghangrekar	Tel: (Off)- 3222-283440 Tel: (Res.) – 3222-283441

	West Bengal		ghangrekar@civil.iitkgp.ernet.in
22	Civil Engineering Department/AHEC Indian Institute of Technology IIT Roorkee Uttarakhand	Dr. A.A Kazmi Prof.Arun Kumar	Tel: 01332-285725 Mob: 9837262698 Tel: 01332-285821 Mob: 9837016916
23	School of Water Resource Engineering Jadavpur University Kolkata – 700032	Dr. Asis Mazumdar	Tel: (Off): 033-2414-6161/6979 , 033-2414-666 Extn. 2485 Fax: 2414-6161/6886 asismazumdar@yahoo.com
24	Environ Biotech Management National Environmental Engineering Research Institute Nagpur – 440020	Dr. Ritesh Vijay Mr. Suresh Kumar	Mob: 9422803805 Tel: 712-2249885 r_vijay@neeri.res.in riteshvijay@gmail.com Mob: 712224988690, (ext. 399) 7122224652 Ms_kumar@neeri.res.in, drmsureshk@yahoo.com
25	Urban Engineering Department Environment Division RITES Bhawan No. 1 Plot no. 1, Sector 29 Gurgaon 122001	Shri Akhilash Ranjan	Tel: 0124-2818926

Terms of reference

Schedule a Description of Project Appraisal Services to be provided

1.1 Objective

To appraise the Detailed Project Reports (DPRs) related to programmes for prevention, control and abatement of pollution in the river Ganga under the National Mission for Clean Ganga (NMCG) programme. These include DPRs for works relating to maintenance of river ecology, maintenance of ecological flows in the river, augmentation of sewerage infrastructure, catchment area treatment, protection of flood plains, promotion of water conservation practices, including recycling and re-use, rain water harvesting, maintenance of water quality, river front development, etc.

1.2 Scope of Work

The Consultant Institution (CI) is required to appraise the DPRs through interactive process including visits to the proposed sites. The CIs will be required to undertake minimum one site visit for two persons. The detailed appraisal shall be broadly for the flowing aspects:

a. Technical feasibility and Design Criteria
b. Reasonability of cost estimates & financial viability,
c. Impact on environment
d. Rehabilitation, statutory compliances and social safeguards &
e. Sustainable O&M of assets to be created through a well devised O&M plan

The CI will ensure that

- The projects meets the present and future requirements of the town/area in terms of services and utilities, over an approved time horizon to be agreed upon.
- The specifications of technical parameters and technical designs are sound, realistic and technically feasible;
- The cost estimates are prepared as per the latest PWD/CPWD Common Schedule of Rate (SOR) / scheduled rates specified by various Central/State regulatory authorities for specific projects of the respective States / budgetary estimates based on market rates, and are reasonable;
- The Project as a whole is financially & economically viable.
- The Project has synergy with other ongoing / project schemes
- The implementing agency has sound organizational capacity to execute the project as per the implementation schedule given in the report and raw materials and other inputs required for the Project have been tied up,
- Impact on environment, if any, is being taken care of to minimize any adverse impact (DPR should address social and environmental impacts with mitigation measures. Special attention is required to be paid to the services to poor and the vulnerable including those required to be resettled, moreover, the consultant should quantify the environmental impact (to the extent possible);
- The various statutory clearances, as applicable have been obtained or application filed with the competent authorities; and
- Any other inputs/remarks/suggestions for sound and successful implementation of the project.

2. Deliverable

a) The CI is required to discuss the preliminary observation/ comment on Detailed Project Reports (DPRs) with the NMCG and the Implementing Agency within 10 days of award of work for clarification/compliance by the implementing agency.
b) The Final Project Appraisal Report along with the proper certification of the technical, financial, environmental and quality wise feasibility containing the details as per Appendix-I to this Schedule, shall have to be submitted within four weeks of award of work.
c) To provide clarifications and assistance, as and when required by the NMCG till the sanction of the project (s).

Prices, Taxes, Duties

(a) Prices

For projects of up to Rs. 50 crore, the reimbursement to the consulting institutions will be **Rs. 1.50 lakh** per project. For projects costing between Rs. 50 to 150 crore, the reimbursement will be Rs. **2.00 lakh** and for project above Rs. 150 crore the reimbursement of Rs, **2.50 Lakh will be payable.**

(b) Service Taxes extra as per the actual.

(c) Travel cost will be extra on actual basis, as per entitlements of the Consultants in his organization, subject to a ceiling of entitlement of Executive director in NMCG. The travel cost will be for a maximum of two persons and for at most 2 visits.

Schedule B Terms and conditions:

1. NMCG shall provide a copy of the Details Project Report (DPR) along with a soft copy to CI.

2. The CI shall discuss the Preliminary observations/comments on the DPR with Implementing Agency (IA) and NMCG officials within 10 days of award of work and hand over the same to the IA for clarification/compliance.

3. Validity of Contract Period of the agreement running price contract shall be valid for the period up to 31.03.2018

4. Time for Submission of Final Appraisal Report:
   Detailed Project Reports received by the NMCG during the validity of contract will be assigned to the selected CI of the sub-sector to which the DPRs pertain to. The appraisal of the DPR assigned is to be completed within four weeks from the date of receipt of DPRs, by CI or in a time frame as may be fixed by NMCG. This time period shall be inclusive of time required for undertaking visits to sites etc. Decision on approval of the final appraisal report will be conveyed by NMCG within a period of 10 days from the receipt of the report.

5. Site visits:
   CI shall make site visits, if necessary, for appraisal of the project, with intimation to NMCG. The CI will have to make necessary arrangements for site visits in consultation with the IAs including travel and stay arrangements.

6. Payment Schedule
   Schedule for release of payment for the study shall be as follows:

SL. No.	Description	Amount (Percentage of the total cost)
1.	Initial payment at the time of allotment of work.	25
2.	On submission of the Appraisal Report.	50
3.	On approval of the Appraisal report.	25

7. Liquidated Damages (Penalty Clauses)

- If the CI requires an extension of time in completion, he shall apply in writing to the NMCG before the stipulated date of submission of appraisal report. Extension in the period may be granted with or without liquidated damages by the NMCD.
- In case of extension in the period with liquidated damages the recovery may be made on the basis of following percentages of claim amount which the CI has delayed.

No.	Condition	LD Percentage
A	Delay up-to one fourth period of the prescribed period of deliverable.	2.5%
B	Delay exceeding one fourth but not exceeding half of the prescribed period of deliverable.	5%
C	Delay exceeding half but not exceeding three fourth of the prescribed period of deliverable.	7.5%

Annexure – I

- Introduction
- Implementing Agency background
- Project Details

I. Structure
II. Purpose and Scope
III. Location & Site
IV. Works proposed
V. Technology/Brief Technical Specification
VI. Availability of Projects/Inputs
    - Land
    - Power
VII. Environment Aspects
VIII. Social and gender issues
IX. Implementation Schedule
X. Status of Approvals and Preparedness

4. Commitments regarding share of State government (if any)

5. Project Cost & Means of Financing

I. Components of Project Cost
II. Project Cost Comparison
III. Means of Finances
IV. Equity from State govt. / Urban local bodies /Private (if any)
V. Phasing of Exp. Etc.

6. Income /Tariff
7. Cost benefit analysis & physical benefits
8. Risk Analysis & Mitigation Mechanism
9. Conclusion

List of Transaction Advisor

Sl. No	Name of The Project	Name of TA Agency
1	TA support for Allahabad STP Projects	M/s Deloitte Touche Tohmatsu India LLP
2	TA support for Patna STP Projects	M/s Deloitte Touche Tohmatsu India LLP
3	TA support for Kolkata & Howrah STP Projects	M/s AT Kearney
4	TA support for Kanpur, Unnao and Shuklaganj STP Projects	M/s AT Kearney
5	TA support for Bhagalpur, Mirzapur, Ghazipur, Farrukhabad, Meerut and Moradabad STP Projects	M/s Pricewaterhouse Coopers Pvt. Ltd.- M/s Mahindra Consulting Engineers
6	TA support for Hoogly-Chinsura and Maheshthala STP Projects	M/s Pricewaterhouse Coopers Pvt. Ltd.- M/s Mahindra Consulting Engineers
7	TA support for Budhana & Muzaffarnagar STP Projects	M/s KPMG Advisory Services Pvt. Ltd.
8	TA support for Asansol, Durgapur and Burdwan STP Projects	M/s KPMG Advisory Services Pvt. Ltd.
9	TA support for Agra STP Projects	M/s Deloitte Touche Tohmatsu India LLP

List of Project Engineer

Sl. No	Name of The Project	Name of PE
1	Project Engineer for 82 MLD STP Projects at Haridwar	M/s Shah Technical Consultant
2	Project Engineer for 50 MLD STP at Ramana , Varanasi	M/s Mahindra Consulting Engineers
3	Project Engineer for Mathura STP Projects	M/s Mahindra Consulting Engineers
4	Project Engineer for Allahabad STP Projects	M/s AECOM
5	Project Engineer for KAnpur STP Projects	M/s Shah Technical Consultant

May, 2018

Model Bidding Documents

(for National Mission for Clean Ganga)

INTERNATIONAL/NATIONAL COMPETITIVE BIDDING

TO (I) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (II) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. NO. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (III) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION & DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN …… , STATE OF …… , INDIA.

May 2018

[Note: The scope of work in this bidding document covers: (i) design & build for STP, (ii) review the design and build for sewerage network and/or interception & diversion works, and (iii) O&M for both. However, depending upon the requirement, the document may be modified suitably to include repair/ refurbishment and O&M of existing STP or sewerage network and/or interception & diversion works in the scope of the work]

PREFACE

This Model Bidding Document for DBOT contract for STP together with Sewerage Network and/or Interception and Diversion (I&D) works has been prepared for the use of Executing Agencies (EAs) of National Mission for Clean Ganga.

ITB and GCC sections of this Bidding Document are based extensively on the corresponding provisions in the World Bank's Model Bidding Documents (for National Ganga River Basin Project, India) for International/National Competitive Bidding to (I) Design and Build Sewage Treatment Plant of Installed Capacity …. MLD and all Appurtenant Structures and Allied Works; (II) Survey, Review the Designs, Redesign where Necessary, and Build New Underground Sewerage Network of about …. km Length Including Survey, Design, Construction of …. No. Pumping Stations and all Appurtenant Structures and Allied Works; And (III) Operation & Maintenance of the Complete Works of Sewage Treatment Plant, Sewerage Network and Pumping Stations for a Period of 10 Years in …… , State of …… , India as also published bid documents of UP Jal Nigam, BUIDCo, Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited. The Model Bidding Document provides that the Operator shall operate and maintain the STP and the Sewerage Network and/or Interception & Diversion Works for a period of 15 years after successful commissioning and testing of these facilities and works. The Model Bidding Document is structured such that the EA invites the bids, signs the contract and continues performing the role assigned to the Owner under the Contract for the entire duration of the Contract including the O & M period of 15 years.

The Model Bidding Document provides options to the EAs for using it for International Competitive Bidding (ICB) or National Competitive Bidding (NCB). It also includes provisions for price adjustment that need to be adapted to the particular contract with appropriate indices. The EAs should refer to the guidance notes and the relevant provisions to ensure that the optional features applicable for the respective mode of procurement are properly used while preparing the bidding document for a specific procurement.

It is advisable to introduce price adjustment provisions for both NCB and ICB to minimize the risk to the bidder that would reflect on the offered prices. In case of ICB, the Bidding Document should provide neutral venue for arbitration.

The Contract Conditions of the Model Bidding Document provide that the Owner (which is the role intended to be performed by the EA) shall appoint the Design-Build-Operations Engineer who shall be responsible for day to day contract management and supervision during the Design-Build Period and the Operations Period. Accordingly, the selection of the Design-Build-Operations Engineer should be carried out and concluded at the time of contract award to the Operator. The terms of reference for the Design-Build-Operations Engineer should correspond with the obligations under the contract with the Operator.

The Model Bidding Document comprises various sections, including Instructions to Bidders, Bid Data Sheet, Schedules to the Bidding Document containing Bid Form, Price Schedules, Qualification Criteria and other relevant Forms, Form of Contract, General Conditions of Contract and various Schedules attached to the Contract.

Executing Agencies are advised to familiarize themselves fully with the Bidding Document; they must in particular go through various footnotes which are intended to provide guidance for preparation of the bidding document for a specific contract. This preface and all footnotes intended for reference of the Executing Agencies should be deleted from the final bidding document for a specific contract.

Executing Agencies should note that all designs and drawings pertaining to the proposed Sewerage Network and/or Interception and Diversion works including alignment have to be finalized and Bill of Quantities included in the document before inviting the bids.

Provisions have been made in the Model Bidding Documents for operation and maintenance of Sewage Pumping Station(s) for pumping effluent from the sewerage network and/or Interception and Diversion works to the STP. However, the EAs should carefully examine the need for such provisions or their deletion based on the scope of work of a specific contract.

The Bidding Document assumes that no prequalification has taken place, and bids are being invited directly from the prospective bidders.

A draft Invitation for Bid (IFB) along with guidance notes has been added, in the beginning of the Model Bidding Documents, which may be used for publishing the IFB in the national newspaper. The Executing Agencies have the option of publishing a shorter version of the advertisement text (in lieu of the complete text given in the draft IFB) in a widely circulated national daily provided that the full text is simultaneously published in the official gazette or on a widely used website or electronic portal with free national and international access. An illustrative Abridged IFB to be published in a widely circulated national daily has also been included in the Model Bidding Document for the reference of the Executing Agencies.

Invitation for Bids

FOR A CONTRACT

TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) FOR OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION & DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN …… , STATE OF …… , INDIA.

NATIONAL MISSION FOR CLEAN GANGA
(NAMAMI GANGE PROGRAMME)
Invitation for Bid
International/ National[1] Competitive Bidding

No:……. **Dt:……..**

1. 'Namami Gange Programme', is an Integrated Conservation Mission, approved as 'Flagship Programme' by the Union Government in June 2014 with budget outlay of Rs.20,000 Crore to accomplish the twin objectives of effective abatement of pollution, conservation and rejuvenation of National River Ganga. The National Mission for Clean Ganga (NMCG) (Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India) is the funding agency for Namami Gange Programme and intends to apply a part of the said budget outlay towards payments under the contract for work detailed below.

2. Qualification requirements as listed briefly below are required to be fulfilled by the bidder. [Bidders are advised to refer to the bidding documents for complete details.]

Financial:

a. The Bidder shall demonstrate that it possesses a net worth equivalent to minimum of INR _____[2] Cr. in each of the last three financial years preceding the date of submission of bid.

b. The Bidder shall demonstrate by submitting along with its bid, a banker's certificate that it has available cash credit facility equivalent to minimum INR .... million[3] as on the date of submission of bid.

Technical:

1. The Bidder shall provide evidence that it has Designed, developed, built, tested and commissioned during last 7 years preceding the month of publication of NIT, STPs a*s per following criteria[4]:*

1.a) <50 MLD Capacity: ***[Nearest lower integer]***
1 STP – 80 % of Total capacity *(MLD)*
2 STP – 60 % of Total capacity *(MLD)*
3 STP – 40 % of Total capacity *(MLD)*

1.b) 51-100 MLD Capacity: ***[Nearest lower integer]***
1 STP – 60 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 30 % of Total capacity *(MLD)*

1.c) 100-150 MLD Capacity: ***[Nearest lower integer]***

[1] *Select as applicable*

[2] *The net worth is recommended to be 25% of the estimated Capital Cost for which the bids are being invited.*

[3] *This amount should be equivalent to estimated average cash flow for 3 months in construction period.*

[4] The clause corresponding to the capacity of STP in the bid only may be retained among 1 (a), 1 (b), 1 (c) and 1 (d).

1 STP – 50 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 25 % of Total capacity *(MLD)*

1.d) >150 MLD Capacity:
Case to Case basis

In case of special treatments, tertiary treatment etc. The Qualification Criteria maybe suitably modified on case to case basis

2. The bidder or his nominated sub-contractor has successfully commissioned at least one Sewage Treatment Plant with the same technology as proposed for this contract for the lowest STP capacity mentioned in clause 1.4 (a) 1. above, operating successfully for a period of 1 year during the last 7 years preceding the month of publication of NIT. *In case of special treatments, tertiary treatment etc. The Qualification Criteria maybe suitably modified on case to case basis*
3. The Bidder has the experience in operating and maintaining successfully STPs a*s per following criteria* during 1 year over the last 7 years preceding the month of publication of NIT

1.a) <50 MLD Capacity: ***[Nearest lower integer]***
1 STP – 80 % of Total capacity *(MLD)*
2 STP – 60 % of Total capacity *(MLD)*
3 STP – 40 % of Total capacity *(MLD)*

1.b) 51-100 MLD Capacity: ***[Nearest lower integer]***
1 STP – 60 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 30 % of Total capacity *(MLD)*

1.c) 100-150 MLD Capacity: ***[Nearest lower integer]***
1 STP – 50 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 25 % of Total capacity *(MLD)*

1.d) >150 MLD Capacity:
Case to Case basis

In case of special treatments, tertiary treatment etc. The Qualification Criteria maybe suitably modified on case to case basis

4. The treatment technology proposed for this contract has been adopted (not necessarily built by the bidder) in at least 3 locations during last 7 years preceding the month of publication of NIT and that such STP has been operating successfully (meeting the required performance standards and environmental norms specified in the Contract) for a period of minimum 2 years over a period of last 7 years preceding the month of publication of NIT.

5. It has designed, developed, built, tested and commissioned Sewerage Network and Pumping Station(s) of 80% length of the total scope of sewerage network

collectively from maximum 3 projects during the last 7 years preceding the month of publication of NIT; of which 50 % should be above the pipe diameter (mm) of the highest dimension as proposed in the project scope as per the following criteria:

- Up to 500mm – same dia or any higher diameter
- 500-1000mm – next lower dia (Maximum by 100mm) or higher diameter
- 1000 – 1500mm – next to next lower dia (Maximum by 200 mm) or higher diameter
- >1500mm- Case to case basis shall be decided

6. The bidder or his nominated sub-contractor has operated and maintained Sewerage Network and Pumping station of 80% length of the total scope of sewerage network collectively from maximum 3 projects during 1 year over the last 7 years preceding the month of publication of NIT

7. [5] The bidder or his nominated sub-contractor has designed, built and commissioned Sewerage Network using trenchless technology for a minimum of 50% of the proposed length of the network to be laid using trenchless technology, during the last 7 years preceding the month of publication of NIT.

3. Bidding will be conducted through the International/ National[6] Competitive Bidding and is open to all eligible bidders.
4. The _____[7] for and on behalf of the Owner in the State of ____, India invites sealed bids from eligible bidders for the works detailed in the table below. The bidders may submit bids for the following work as per Instructions to Bidders and the Annexures thereto.

Name of the Work	**Bid Security**	**Cost of Bidding Document**	**Period**
(i) design and build sewage treatment plant of installed capacity …. MLD and all appurtenant structures and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or diversion works with interception sewer of about …. km length including survey, design, construction of …. No. pumping stations and all appurtenant structures and allied	Rs. ____ million.[9]	Rs.…… including GST	Design, Build, Test and Commissioning period of ….. years, and Operation and Maintenance period of 15 years.

[5] *This clause 1.4(a) (3) is to be included only if trenchless technology is required to be used in the work.*
[6] *Select as applicable*
[7] *Name of the Executing Agency inviting the bids on behalf of the Owner*
[9] *2% of the capital cost for contracts estimated to cost up to INR 1000 million, or 1% of the capital cost subject to a minimum of INR 20 million if estimated cost exceeds INR 1000 million.Amount should be in INR only.*

works; and (iii) operation & maintenance of the complete works of sewage treatment plant, sewerage network and/or interception & diversion works and pumping stations in[8] …… , State of …… , India.			

5. Interested eligible bidders may obtain further information from and inspect the bidding documents at the office of the _____, at the address given below during office hours i.e. …… to …… hours.

6. A complete set of bidding documents will be available on the _____website (www._____) w.e.f. _____. The bidders who are interested to participate in the bidding process can download the bid documents from the website for their reference. Bidders are advised to obtain the hard copy of the bidding document for preparation of their bids.

7. The bidders who download the documents from the website and use the same for submission of the bids should note that if there is any discrepancy between the downloaded document and the hard copy of the document issued to the bidders, the hard copy shall be treated as final and shall prevail over the downloaded documents.

8. The bidders who download the documents shall have to pay along with their bid submission, the non-refundable cost of Rs. ……. including GST in the form of a Certified Cheque/Demand Draft issued by a scheduled bank in India listed with the Reserve Bank of India, payable to the _____ payable at _____, _____[10].

9. Bidders can also purchase the bid documents commencing from _____ on payment of Rs. …….including GST ….. in the form of a Demand Draft issued by a scheduled bank in India listed with the Reserve Bank of India payable to the _____ payable at[11] _____, State of _____. Bid documents requested by post shall be sent through speed post/ registered post on payment of an extra amount of Rs. …….. The _____ (*Insert name of Executing Agency*) will not be held responsible for the postal delay if any, in the delivery of the documents or non-receipt of the same.

10. The bidders may also note that the pre-bid proceedings, corrigendum if any will also be uploaded on the website mentioned hereinabove.

11. All bids must be accompanied by Bid Security of the amount specified in the table above, drawn in favour of _____.

12. Bids shall be submitted electronically only to _____ on or before ….. hours on _____ *[insert date]*. Bids will be opened on ..... at …… hours, in the presence of the bidders' representatives who choose to attend. If the office happens to be closed on the last date for receipt of the bids as specified, the bids will be received and opened on the next working day at the same time and venue. Late bids will be rejected.

Add: _____,
_____, India

[8] *Specify the City in which the Project is to be implemented.*
[10] *Specify the Name of the City and State where the project is being located*
[11] *Specify the name of the city in which the project is being implemented.*

Phone No. _____,
Email: _____,
Project Website: _____

[Illustrative Abridged IFB to be published in a widely circulated national daily][12]

NATIONAL MISSION FOR CLEAN GANGA
(NAMAMI GANGE PROGRAMME)
Invitation for Bids (IFB)
International/ National[13] Competitive Bidding

1. The ……[14] for and on behalf of the Owner in the State of……., India invites sealed bids (to be submitted in hard copy only) from eligible Bidders for the works comprising (i) design and build sewage treatment plant of installed capacity …. MLD and all appurtenant structures and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or diversion works with interception sewerof about …. km length including survey, design, construction of …. No. pumping stations and all appurtenant structures and allied works; and (iii) operation & maintenance of the complete works of sewage treatment plant, sewerage network and/or interception & diversion works and pumping stations in …….[15], State of……., India. Period for design/ redesign, build, test and commissioning is ……years, and Operation and Maintenance period is 15 years.
2. Detailed Invitation for Bid which includes instructions for submission of bids and all other relevant information is available on …….. website i.e. www……..... Bidding Documents will be available with effect from…… *[insert date]*
3. The last date & time of bid submission is …….. *[dd/mm/yyyy]* at …… hours. The bids will be opened on the same day at ….. hours. E-bidding *[will/ will not]*[16] be permitted.
4. The interested eligible bidders may participate in the bidding process as per instructions given in the bidding documents.

Address:
…….
…….
Tel Fax: ……..,
Telephone: …….,
e mail: ……..

[12] *This is an illustrative abridged IFB which may be published in a widely circulated national daily, provided complete text of advertisement shall be published on a widely used website or electronic portal with free national and international access.*
[13] *Strike out what is not applicable*
[14] *Name of the Executing Agency inviting the bids on behalf of the Owner*
[15] *Name of the city*
[16] *If electronic bidding is to be permitted, bid document with all relevant clauses modified for electronic bidding shall be used.*

[17] Government of [*][18]

[19]

Bidding Document

[20]INTERNATIONAL/ NATIONAL COMPETITIVE BIDDING

[21]TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) FOR OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION & DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN …… , STATE OF …… , INDIA.

ICB/ NCB No: _____

PROJECT: _____

OWNER: _____

[Add name and address of the Office inviting bids]

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[17] *Such footnotes and the notes in italics in parentheses are meant for Project's guidance should be deleted prior to issue of Bidding Documents. Footnotes intended for the bidders shall be retained in the Bidding Documents.*

[18] *Name of the State in which the project is being implemented.*

[19] *Specify the name of the Owner.*

[20] *Strike out what is not applicable. If the estimated value of the work is less than USD 40 million, National Competitive Bidding can also be adopted.*

[21] *Modify to incorporate name of the work.*

INSTRUCTION TO BIDDERS

FOR A CONTRACT

TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) FOR OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION & DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN …… , STATE OF ….. , INDIA.

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INSTRUCTIONS TO BIDDERS

Section 1. Introduction

1.1. Source of Funds & Scope of work

a. 'Namami Gange Programme', is an Integrated Conservation Mission, approved as 'Flagship Programme' by the Union Government in June 2014 with budget outlay of Rs.20,000 Crore to accomplish the twin objectives of effective abatement of pollution, conservation and rejuvenation of National River Ganga. The National Mission for Clean Ganga (NMCG) (Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India) is the funding agency for Namami Gange Programme and intends to apply a part of the said budget outlay towards payments under the contract for which these Bidding Documents are issued.

b. Owner **named in the Bid Data Sheet** intends to use the 100% funds from the Government of India (National Mission for Clean Ganga, NMCG)/ .....% funds from the Government of India (National Mission for Clean Ganga, NMCG) and ..... % of funds provided by the Government of .....*[State]* towards the Capital Cost and Operation and Maintenance Cost for the Operations Period as per the provisions of this Contract.

c. Scope of work: The bidder's scope of work shall include (i) design and build sewage treatment plant of installed capacity **indicated in the Bid Data Sheet** and all appurtenant structures and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or interception & diversion works including sewage pumping station(s) of length and capacity **indicated in the Bid Data Sheet** and all appurtenant structures and allied works; and (iii) operation & maintenance after successful commissioning and testing of the complete works **("Project")** of sewage treatment plant, sewerage network and/or interception & diversion works and pumping stations for a period of 15 years at the Place and State **indicated in the Bid Data Sheet**.

d. The Owner shall make available (i) the Right of Way and the land area for the Sewage Treatment Plant and all appurtenant structures up to the area allocated for this facility as **indicated in the Bid Data Sheet;** and (ii) the Right of Way for the Sewerage Network and/or Interception & Diversion Works, and the land area allocated for setting up the Sewage Pumping Station(s) and all appurtenant structures as **indicated in the Bid Data Sheet**.

e. For Sewage Treatment Plant: the selected Bidder shall adopt the most appropriate and techno economically feasible treatment process technology and Design the Sewage Treatment Plant ensuring that the Design standards and the performance standards as specified in the Contract are satisfied along with other conditions as may be applicable under the law.

f. For Sewerage Network and/or Interception & Diversion Works:

(a) the Owner shall make available all the designs and drawings pertaining to the proposed Sewerage Network and/or Interception & Diversion Works including alignment, peripheral land etc.;

(b) the selected bidder shall conduct field survey, review the available designs, redesign where necessary the Sewerage Network and/or Interception & Diversion Works based on the survey, ensuring that the design standards and the performance standards as specified in the Contract are satisfied along with other conditions as may be applicable as per the law; and

(c) if the selected bidder (Operator) redesigns where necessary, he shall obtain Owner's approval of the redesigned component and work shall be carried out as per the revised approved design. Payments will be made for the actual quantities as per rates quoted by the bidder and incorporated in the Contract. Rates for items not found in the original BOQ or variations in quantities from the original BOQ will be regulated as per provisions of the Contract.

1.2. Eligible Bidders

1.2.1 A bidder may be a firm that is a private entity, a government-owned entity—subject to ITB 1.2.4 — or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution. The number of members in a JV shall be limited to the number **specified in the BDS**.

1.2.2 Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:

(a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or

(b) receives or has received any direct or indirect subsidy from another Bidder; or

(c) has the same legal representative as another Bidder; or

(d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Owner regarding this bidding process; or

(e) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or

(f) any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or

(g) any of its affiliates has been hired (or is proposed to be hired) by the Owner or NMCG as Engineer for the Contract implementation; or

(h) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 1.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or

(i) has a close business or family relationship with a professional staff of the the project implementing agency, who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract throughout the procurement process and execution of the contract.

1.2.3 A Bidder may have the nationality of any country. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.

1.2.4 Bidders that are Government-owned enterprises or institutions in the Owner's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Owner. To be eligible, a government-owned enterprise or institution shall establish through all relevant documents that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.

1.2.5 A Bidder shall not be under suspension from bidding by the Owner as the result of the operation of a Bid–Securing Declaration.

1.2.6 A Bidder shall provide such evidence of eligibility satisfactory to the Owner, as the Owner shall reasonably request.

1.3. Eligible Materials, Equipment, and Services

The materials, equipment and services to be supplied under the Contract may have their origin in any country, subject to the restrictions specified in **Annexure A Part g - Eligible Countries**, and all expenditures under the Contract will not contravene such restrictions. At the Owner's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.

1.4. Inspection and Audit

The NMCG and Owner require compliance with their policies in regard to corrupt and fraudulent practices as set forth in Section 6.8. In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Owner to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors.

1.5. Cost of Bidding

The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Owner will in no case be responsible for these costs, regardless of the conduct or outcome of the bidding process.

Section 2. The Bidding Documents

2.1. Content of Bidding Documents

a. The nature of the services, the site and the plant that are to be designed, built, operated and maintained by the Bidder, the procedures that are to be followed during the bidding process and the contract terms and technical requirements are prescribed in the Bidding Documents. The Bidding Documents consist of:

1. the Instructions to Bidders (ITB);
2. the Bid Data Sheet;
3. Annexure A to the Bidding Documents – Forms
    a. Bidder's Bid Form
    b. Bidder's Price Schedules
    c. Form of Bid Security
    d. Form of Performance Security
    e. Format of Curriculum Vitae for Proposed Key Staff
    f. Form for Clarification Questions
    g. List of eligible Countries
    h. Qualification Criteria
    i. Information Forms
    j. Declaration Format for Deemed Export Benefits
    k. Form of Letter of Intent by JV Partners
    l. Form of Power of Attorney for Joint Venture
    m. Form of undertaking by JV Partners
4. Annexure B to the Bidding Documents – the contract (the "Draft Contract") consisting of:
    i. Form of Contract;
    ii. General Conditions of the Contract; and
    iii. Schedules attached to the Contract
5. Addenda to the documents listed in ITB Section 2.1(a) (1) to (4), if any are issued by the Owner.

The Invitation for Bids issued by the Owner is not part of the Bidding Documents.

2.1.1. The documents listed in ITB Section 2.1(a) (1), (2), (3), (4) and (5) are collectively the "Bidding Documents".

2.1.2. Each Bidder shall examine all instructions, terms and conditions, forms, specifications and other information contained in the Bidding Documents. If the Bidder fails to provide all documentation and information required by the Bidding Documents; or submits a Bid which is not substantially responsive to the terms and conditions of the Bidding

Documents, such action is at the Bidder's risk and the Owner may determine that the Bid is non-responsive to the Bidding Documents and may reject it.

2.2. Clarification of Bidding Documents

a. A prospective Bidder requiring any clarification of the Bidding Documents may notify the Owner in writing by mail, courier, fax or hand delivery at the Owner's mailing address **indicated in the Bid Data Sheet**. Similarly, if a Bidder feels that any important provision in the Bidding Documents, such as those listed in ITB Section 3.3, will be unacceptable, such an issue must be raised during the clarification stage.

b. All such queries and requests for clarification shall be submitted using the Form for Clarification Questions contained in Annexure A Part f to the Bidding Documents.

c. The Owner will respond in writing to any request for clarification or modification of the Bidding Documents that it receives on the Form for Clarification Questions no later than the date **set out in the timetable in the Bid Data Sheet**. Written copies of the Owner's response, including an explanation of the query but not identification of its source, (the "Response to Questions Document") will be sent to all prospective Bidders that have received the Bidding Documents. If similar or repeated queries are made by Bidders, the Owner may list those queries as one query & respond to such query only once.

2.3. Site Visit

a. Each Bidder is advised to visit and inspect the site/alignment of (a) the proposed Sewage Treatment Plant; and (b) the Sewerage Network and/or Interception & Diversion Works, SPS (the "Site Visit") and their surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into the Contract. The Owner will schedule a time on or after the date set out in the timetable **specified in the Bid Data Sheet** and develop a procedure for Bidders to conduct a Site Visit. The costs of visiting the site shall be at the Bidder's own expense.

b. Each Bidder and any of its personnel or agents will be granted permission by the Owner to enter upon its premises and lands for the purpose of such a Site Visit, but only upon the express condition that the Bidder, its personnel and agents will release and indemnify the Owner, the Borrower and their personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the Site Visit.

2.4. Data Room and Background Information

Owner shall establish a data room (the "Data Room") at the location **specified in Bid Data Sheet** with a collection of relevant data to be accessible to Bidders or their representatives from the date set out in the timetable **specified in the Bid Data Sheet** until the deadline for submission of Bids (the "Submission Deadline"), in accordance with a schedule established by the Owner.

2.5 Pre-Bid Meeting

Each prospective Bidder is invited to attend a Pre-Bid Meeting, which will take place at the venue and time **stipulated in the Bid Data Sheet**. While attendance at the pre-bid

meeting is not mandatory, Bidders are strongly encouraged to attend. The purpose of the pre-bid meeting is to provide a technical presentation and to clarify issues and answer questions on any matter that may be raised at the meeting. Each prospective Bidder is requested, as far as possible, to submit any question in writing to reach the Owner not later than one week before the pre-bid meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted as indicated hereafter. Minutes of the pre-bid meeting will be transmitted without delay to all prospective Bidders that have been issued Bidding Documents. All responses to questions raised at the pre-bid meeting will be included in the Response to Questions Document. The proceedings of the pre-bid meeting, reply to the queries and corrigendum if any will also be uploaded on the website **specified in the Bid Data Sheet**.

2.6. Amendment of Bidding Documents

a. At any time prior to the Submission Deadline, the Owner may, for any reason, whether at its own initiative, or in response to a clarification requested by a prospective Bidder, amend the Bidding Documents by addendum. No other communications of any kind whatsoever, including, without limitation, the minutes of the pre-bid meeting or the Response to Questions Document, shall modify the Bidding Documents.

b. Addenda, if any, will be sent in writing by air mail, courier or facsimile to all prospective Bidders and will be binding on them. Bidders shall immediately acknowledge receipt to the Owner of any such amendment, and it will be assumed that the information contained therein has been taken into account by the Bidder in its Bid. Such Addenda will also be uploaded on the website specified in ITB 2.5.

c. In order to afford prospective Bidders reasonable time in which to take the amendment into account in preparing their Bids, the Owner may, at its discretion, extend the Submission Deadline, in which case, the Owner will notify all prospective Bidders in writing of the extended deadline.

2.7. Contact with the Owner for the Purpose of Clarification

The prospective Bidders shall contact only the persons **named at the addresses in the Bid Data Sheet** for the purpose of requesting information and clarification or for any other purpose relating to the bidding process. The prospective Bidders shall not contact any other person at the Owner during the bidding process. From the time of Bid opening to the time of Contract award, if any Bidder wishes to contact the Owner on any matter related to the bidding process, it may do so in writing.

2.8. Information Provided by the Owner/Bidders Due Diligence

a. Each Bidder is solely responsible for conducting its own independent research, due diligence, and any other work or investigations and for seeking any other independent advice necessary for the preparation of Bids, negotiation of agreements, and the subsequent delivery of all services to be provided by the Bidder that has been successful in the bidding process (the "Successful Bidder"). The Bidder shall submit its bid considering that the treated effluent from the STP has to be discharged into the location as specified in the **Bid Data Sheet** under ITB 3.3(b).

b. No representation or warranty, express or implied, is made and no responsibility of any kind is accepted by the Owner or its advisors, employees, consultants or agents, for the completeness or accuracy of any information contained in the Bidding Documents or the Response to Questions Document, or provided during the bidding process or during the term of the Contract. The Owner and its advisors, employees, consultants and agents shall not be liable to any person or entity as a result of the use of any information contained in the Bidding Documents or the Response to Questions Document, or provided during the bidding process or during the term of the Contract.

c. Bidders shall not rely on any oral statements made by the Owner or its advisors, employees, consultants or agents.

d. All Bidders shall, prior to submitting their Bid, review all requirements with respect to corporate registration and all other requirements that apply to companies that wish to conduct business in the Owner's country. The Bidders are solely responsible for all matters relating to their legal capacity to operate in the jurisdiction to which this bidding process applies.

2.9. Timetable

a. The estimated timetable, from the issuance of the Bidding Documents to the identification by the Owner of the Successful Bidder and the execution of the Contract, is **set out in the Bid Data Sheet**.

b. The Owner may, in its sole discretion and without prior notice to the Bidders, amend the estimated timetable specified in the Bid Data Sheet. Bidders shall not rely in any way whatsoever on the estimated timetable **specified in the Bid Data Sheet** and the Owner shall not incur any liability whatsoever arising out of amendments to the estimated timetable. The Owner shall give notice of timetable changes, if any, by addenda.

Section 3. Preparation of Bids

3.1. Language of Bid

The Bid prepared by the Bidder, all correspondence and documents related to the Bid exchanged by the Bidder and the Owner and the bidding process shall be written in the language **specified in the Bid Data Sheet**, provided that any printed literature furnished by the Bidder may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in the language specified in the Bid Data Sheet, in which case, for purposes of interpretation of the Bid, the translation shall govern.

3.2. Documents Comprising the Bid

a. Each Bidder shall submit only one Bid comprising of two covers, one containing the Technical Bid/ Proposal and the other the Financial or Price Bid/ Proposal. The bid shall consist of:

1. One Technical Bid/ Proposal which contains the following parts in the following order:

i. Part I – the information required by ITB Section 3.3;

ii. Part II – the Bid Security required by ITB Section 3.4;

iii. Part III – the Bid Form required by ITB Section 3.5(a), and the information required by ITB Section 3.5(b) and Appendix to Bid containing completed Tables of Schedule of Adjustment Data as required by ITB Section 3.11 b;

iv. Part IV – where applicable, the joint venture documents required by ITB Section 3.6;

v. Part V – the power of attorney required by ITB Section 3.7;

vi. Part VI – the declaration of commissions and gratuities required by ITB Section 3.8;

vii. Part VII – Optional, separately bound pre-printed literature as per ITB Section 3.9; and

2. One Financial Bid/Proposal which shall consist of the Price Schedules completed in accordance with ITB Section 3.10.

b. Each Bidder shall also submit an initialled Draft Contract, in accordance with ITB Section 3.15 (b), in the same envelope as its Technical Section.

3.3. Technical Section – Part I – Technical and Staffing Information

The Bidder, while making his technical proposal shall consider the following aspects.

For STP

a. The Owner shall make available the right of way and the land area allocated for this facility for setting up of Sewage Treatment Plant. The Owner shall also make available the right of way to the facilities to be set up under the contract, for making

arrangements in connection with reuse of treated effluent from STP as specified in the contract.

The bidders will be free to offer STP based on a technology of their choice and indicate in their bid the actual land requirement for setting up treatment facility as offered by them. The status of availability and ownership of the land is **specified in the Bid Data Sheet**.

b. The location for disposal of treated Sewage and sludge shall be as specified in the **Bid Data Sheet**.

c. The land that will be required for STP, roads, drains and other appurtenant structures shall be indicated by the bidder and the cost of such Land requirement as determined on the basis of land price specified in the **Bid Data Sheet** shall be added to the bid price for evaluation of the lowest evaluated substantially responsive bidder.

d. The Operator shall design and construct the STP with installed capacity as indicated in the Bid Data Sheet clause 1.1(d).

For Network

e. The owner shall make available the right of way for the Sewerage Network and/or Interception & Diversion Works and land area allocated for setting up the Sewage Pumping Station and all appurtenant structures. The status of availability and ownership of the land is **specified in the Bid Data Sheet**.

Part-I of the Technical Section of the Bid

f. **For STP**: Part-I of the Technical Section of the Bid shall consist of the following sub-parts in the following order:

1. an executive summary of the Technical Section;

2. a detailed design-build work plan including a detailed program timetable (the "Design-Build Work plan") setting out the manner in which the Bidder proposes to carry out the Design-build services as defined in the Draft Contract (the "Design-Build Services") and meet the Design-build technical standards in accordance with the Technical Standards Schedule to the General Conditions. The Design-Build Work plan shall be divided into the following sections:

i. (a) A well-defined proposal for the treatment process technology proposed by the Bidder with evidence showing the ability of the treatment process technology of meeting the service standards and the environmental norms;

(b) Plan for reuse of treated effluent along with conceptual drawings, to meet the requirements specified in the **Schedule 2 of the Contract, namely Design Build Services Schedule (DBSS);**

(c) Proposal for using solar photovoltaic cells for power generation for minimum ..... watts for STP and ..... watts for each SPS which should be adequate to meet the lighting & fans load of these facilities.

The Owner will make available the land required for the STP and ancillary works up to the limit specified in Section 3.3(a) above. The Bidder's Design

should aim at optimizing the land requirement. This shall also include details of modules of the treatment process and the details of modular approach to capacity addition if it is adopted in the proposal.

ii. a section entitled "Drawings" which consists of conceptual drawings that are sufficiently detailed to communicate the Bidder's Design intent for all components of the proposed Sewage Treatment Plant. The conceptual drawings shall include the following:

   a. a site plan showing the location of the STP area, alignment and limits to the Bidders construction activities; along with the land required for the total planned area for STP. The site plan / layout shall include new STP, Layout of various units of preliminary and secondary treatment, Layout of piping between various units and unit bypass for each unit, plant bypass, Layout of internal roads, hard standing, parking, compound wall and gate house, etc. Location of power transformer, switch room, control room and switchgear, Power wiring and underground cable layout, Relative location of administrative office, lab and control centre, Internal roads and parking provisions, Landscaping and reservations for future expansion, possible future tertiary treatment and Any other features for safe and efficient working during operations and maintenance.

   b. a site plan showing all proposed works listed in the **Bid Data Sheet**;

   c. a detailed narrative in support of the conceptual drawings setting out the Bidder's plan for compliance with the Design-Build Services Schedule and the technical standards set out in the Technical Standards Schedule, to include construction quality assurance and control;

iii. a detailed program and schedule setting out the proposed sequence of works to be undertaken, including estimated start date, finish date and time allocations for individual units of the works, proposed resources to be allocated and the identification of all major milestones, including the submission of schematic Design documents, Design development documents, the Design-Build Documents and the commissioning of individual units of the Sewage Treatment Plant (STP); and

iv. an itemised list of the principal codes of practice and standards proposed to be used for the Design-Build Services

3. a section specifying the power consumption for Operations and Maintenance of the STP on an annual basis. The Bidder shall further provide the breakup of electricity consumption in various facilities in the STP on an annual basis. The Bidder shall provide the total estimated connected load in KW, maximum power demand, average energy consumption in kWh per day with full load up to the installed capacity of the STP, estimated power factor, any proposals for improving efficiency in terms of lower power consumption.

g. **For Network** and/or Interception & Diversion Works: Part-I of the Technical Section of the Bid for Network and/or Interception & Diversion Works shall consist of the following sub-parts in the following order:

1. An Executive Summary of the Technical Section;

2. A detailed work plan for conducting field survey, reviewing the designs provided by the owner, redesigning (where necessary or can submit a full design but the specifications such as proposed pipe materials etc. remain the same so that there will not be any need for revising BOQ etc. except modifying some quantities) and build-work-plan comprising a detailed program timetable (the "Design-Build Work Plan") setting out the manner in which the Bidder proposes to carry out the design-build services as defined in the Draft Contract (the "Design-Build Services") and meet the design-build technical standards in accordance with the Technical Standards Schedule to the General Conditions. The Design-Build Work plan shall be divided into the following sections:

   i. A well-defined proposal for the configuration of Sewerage Network and/or Interception & Diversion Works proposed by the bidder along with the details of the manholes, Pumping Stations, system design of the pumping stations etc. The bidder's design should aim at optimizing the energy requirements for pumping of the sewage.

   ii. a section entitled "Drawings" which consists of conceptual drawings that are sufficiently detailed to communicate the Bidder's design intent for all components of the proposed Sewerage Network and/or Interception & Diversion Works. The conceptual drawings shall include the following:

      a. The site plan / layout for Pumping Station, Layout of piping between various units and unit bypass for each unit, plant bypass, compound wall and gate house, etc. Location of power transformer, if applicable, location of administrative office and control centre, and any other features for safe and efficient working during operations and maintenance.

      b. a layout plan showing all proposed works **listed in the Bid Data Sheet**;

   iii. a detailed narrative in support of the conceptual drawings setting out the Bidder's plan for compliance with the Design-Build Services Schedule and the technical standards set out in the Technical Standards Schedule, to include construction quality assurance and control;

   iv. a detailed program and schedule setting out the proposed sequence of works to be undertaken, including estimated start date, finish date and time allocations for individual units of the works, proposed resources to be allocated and the identification of all major milestones, including the submission of schematic design documents, design development documents, the Design-Build Documents and the commissioning of individual units of the Sewage Pumping Station; and

   v. an itemized list of the principal codes of practice and standards proposed to be used for the Design-Build Services; and

A section specifying the Power Consumption for Operations and Maintenance of the Sewage Pumping Station on annual basis. The Bidder shall provide the total estimated connected load in kW, maximum power demand, average energy consumption in kWh per day with full load of pumping sewage up to the installed capacity, estimated power factor, any proposals for improving efficiency in terms of lower power consumption

h. **For Both STP and Network** and/or Interception & Diversion Works: Part-I of the Technical Section of the Bid shall further consist of the following sub-parts in the following order:

1. a section entitled "Plant and Equipment and Operator's Equipment" which consists of a list of proposed suppliers of major Plant and Equipment and Operator's Equipment (Design-Build) and Operator's Equipment (Operations), including:

   i. plant and equipment;

   ii. materials including pipe work and principal construction materials.

   For all items listed in ITB Section 3.3(h)(1), the Bidders shall provide either catalogues or detailed information with respect to manufacturer and source, model Designation, primary specifications, and year of manufacture, as applicable.

2. a detailed work plan (the "Operations Work Plan") setting out the manner in which the Bidder proposes to carry out the operation of the STP and Sewerage Pumping Station as set out in the Contract (the "Operations Services") and meet the operating technical standards in accordance with the Technical Standards Schedule to the General Conditions. The Operations Work Plan shall contain a section entitled "Operation and Maintenance Plan" which provides an outline contents and overview of the Bidder's proposed plans and programs for Operations and Maintenance of STP and Sewerage Network and/or Interception & Diversion Works;

3. a detailed description of the Bidder's plans and methodologies to ensure that the requirements of the applicable Environmental Management Plan specified in the special conditions of contract for the proposed STP, Sewerage Network and/or Interception & Diversion Works and allied services at Site will be implemented and monitored;

4. a detailed staffing plan (the "Staffing Plan") setting out the Bidder's proposed staffing arrangements for the carrying out of the Design-Build and Operations Services. The Staffing Plan shall be divided into the following sections:

   i. two sub-sections, (one for the Design-Build Services and one for the Operations Services) each entitled the "Staffing Chart" and each consisting of a chart setting out a list of all proposed Operator's Personnel positions, the role of each position, the duration of existence of the position, and the location of the staff person filling the position during the periods of assignment to carry out the Design-Build and Operations Services;

ii. a section entitled "Summary of Staff Qualifications" which consists of a summary table setting out,

a. for the Key Staff positions, the names of the Bidder's employees who will occupy the Key Staff positions during Design-Build Services; and

b. all proposed positions for the Operator's Key Personnel and the qualifications, years of experience and areas of expertise, including a clear indication of the expertise that the staff will provide consistent with the requirements set out in the **Bid Data Sheet** for each of the proposed positions; The Bidder's personnel as indicated in the bid proposals shall not be changed during the period of the contract. In case if the successful Bidder, intends to change the key staff, such change will be subject to approval from the Owner on justification provided by the successful Bidder. The replaced key staff shall have to be of equivalent or higher qualification and experience.

iii. a section entitled, "Curriculum Vitae" which contains the signed curriculum vitae for each of the Key Staff, in the format set out in Annexure A Part e to the Bidding Documents;

5. For the purpose of ITB Section 3.3(h)(4), "Key Staff" means those individuals that will fill the positions listed in the **Bid Data Sheet**; and

6. A list of all nominated sub-contractor and sub- consultants and a detailed description of the services to be carried out or the Plant and Equipment to be provided by the nominated sub-Contractor and sub-consultants. The Bidder shall provide the name and nationality of all nominated sub-contractors and sub-consultants. The Bidder shall ensure that all nominated sub-contractors and sub consultants comply with ITB Sections 1.3 and 6.8. The Bidder shall not exceed the maximum percentage of subcontracting and sub consulting set out in **Bid Data Sheet**.

i. Environmental, Social, Health and Safety (ESHS) Code of Conduct (For both STP and Network -combined or separate)

1. The Bidder shall submit the Environmental, Social, Health and Safety (ESHS) Code of Conduct that will apply to the Contractor's employees and subcontractors. The Code of Conduct shall ensure compliance with the ESHS provisions of the contract including those described in the following documents.

a. *[Scope of work];*

b. *[Environmental and Social Impact Assessment (ESIA)];*

c. *[Environmental and Social Management Plan (ESMP)];*

d. *[Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project)]; and*

e. Environmental and Social Management Framework for the Namami Gange Program

f. *[specify any other relevant document*/s]

2. The code of conduct will contain obligations on all project staff (including sub-contractors and day workers) that are suitable to address the following issues, as a minimum. Additional obligations may be added to respond to particular concerns of the region, the location and the project sector or to specific project requirements. The issues to be addressed include:
   i. Compliance with applicable laws, rules, and regulations of the jurisdiction
   ii. Compliance with applicable health and safety requirements (including wearing prescribed personal protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
   iii. The use of illegal substances
   iv. Non-Discrimination (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction)
   v. Interactions with community members (for example to convey an attitude of respect and non-discrimination)
   vi. Sexual harassment (for example to prohibit use of language or behavior, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
   vii. Violence or exploitation (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior)
   viii. Protection of children (including prohibitions against abuse, defilement, or otherwise unacceptable behavior with children, limiting interactions with children, and ensuring their safety in project areas)
   ix. Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
   x. Avoidance of conflicts of interest (such that benefits, contracts, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
   xi. Respecting reasonable work instructions (including regarding environmental and social norms)
   xii. Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
   xiii. Duty to report violations of this Code
   xiv. Non retaliation against workers who report violations of the Code, if that

report is made in good faith.

3. The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:
   i. received a copy of the code;
   ii. had the code explained to them;
   iii. acknowledged that adherence to this Code of Conduct is a condition of employment; and
   iv. understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.
4. In addition, the Bidder shall submit an outline of how this Code of Conduct will be implemented. This will include: how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Contractor proposes to deal with any breaches.

3.4. Technical Section – Part II – Bid Security

a. In Part II of the Technical Section of its Bid, the Bidder shall furnish, as part of its Bid, a Bid security in the amount and currency **stipulated in the Bid Data Sheet**. The bid security of a Joint Venture must define as "Bidder" all Joint Venture Partners and list them in the following manner:

"a Joint Venture consisting of '.....', '.....' and '.....'.

b. The Bid Security shall, at the Bidder's option, be in the form of a certified cheque, but only if the certified cheque shows a validity date, letter of credit/ demand draft or a bank guarantee from a scheduled bank in India selected by the Bidder The format of any bank guarantee provided by a Bidder shall be in accordance with the form of Bid Security contained in Annexure A Part c to the Bidding Documents. The Bidder shall ensure that the Bid Security remains valid for a period of **45 days** after the end of the original Bid Validity Period, as defined in ITB Section 3.14(a), and **45 days** after any extension subsequently requested by the Owner in accordance with ITB Section 3.14(b).

c. Any Bid not accompanied by an acceptable Bid Security shall be rejected by the Owner as being non-responsive. The Bid Security of a joint venture must be in the name of all of the participants in the joint venture submitting the Bid.

d. The Owner will return the Bid Securities of the unsuccessful Bidders as promptly as possible, upon the successful Bidder's signing the contract and furnishing the required performance security and ESHS Performance Security.

e. The Bid Security of the Successful Bidder will be returned when the Bidder has signed the Form of Contract pursuant to ITB Section 6.4 and has provided the required Performance Security and ESHS Performance Security as set out in the Contract and ITB Section 6.5.

f. The Bid Security may, in the discretion of the Owner, be forfeited,

   1. if the Bidder withdraws its Bid during the Bid Validity Period; or
   2. in the case of the Successful Bidder, if the Successful Bidder fails within the specified time limit,

i. to execute the Form of Contract in accordance with ITB Section 6.4; or

ii. to furnish the Performance Security and ESHS Performance Security to the Owner in accordance with ITB Section 6.5.

3.5. Technical Section – Part III – Bid Form and Qualification Information

a. In Part III of the Technical Section of its Bid, each Bidder shall provide a completed Bid Form in the same form and substance as the Bid Form contained in Annexure A Part a to the Bidding Documents.

b. In Part III of the Technical Section of its Bid, Bidders shall submit Information Forms duly completed to evidence compliance with the Qualification Criteria provided in the Annexure A Part h to the bidding documents. The Information Forms are provided in the Annexure A Part i to the Bidding Documents.

3.6. Technical Section – Part IV - Joint Venture Documents and Requirements

a. Each Joint Venture Bidder shall submit, as Part IV of the Technical Section of its Bid, a written commitment, in the form of a letter duly executed by an authorized officer of each joint venture participant which,

1. Confirms each joint venture participant's commitment to the joint venture and acceptance of the joint venture arrangements described in the Bid in accordance with ITB Section 3.6(b);

2. Confirms each joint venture participant's willingness to provide a joint and several guarantee to the Owner to underwrite the performance of the joint venture in respect of the Contract; and

3. Identifies which joint venture participant,

i. will assume the leading role on behalf of the other joint venture participants; and

ii. will have the authority to commit all joint venture participants.

iii. will have the authority to incur liabilities and receive instructions for and on behalf of any and all participants of the joint venture.

b. A copy of the Joint Venture Agreement entered into by the Partners (JV Participants) shall be submitted with the bid. Alternatively, a Letter of Intent as per format provided under Annexure A - Part K to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the bid together with a copy of the proposed Agreement, clearly indicating the objectives of the joint venture, the proposed management structure, the contribution of each participant to the joint venture operations, the commitment of the participants to joint and several liability for performance of the contract, recourse or sanctions within the joint venture in the event of default or withdrawal of any participant, and arrangements for providing the required indemnities.

c. If the Successful Bidder is a Joint Venture to whom the contract is awarded, each partner of the Joint Venture shall sign and execute the contract with the Owner and shall be jointly and severally responsible to Owner for the performance of the contract.

3.7. Technical Section – Part V – Power of Attorney

Each Bidder shall provide, as Part V of the Technical Section of its Bid, a written power of attorney in accordance with ITB Section 3.15(c).

3.8. Technical Section – Part VI – Commissions and Gratuities

In Part VI of the Technical Section of its Bid, each Bidder shall provide detailed information listing all commissions and gratuities, if any, paid or to be paid by the Bidder to agents relating to this Bid or the Contract if the Bidder is awarded the Contract. The Bidder shall list the name and address of any agents, the amount and currency paid or to be paid to the agents and the purpose of the commission or gratuity. If no such commissions and gratuities have been paid, the Bidder shall provide this information in Part VI of the Technical Section of its Bid.

3.9. Technical Section – Part VII – Pre-Printed Literature

If the Bidder wishes to provide pre-printed literature about the Bidder or the joint venture participants, that pre-printed literature shall be contained in Part VII of the Technical Section of the Bid only and shall be separately bound.

3.10. Financial Section – Price Schedules

Each Bidder shall submit completed and properly executed Price Schedules in the forms contained in Annexure A to the Bidding Documents. Bidders shall complete the Price Schedules in full and shall not amend or change the form in any way. The Financial Section of each Bidder's Bid shall consist of only completed and properly executed Price Schedules.

3.11. Financial Section – Bid Prices

a. Bidders shall quote their Bid Price covering the total cost of (i) design, construction, testing, commissioning of the Sewage Treatment Plant; and of (ii) survey, review of design, redesign where necessary, construction, testing and commissioning of Sewerage Network and/or Interception and Diversion works (including pumping stations), and all appurtenant structures and allied works within the period **indicated in the Bid Data Sheet,** and of (iii) operation and maintenance of the complete works of Sewage Treatment Plant, Sewerage Network and/or Interception and Diversion works, and Pumping Stations for a further period of 15 years on a "single responsibility" basis such that the total Bid Price covers all of the Operator's obligations mentioned in or to be reasonably inferred from the Bidding Documents in respect of the design/ redesign, construction, commissioning, installation, testing, operation and maintenance and provisions mandated in Environmental Management Plan (attached as .....) *[EA should insert the reference in the blank.]* etc. of the Sewage Treatment Plant and Sewerage Network and/or Interception and Diversion works (including pumping stations) as set out in the Contract.

b. The Bidders shall quote their Bid Price in the following components:

For Sewage Treatment Plant:

1) **Part A - Design-Build Price:**

(i) The bidder shall quote total cost of design, development, construction, testing and commissioning of the STP including the cost for all materials,

electro mechanical equipment, labour, temporary works required for the construction, ancillary & allied works, consumables, acquisition of all permits / approvals / licences, duties and taxes and all related items of work as may be necessary for setting up the STP and making it fully functional in compliance with the provisions of the Contract.

Design-Build Price shall remain firm and fixed and will not be subject to price adjustment unless **specified otherwise in the Bid Data Sheet**.

In case the contract is subject to price adjustment, the Bidder shall furnish in the Schedule of Adjustment Data (under Appendix to Bid) for the purpose of Price Adjustment formulae, proposed weightings for various indices The Owner may require the Bidder to justify its proposed weightings and/or the source of indices.

(ii) The bidder shall furnish requirement of land that will be required for the proposed STP (considering the technology offered by the bidder), roads, drains and other appurtenant structures, in accordance with ITB 3.3 (c). The cost of such land requirement as determined on the basis of land price specified in the BDS ITB 3.3 (c) shall be indicated in the Price Schedule for determining the evaluated bid price.

The bidder should make a realistic assessment of land requirement. The bidder's attention is also drawn to provision under SCC Clause 4.2 which will apply if the successful bidder finds at the time of construction of the facility that the requirement indicated in its bid is inadequate.

2) **Part B - Annual O & M Prices of STP, for treatment of Threshold Sewage Flow indicated in the Bid Data Sheet,**

The bidder shall quote annual O&M prices for treatment of threshold sewage flow rate for each of 15 years after commencement of the Operations Period. These prices should include costs of skilled and unskilled manpower, establishment, consumables, energy consumption, replacements, routine maintenance and periodic maintenance of the STP in compliance with the provisions of the Contract, etc.

While quoting O&M prices, the bidder shall assume that full requirements of power for operating the STP shall be met by supply from the Electricity Utility Company throughout the O&M period.

The actual Payment of O&M price to the Operator shall, however, be based on the actual quantities of sewage handled by the STP, subject to the condition that the price quoted for the Threshold Flow shall be the base (minimum) price which shall not be subject to adjustment in case actual sewage flow falls short of the Threshold Sewage Flow.

The Payment of O&M price shall also be subject to adjustment to compensate the Operator for the extra cost on account of Diesel consumption incurred by the Operator for using the power supply from the back-up power supply unit (DG set) when power from the Electricity Utility Company is not available.

The bidder is advised to refer to Schedule 6 of the Contract - Terms and Procedure of Payment and Schedule 8 of the Contract – Price Adjustment, while quoting the O&M prices.

3) **Part C – Additional O&M Prices for treatment of sewage flow in excess of Threshold Sewage Flow on a per MLD basis** for each of the 15 years after commencement of Operations Period and shall include all the fixed and variable costs such as costs of consumables, chemicals, energy consumption, etc. for treatment of the additional sewage flow in compliance with the provisions of the Contract.

For Sewerage Network and/or Interception and Diversion works:

4) **Part D - Bid Price for-BOQ items:** The Bidder shall quote rates and prices for all items of the Works described in the Bill of Quantities (BOQ). Items against which no rate or price is entered by the Bidder shall be deemed covered by the rates for other items in the Bill of Quantities and will not be paid for separately by the Owner. An item not listed in the priced Bill of Quantities shall be assumed to be not included in the Bid, and provided that the Bid is determined substantially responsive notwithstanding this omission, the average price of the item quoted by substantially responsive bidders will be added to the bid price and the equivalent total cost of the bid so determined will be used for price comparison. The bid prices shall remain firm and fixed and will not be subject to price adjustment, unless otherwise **provided in the BDS** and the Conditions of Contract.

5) **Part E - Annual O&M Price** for each of 15 years after commencement of the Operations Period including skilled and unskilled manpower, establishment costs, replacements, routine maintenance and periodic maintenance of the Sewerage Network and/or Interception & Diversion Works and Sewage Pumping Stations in compliance with the provisions of the Contract.

   If O & M of the SPS(s) is included in the scope of work, the bidder shall for the purpose of quoting O&M prices assume that (a) the SPS(s) will be required to handle quantities of sewage in the respective years of the O&M period as per "Indicative Sewage Flow Rate for SPS" shown in the Appendix to Bid (Indicative Flow) and (b) full requirements of power for operating the SPS(s) shall be met by supply from the Electricity Utility Company throughout the O&M period. The actual Payment of O&M price to the Operator shall, however, be based on the actual quantities of sewage handled by the SPS(s) and will also be subject to adjustment to compensate the Operator for the extra cost on account of Diesel consumption incurred by the Operator for using the power supply from the back-up power supply unit (DG set) when power from the Electricity Utility Company is not available.

   The bidder is advised to refer to Schedule 6 of the Contract - Terms and Procedure of Payment and Schedule 8 of the Contract – Price Adjustment, while quoting the O&M prices.

c. O&M Prices (Part B, Part C, and Part E) shall be subject to adjustment only on account of variation in electricity tariff evidenced by the electricity bills paid by the Operator for the Sewage Treatment Plant and the Sewage Pumping Station(s) to be operated and maintained by him as per Contract, with reference to the "Base Rate of Electricity" **stipulated in BDS**. The Bidder shall furnish with its Bid the Guaranteed Energy Consumption per MLD of the sewage handled by the Sewage Treatment Plant and the Pumping Station(s). Adjustment of O&M prices shall be applicable for the actual energy consumption evidenced by the electricity bills subject to the ceiling as per guaranteed energy consumption level as per provisions of Schedule 8 of the Contract.

d. For the purpose of submitting Bids, Bidders should note that the Bid Price shall include all kinds of taxes, duties, levies or charges of the Owner's country in accordance with the Contract.

Note:

Bidders may like to ascertain availability of GST/excise/custom duty exemption benefits available in India for similar contracts. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the Owner will not compensate the bidder (Operator). The bidder shall furnish along with his bid a declaration to this effect in the Declaration Format provided in **Annexure A Part j** of the bidding documents.

Where the bidder has quoted taking into account such benefits, he must give all information required for issue of certificates in terms of the Government of India Central Excise Notification and Customs Notification as per the form stipulated in **Annexure A Part j** of the Bidding Documents. In case the bidder has not provided the required information or has indicated to be furnished later on in the Declaration Format, the same shall be construed that the goods/equipment for which certificate is required is Nil.

To the extent the Owner determines the quantities indicated therein are reasonable keeping in view the work schedule, construction programme and methodology, the certificates will be issued and no subsequent changes will be permitted. The certificate will be issued within 60 days of signing of the contract for material, equipment and machinery.

If the bidder has considered the GST/customs/excise duty exemption for materials/construction equipment to be bought for the work, the bidder shall confirm and certify that the Owner will not be required to undertake any responsibilities of the Government of India Scheme or the said exemptions being available during the contract execution, except issuing the required certificate. Where such certificates are issued by the Owner, excise duty/GST will not be reimbursed separately.

The bids which do not conform to the above provisions or any condition by the bidder which makes the bid subject to availability of customs/excise duty exemption for materials/construction equipment or compensation on withdrawal of any variations to the said exemptions will be treated as non-responsive and rejected.

Any delay in procurement of the construction equipment /machinery/goods as a result of the above shall not be entertained as a reason for granting any extension of time.

e. Bidders are strongly encouraged to review GC Section 5.5, Terms and Procedures of Payment Schedule (Schedule 6 of the Contract) and Price Adjustment Schedule (Schedule 8 of the Contract) prior to completing their Price Schedules and submitting their Bid Prices.

3.12. Financial Section – Bid Currencies

Bidders shall quote their prices in Indian Rupees only.

3.13. Bidding of alternatives not to be considered

a. The Bidders shall base their Bids on the terms and conditions of the Bidding Documents and, without limiting the generality of the foregoing, shall,

1. Submit their prices based on the terms and conditions in the Bidding Documents;
2. submit their Bids based on the assumption that the final Contract will be the same as the Draft Contract and shall not base their Bids on the premise that they may be able to change the Draft Contract; and
3. Include in their Bids a Form of Contract and Draft Contract initialled on each page in accordance with ITB Section 3.15(b) (3).

b. No Bidder shall submit a Bid that contains statements that are inconsistent with the Bidding Documents.

c. A Bidder shall not submit a Bid that proposes an arrangement between the Owner and the Bidder which, in the discretion of the Owner, is different than the arrangement set out in the Bidding Documents (an "Alternative Bid").The Owner intends to enter into a contract to design, build and operate a Sewage Treatment Facility and a Sewerage Network and/or Interception & Diversion Works based on the terms and conditions of the Bidding Documents. If a Bidder submits an Alternative Bid it will be returned to the Bidder and will not be considered, in any way, by the Owner.

3.14. Period of Validity of Bid

a. Bids shall remain valid for the period **named in the Bid Data Sheet** after the Submission Deadline or any extension thereof prescribed by the Owner for the receipt of Bids, pursuant to ITB Section 3.14(b). A Bid valid for a shorter period shall be rejected by the Owner as being non-responsive.

b. In exceptional circumstances, the Owner may solicit the Bidders' consent to an extension of the Bid Validity Period. The request and responses thereto shall be made in writing and sent by air mail, courier or fax. If a Bidder accepts to prolong the Bid Validity Period, the Bid Security shall also be suitably extended. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request will not be required nor permitted to modify its Bid, except as provided in ITB Section 4.4.

3.15. Format and Signing of Bid

a. Each Bidder shall prepare one electronic copy of the Technical e-bid (Vol-I) and financial e-bid (Vol-II) each separately.

b. The documents designated to be uploaded shall be physically signed at all places indicated.

c. The e-bid document shall be digitally signed, at the time of loading, by the bidder or a person or persons duly authorized to bind the bidder to the contract. All the pages/documents of the e-bid that are to be uploaded shall be digitally signed by the person authorized to sign the e-bid.

d. The authority of the person or persons signing the Bid to bind the Bidder shall be demonstrated by a written and duly notarized power of attorney included in the Bid and submitted as Part V of the Technical Section of the Bid and which shall bind the Bidder for the full length of the Bid Validity Period.

e. The Bid shall contain no alterations, omissions or additions, unless such corrections are initialled by the person or persons signing the Bid.

Section 4. Submission of Bids

4.1. Sealing and Marking of Bids

a. The bidder shall download the bid document from the website: www._____ and upload the softcopy/scanned copy of required documents together with filled up documents on the website.: …… . The Bidder shall enclose the Technical Bid and the Financial Bid in separate covers. The contents of Technical and Financial Bids will be as per bid document.

b. Each Bidder shall submit a hard copy of the original Bid Security, Power of Attorney, the proof of payment of price of Bidding Document and processing fee to the …… *[Executing Agency]* in a sealed envelope. It is clarified that the Bidder will not be required to submit a hard copy of its Technical and/or Financial Bid, and if a hard copy of the Technical and/or Financial Bid is submitted, then the Bid submitted by such Bidder shall be rejected as being non-responsive.

c. The hard copy of the Bid Security, Power of Attorney, joint bidding agreement, etc will be duly sealed in an envelope, which will be super-scribed as follows:

"---------- [project name in short]

QUALIFICATION PROPOSAL

DO NOT OPEN BEFORE SPECIFIED TIME ON BID DUE DATE"

d. The hard copy of the Bid Security, Power of Attorney, etc will either be hand delivered or sent by registered post acknowledgement due or courier to the address specified in Bid Data Sheet.

4.2. Deadline for Submission of Bids

a. Bids must be uploaded on the Owner's website **specified in the Bid Data Sheet** no later than the time and date **stated in the Bid Data Sheet** as the Submission Deadline.

b. The Owner may, at its discretion, extend the Submission Deadline by amending the Bidding Documents in accordance with ITB Sections 2.6 and 2.9(b), in which case all rights and obligations of Owner and Bidders will thereafter be subject to the Submission Deadline as extended.

4.3. Late Bids

Any Bid received by the Owner after the Submission Deadline prescribed by the Owner, pursuant to ITB Section 4.2, will be rejected.

4.4. Withdrawal, Substitution, and Modification of Bids

(1) Bidders may modify their bids by using the appropriate option for bid modification on e-Procurement Portal, before the deadline for submission of bids. For bid modification and consequential re-submission, the Bidder is not required to withdraw his bid submitted earlier. The last modified Bid submitted

by the Bidder within the Bid Due Date shall be considered as the Bid. For this purpose, modification/withdrawal by other means will not be accepted. In online system of bid submission, the modification and consequential re-submission of Bid is allowed any number of times. A bidder may withdraw his Bid by using the appropriate option for Bid withdrawal, before the deadline for submission of Bids. However, if the Bid is withdrawn, re-submission of the Bid is not allowed.

(2) Bids requested to be withdrawn in accordance with ITB Section 4.4 (1) shall not be opened.

(3) No Bid may be modified, substituted or withdrawn in the interval between the deadline for Bid Submission and the expiration of the Bid Validity Period. Withdrawal of a Bid during this interval may result in the Bidder's forfeiture of its Bid Security, pursuant to ITB Section 3.4(f).

Section 5. Bid Opening and Evaluation

5.1. Opening of Bids by Owner

(a) The electronic Technical Bids shall be opened by the Owner at the time, date and place **specified in the Bid Data Sheet** in the presence of the Bidders or their authorized representatives, who choose to be present. The Bidders may choose to witness the electronic Bid opening procedure online.

If the bidder fails to submit a hard copy of the original Bid Security, Power of Attorney, the proof of payment of price of Bidding Document and processing fee or the bid security furnished does not conform to the amount, form and validity period as specified in the Bid, upon verification then its technical bid will not be opened.

(b) The Financial Proposals of the Bids shall remain unopened in the e-Procurement System, until the subsequent public opening following the evaluation of the Technical Proposals of the Bids.

(c) First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. If the withdrawal envelope does not contain a copy of the "power of attorney" confirming the signature as a person duly authorized to sign on behalf of the Bidder, the corresponding bid will be opened. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid

authorization to request the modification and is read out at Bid opening. Only envelopes that are opened and read out at Bid opening shall be considered further.

(d) All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the Bid Prices, including any discounts and alternative offers; the presence of a Bid Security or Bid-Securing Declaration, if required; and any other details as the Owner may consider appropriate. Only discounts and alternative offers read out at Bid opening shall be considered for evaluation. No Bid shall be rejected at Bid opening except for late bids, in accordance with ITB section 4.3.

(e) The Owner shall prepare a record of the Bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; and the presence or absence of a Bid Security. The Bidders' representatives who are present shall be requested to sign the attendance sheet. A copy of the record shall be distributed to all Bidders who submitted bids in time.

(f) After the completion of Technical Evaluation, the bidders who have submitted substantially responsive technical bids and who have been determined as being technically qualified will be informed of a date, time and place for opening of their Financial Proposals. The Financial Proposals will be opened in the presence of the representatives of the qualified Bidders that choose to be present.

5.2. Clarification of Bids

During Bid evaluation, the Owner may, at its discretion, ask the Bidder for a clarification of its Bid. The request for clarification and the response shall be in writing, and no change in the price or substance of the Bid shall be sought, offered or permitted.

5.3. Preliminary Examination of Bids

a. The Owner will examine each Bid to determine whether it is complete, whether any computational errors have been made, whether required securities have been furnished, whether the documents have been properly signed, and whether the Bid is generally in order.

b. Arithmetical errors in the Bids will be rectified on the following basis:

   1. If there is a discrepancy between subtotals and the total price, the unit or subtotal price shall prevail, and the total price shall be corrected; and

   2. If there is a discrepancy between words and figures, the amount in words shall prevail.

   If the Bidder does not accept the correction of arithmetical errors, its Bid shall be rejected.

c. The Owner may waive any minor informality, nonconformity or irregularity in a Bid that does not constitute a material deviation, and that does not prejudice or affect the relative ranking of any Bidder as a result of the technical and price evaluation pursuant to ITB Sections 5.4 and 5.5.

d. Prior to the detailed evaluation, the Owner will determine whether each Bid is of acceptable quality, is complete and is substantially responsive to the Bidding

Documents. For purposes of this determination, a substantially responsive Bid is one that conforms to all the terms, conditions and specifications of the Bidding Documents without material deviations, objections, conditions or reservations. A material deviation, objection, conditionality or reservation is one,

1. that affects in any substantial way the scope, quality or performance of the contract;
2. that limits in any substantial way, inconsistent with the Bidding documents, the Owner's rights or the Successful Bidder's obligations under the contract; or
3. whose rectification would unfairly affect the competitive position of other Bidders who are presenting substantially responsive Bids.

e. If a Bid is not substantially responsive, it will be rejected by the Owner, and may not subsequently be made responsive by the Bidder by correction of the nonconformity. The Owner's determination of a Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.

5.4. Technical Evaluation

a. The Owner will carry out a detailed evaluation of the Technical Sections previously determined to be substantially responsive in order to determine on a pass/fail basis whether the technical aspects are in accordance with the requirements set forth in the Bidding Documents. Bidders acknowledge that, in order to reach such a determination, the Owner will examine and analyse the technical aspects of each Bid on the basis of the information supplied by Bidders, taking into account the completeness, consistency and level of detail of the following factors:

1. with respect to the Design-Build construction plan,
    i. the Bidder's ability to demonstrate how it will meet the Owner's project objective and requirements, the technical standards and the Environmental Management Plan;
    ii. the soundness of the proposed methodology and approach, and the extent to which the Design-Build Work plan demonstrates an understanding of the local conditions and specific Project requirements;
2. with respect to the Operation and Maintenance Work plan,
    i. the extent to which the Operations Work plan addresses all of the Operations Services that are to be provided in accordance with the Contract;
    ii. the soundness of the proposed methodology and approach, and the extent to which the Operations Work plan demonstrates an understanding of the local conditions and specific Project requirements; and the Bidder's ability to demonstrate how it will meet the technical standards; and
3. with respect to the Staffing Plan,
    i. the qualifications and competence of the Key Staff; and

ii. the overall quality of the Staffing Plan, including the depth and organisational strength demonstrated by the Plan and the extent to which it meets the expertise requirements set out in the BDS under ITB 3.3 (h) (4) and ITB 3.3 (h) (5).

b. For the purpose of ITB Section 0(a) (3)(ii), the evaluation of the overall quality of the Staffing Plan shall be based on,

1. the clarity, comprehensiveness and level of detail of the Staffing Plan;
2. the extent to which the expertise required by the Operator's Key Staff as specified in the BDS under ITB 3.3 (h) (4) and ITB 3.3 (h) (5) is included in the Staffing Plan; and
3. the extent to which the Staffing Plan addresses the specific Services that are required by the Design-Build and Operations Services Schedules to the General Conditions.

5.5. Price Evaluation and Comparison of Bids

a. The Owner shall examine each Bidder's Financial Section to determine whether such Financial Section is complete and substantially responsive to the Bidding Documents.

b. The Financial Sections, which are substantially responsive to the Bidding Documents, shall be evaluated to determine the lowest evaluated bid.

c. The Owner shall evaluate the bid prices by determining and adding various components of cost and prices as under:

i. Price adjustment for correction of arithmetic errors in accordance with Section 5.3(b); plus

ii. Cost of design, development, construction, testing and successful commissioning of STP; plus

iii. Cost of land requirement for STP indicated by the bidder and as determined in accordance with ITB Section 3.3(c); plus

iv. Bid Price for BOQ items and quantities, for Sewage Network; plus

v. NPV of the yearly payments due on account of O & M charges over 15 years of O & M in case of (a) STP assuming "Indicative Sewage Flow Rate for STP" reaching the STP during respective years of the Operation Period as indicated in the Appendix to Bid (Indicative Flow); (b) Sewerage Network and/or Interception & Diversion Works, and SPS(s) in line with the specified scope of work, without considering any price adjustment applicable in terms of Section 3.11c. For the purpose of determining the NPV discount factor of 10 % per annum shall be applicable.

vi. For the purpose of evaluation, if operation of SPS is included in the scope of work, O&M charges referred to in v above will be determined on the basis of sewage flow projected by the Owner being pumped by SPS, as detailed year wise in the Appendix to Bid (Indicative Flow) and termed as "Indicative Sewage Flow Rate for SPS".

d. The Owner shall compare the evaluated prices of all substantially responsive bids to determine the lowest evaluated bid.

5.6. Qualification of the Bidder

a. The Owner shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid meets the Qualification Criteria specified in Annexure A Part h of bidding documents.

b. The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to Section 3.5 (b).

c. An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Owner shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.

5.7. Contacting the Owner

a. From the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Owner, it must do so in writing.

b. Any effort by a Bidder to influence the Owner, its advisors, employees, consultants or agents, in the Owner's Bid evaluation, Bid comparison, or Contract award decision may, in the discretion of the Owner, result in rejection of the Bidder's Bid.

Section 6. Award of Contract

6.1. Award Criteria

Subject to ITB Section 6.2, the Owner will award the Contract to the Bidder whose Bid has been determined, by the technical and price evaluation, to be substantially responsive, has received a "pass" in the technical evaluation, and has the lowest evaluated Bid Price, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily.

6.2. Owner's Right to Accept or Reject and Waive Irregularities

a. The Owner reserves the right to,

   1. accept any Bid;
   2. reject any Bid;
   3. annul the bidding process and reject all Bids;
   4. annul the bidding process and commence a new process; and
   5. waive irregularities, minor informalities, or minor non-conformities which do not constitute material deviations in the submitted Bids from the Bidding Documents, at any time prior to the award of the Contract without incurring any liability to the affected Bidder or Bidders and without any obligation to inform the affected Bidder or Bidders of the grounds for the Owner's actions.

b. Nothing in ITB Section 6.2(a) is intended to permit the Owner to refuse to provide reasons for rejection to an unsuccessful Bidder.

6.3. Notification of Award

Prior to the expiration of the Bid Validity Period, the Owner shall notify the Successful Bidder in writing by courier that its Bid has been accepted by the Owner (the "Notification of Award"). The effectiveness of the Contract shall be as of the date of the Owner's signing of the Contract contingent on final approval by the NMCG.

6.4. Signing the Form of Contract

a. At the same time as the Owner sends the Successful Bidder the Notification of Award, the Owner shall send the Successful Bidder,

   1. Form of Contract; and
   2. the other Contract Documents.

b. Not later than 15 days after the Successful Bidder's receipt of the Notification Award, the Form of Contract and the other Contract Documents pursuant to ITB Sections 6.3 and 6.4(a), the Successful Bidder shall sign and date the Form of Contract and initial each page of the Contract and return them to the Owner.

6.5. Performance Security

a. No later than 15 days after the Successful Bidder's receipt of the Notification of Award, the Successful Bidder shall provide the Owner with the performance security ESHS Performance Security in the amount **given in the Bid Data Sheet** and in the

substance and form set out in **Annexure A Part d** or in another form approved by the Owner. The Performance Security and ESHS Performance Security Forms of a Joint Venture shall be in the name of Joint Venture.

b. In case if the Owner finds from the break-up of design build prices of STP and Network contained in Price Schedule Parts A and D, that the prices indicated therein are unbalanced, the successful bidder shall have to provide additional performance guarantee as may be required by the Owner for such unbalanced bid prices of value equal to 10% of such unbalanced amount.

6.6. Failure to Sign the Form of Contract or provide the Performance Security

If the Successful Bidder fails to comply with the provisions of ITB Sections 6.4(b) or 6.5, this failure shall constitute sufficient grounds for annulment of the award and forfeiture of the Bid Security and in which event the Owner may make the award to the next lowest evaluated Bidder or call for new bids.

6.7. Adjudicator

The Owner proposes that the person **named in the Bid Data Sheet** be appointed as Adjudicator under the contract, at a fee **stated in the Bid Data Sheet**. A résumé of the named person is **attached to the Bid Data Sheet**, as well as a description of the expenses that would be considered reimbursable. If a Bidder does not accept the Adjudicator proposed by the Owner, it should so state in its Bid Form and make a counterproposal of an Adjudicator and an hourly fee. If, on the day the Form of Contract is signed, the Owner and the Operator have not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed, at the request of either party, by the Appointing Authority specified in the Special Conditions of Contract.

6.8. Fraud and Corruption

NMCG, Owner, bidders, suppliers, Operators and their agents (whether declared or not), sub-contractor, sub-consultants, service providers or suppliers, and any personnel thereof, are required to observe the highest standard of ethics during the procurement and execution of contract.[22]

(a) For the purposes of this provision, the terms set forth below are defined as follows:

(i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;[23]

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;[24]

[22] In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

[23] For the purpose of this sub-paragraph, "*another party*" refers to a public official acting in relation to the procurement process or contract execution. In this context, "*public official*" includes employees of all organizations taking or reviewing procurement decisions.

(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;[25]

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;[26]

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede an Owner's investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Owner's inspection and audit rights provided for under ITB Section 1.4.

(vi) **"**restrictive practice" means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating full and fair competition in the Bid Process.

(b) The Owner will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-Operators, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) Without prejudice to the rights of the Owner under Clause 6.8 (b) above, in the event that a Bidder is found by NMCG or the Owner to have directly or indirectly or through an officer, employee, agent or advisor engaged or indulged in any corrupt, fraudulent, collusive, coercive, undesirable or restrictive practice during the Bid Process, such Bidder will not be eligible to participate in any tender or request for qualification issued by NMCG or the Owner for 5 years, from the date such Bidder is found by NMCG or the Owner to have directly or indirectly or

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[24] For the purpose of this sub-paragraph, "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

[25] For the purpose of this sub-paragraph, "parties" refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

[26] For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution

through an officer, employee, agent or advisor engaged or indulged in any of the activities mentioned above.

6.9. Procurement Related Complaint

6.9.1. The procedures for making a Procurement-related Complaint are as specified in the BDS.

Bid Data Sheet[27]

The following bid-specific data for the facility and services to be procured shall amend or supplement the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in the ITB.

ITB SECTION REFERENCE	REQUIRED INFORMATION
ITB 1.1 (b)	Name of Owner: ..... *[Please insert the name of Executing Agency (EA). The Bidding Document is structured such that the EA invites the bids, signs the contract and continues the role assigned to the Owner under the Contract for the entire duration of the Contract inclusive of the O & M period of 15 years.]*
ITB 1.1 (c)	The installed capacity of the STP is ____ (Average Flow = ____ ; Peak Flow = ____) and is located at _____. The Sewerage Network is about .....Km in length; the number of diversion works/drain tapping is….. with …. km of interception sewer; the number of Sewage Pumping Stations is ..... of capacity ..... & ..... etc. The work is to be carried out at ..... in …….. city in the State of ..... in India The Existing Sewerage Network layout has been attached with bid document. It has about …….. km of main trunk sewers and its lengths diameter wise are mentioned below. *[EA to retain this paragraph and enter these details only if either of the following are to be taken up: condition assessment of existing sewers, repair/refurbishment of existing sewers, checking capacity of existing sewers, integration of existing sewers with proposed system]*
ITB 1.1 (d)	Details of the maximum area of land available and allocated for (a) the Sewage Treatment Plant, (b) setting up the infrastructure required for reuse of the treated effluent and (c) arrangements needed for discharge of the balance unused treated effluent are as under: .... The maximum area of land available and allocated for setting up the Sewage Pumping Station and all appurtenant structures is ..... square metres. The land is located at ……. A sketch of the available land is attached. *[EA should insert relevant information here.]*
ITB 1.2.1	The number of members of a JV bidder shall be limited to ..... *[EA should insert the figure which should be consistent the figure specified in Para 1.1 of Annexure A – Part h.]*

[27] *The details in this BDS shall be filled specific to the project for which the contract is being awarded.*

ITB SECTION REFERENCE	REQUIRED INFORMATION
ITB 2.2(a)	Address of Owner: _____
ITB 2.2 c	A request for clarification of the Bidding Documents shall be received no later than 15 days prior to the deadline for submission of bids indicated in the BDS under ITB 4.2
ITB 2.4	Data Room: Data Room is at the following location: ……. …….
ITB 2.5	**Venue and time of pre-bid meeting:** **_____** **_____** **Date : _____ Time: _____ Hrs.** The website where proceedings of the pre-bid meeting, reply to the queries and corrigendum if any will also be uploaded is: ..... *[Insert the URL of the website.]*

ITB SECTION REFERENCE	REQUIRED INFORMATION
ITB 2.7	Address of Owner, telephone, email and facsimile of contact persons:
ITB 2.9(a), 2.2(c), 2.3(a), 2.4, 2.9(b)	The estimated timetable is: (a) Issue of Bidding Documents: [From _____ to _____] (b) Site Visits [From _____ to _____] (c) Pre-Bid Meeting [_____] (d) Last Day for Bidders to Submit Questions on Bidding Documents [_____] (e) Last Day for Bidders to Submit Supplementary Questions (arising out of Site Visits only) [_____] (f) Issue of Response to Questions Document and Final asset condition assessment study: [_____] (g)[28] Calculation Date for Conversion to a Single Currency for Evaluation (ITB Section **Error! Reference source not found.**) [_____] (h) Deadline for Submission of Bids [_____] (Bid Submission Date) ……..local time (i) Opening of Bids (Bid opening date) [_____] ……. local time (j) Identification of Successful Bidder [_____] (k Notification of Award [_____] (l) Contract Signature [_____] (m) Design-Build- Starting Date [_____] (n) Completion of STP and arrangements for reuse of treated effluent [_____] (o) Completion of Sewerage Network and/or Interception and Diversion Works & SPS(s), if applicable [_____]
ITB 3.1	Language of Bid is English.
ITB 3.3 (a), 3.3 (e)	Status of availability and Ownership of Land for STP ……. Status of availability and Ownership of Land for Sewage Pumping Station(s) and appurtenant structures ……. *[Detail the status of Ownership of Land. Either state that the Land is under the Ownership of the Owner or provide the status of land acquisition / transfer so as to provide the Bidders with an accurate status of the land title].*

[28] Delete in case of NCB

ITB SECTION REFERENCE	REQUIRED INFORMATION
ITB 3.3(b)	Location of disposal of Sludge: _____[29] Distance of location of sludge disposal from STP: _____ Km The treated effluent, which is left after taking out the quantity intended for reuse, shall be discharged at _____[30].
ITB 3.3 (c)	Price of Land to be considered for evaluation of the Bid Prices: ____ Rs. / Sq. M *[Project should indicate the prevailing land rate]*
ITB 3.3(f)(2)(ii)(b)	Works to be specified in Site plan[31] for STP: 1. Intake arrangement for receiving the raw sewage into the STP, 2. Main Pumping Station (MPS) 3. Initial screening; 4. Various components of primary, and secondary Sewage Treatment processes, including tertiary treatment if proposed by the bidder; 5. Sludge treatment and reuse of sludge in power generation for operation of STP (if any) 6. Sludge disposal arrangements 7. Arrangements for reuse of the specified minimum quantity of treated effluent 8. Arrangements for disposal of treated effluent left over after taking out the quantity intended for reuse 9. Onsite testing facility for parameters mentioned in SCC 10. Staff Quarters and Campus Development Works 11. Infrastructure for Electricity generation from solar photovoltaic arrangement (minimum 1000 watts for STP and 200 watts for each SPS to take care of internal lighting, fans etc.) 12. Any other facility as required to conform to effluent standards
ITB 3.3(g)(2)(ii)(b)	Works to be specified in layout plan[32] for Interception and Diversion Works: 1. Diversion Structure 2. Intercepting Sewer and/or Sewerage Network: 1. Primary and Trunk sewerage network 2. Secondary and collector lines on the sewerage network; 3. Sewage Pumping Station(s); 4. Inspection chambers and manholes; 5. Infrastructure, if any, proposed for reuse of treated effluent

[29] *Specify the location of the sludge disposal point as identified by the Owner and for which all the necessary clearances and permissions have been taken.*

[30] *Specify the location where the treated effluent shall be discharged, specifying the distance of the location from the STP and the outfall mechanism and testing that shall be conducted while discharging the treated affluent.*

[31] *To be specified depending upon the specific components identified in the DPR of the Project.*

[32] *To be specified depending upon the specific components identified in the DPR of the project.*

<table>
<tr><th>ITB SECTION REFERENCE</th><th>REQUIRED INFORMATION</th></tr>
<tr><td>ITB 3.3(h)(4)(ii)(b)</td><td>Language capabilities for Bidder’s Personnel: English</td></tr>
<tr><td>ITB 3.3(h)(4)(ii)(b), 3.3(h)(5)</td><td>List of Key Staff to be deployed by the Operator during the Design build services for STP and Sewerage Network and/or Interception & Diversion Works as stipulated in SCC 8.3 is reproduced here.
[EA should ensure that the requirements indicated in the Table below are consistent with those specified in SCC 8.3. The key staff in the table below is indicative to which positions and qualifications could be adjusted/added]

<table>
<tr><th>S.No</th><th>Staff</th><th>No *</th><th>Minimum Qualifications</th></tr>
<tr><td>1</td><td>Project Manager</td><td>1</td><td>A Graduate in Civil Engineering with not less than 10 years’ experience in construction of Sewage Treatment Plants/ Sewerage networks.</td></tr>
<tr><td>2</td><td>Civil Engineer</td><td>2</td><td>A Civil Engineer (Graduate Engineer) with not less than eight years’ experience in construction of similar engineering works or Diploma in Civil Engineering with 8 years’ experience</td></tr>
<tr><td>3</td><td>Electro Mechanical Engineer</td><td>1</td><td>A Electro /Mechanical Engineer (Graduate Engineer) with not less than 8 years’ experience in construction of similar engineering works or Diploma in Electro/ Mechanical Engineering with 10 years’ experience</td></tr>
<tr><td>4</td><td>Civil Supervisors</td><td>3</td><td>Diploma in Civil Engineering with minimum 2 years’ experience in Construction of Civil Engineering works</td></tr>
<tr><td>5</td><td>Environmental Engineer</td><td>1</td><td>Graduate in civil Engineering / environmental Science / environmental planning with total 5 years’ experience of which minimum 3 years’ experience in environmental management works of urban infrastructure projects.</td></tr>
<tr><td>6</td><td>Health and Safety Engineer</td><td>1</td><td>Graduate in any field with specialised qualification in Occupational Health and safety (OHS) with total 5 years’ of experience of which 3 years’ in management of OHS works in infrastructure projects.</td></tr>
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<table>
<tr><th>ITB SECTION REFERENCE</th><th>REQUIRED INFORMATION</th></tr>
<tr><td></td><td>
<table>
<tr><td>7</td><td>Social Expert</td><td>1</td><td>Degree in Social science / Sociology / Social Work / Anthropology / Planning with total 5 years' experience of which 3 years in management of social safeguard activities in infrastructure projects.</td></tr>
</table>
*EA to specify the number as per requirement and quantum of work.
CVs of key staff shall be submitted along with the bid and shall be subject to approval of Owner. Bidder's attention is drawn to Article 7.2 of Schedule 2 (Design Build Services Schedule) of the Contract which shall be applicable, if the Operator proposes to replace any Key Staff during Design & build services period.
For O&M services, qualifications and experience of the Key Staff have been specified in Article 2.6 of Schedule 3 (Operations and Maintenance Services Schedule) of Contract. The bidder shall take the same into account while submitting the Staffing Plan for O&M services with its bid.
</td></tr>
<tr><td>ITB 3.3 (h)(6)</td><td>Maximum percentage of sub-contracting the design-build services is 25%. However the nominated sub-contractor whose experience and qualification have been claimed for meeting the qualification criteria in accordance with stipulations in Annexure A part h shall be excluded while applying the ceiling of 25 %.</td></tr>
<tr><td>ITB 3.3 (i)</td><td>The Bidder shall submit the following additional documents in its Bid:
Code of Conduct (ESHS)
The Bidder shall submit its Code of Conduct that will apply to Operator's Personnel (as defined in Sub-clause 1.1.2.7 of the GC), to ensure compliance with its Environmental, Social, Health and Safety (ESHS) obligations under the contract. [Note: Complete and include the risks to be addressed by the Code in accordance with works' requirements, e.g. risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining a safe environment etc.]
In addition, the Bidder shall detail how this Code of Conduct will be implemented. This will include: how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Operator proposes to deal with any breaches.
The Operator shall be required to implement the agreed Code of Conduct.
In addition, the Operator shall be required to submit for approval, and subsequently implement, the Operator's Environment and Social Management Plan (O-ESMP) and management strategies and implementation plan to manage ESHS risks, in accordance with Appendix 1 to Schedule 2 (Design Build Services), that includes the agreed</td></tr>
</table>

ITB SECTION REFERENCE	REQUIRED INFORMATION
	Management Strategies and Implementation Plans described here.
ITB 3.4(a)	**Amount of Bid Security: Rs. ____ (Rupees _____)**[33] or US$ ..... or an equivalent amount in a freely convertible currency.
ITB 3.11 a	Period (i) for design, construction, testing, commissioning of the STP and allied works; and (ii) for Survey, Review of designs, redesign where Necessary, construction, testing, commissioning etc. of the Sewerage system including survey, design, construction of …..No. pumping stations and all appurtenant structures and allied works is:……years.
ITB 3.11 b (1)	The Design-Build prices quoted by the bidder for STP i.e. Part A of the Bid Prices *[insert "shall be" or "shall not be"]*[34] subject to price adjustment. Price adjustment, if applicable, shall be carried out in accordance with Schedule 8 of the Contract.
ITB 3.11 b 2 & 3.11 b 3	The Threshold Sewage Flow is: ..... The threshold sewage flow means the expected level of sewage flow available for treatment immediately on completion of the STP facility
ITB 3.11 b (4)	The prices quoted by the Bidder for BOQ items for Sewage Network, i.e. Part D of the Bid Prices *[insert "shall be" or "shall not be"]*[35] subject to adjustment during the performance of the Contract. Price adjustment, if applicable, shall be carried out in accordance with Schedule 8 of the Contract.
ITB 3.11 c	The prevailing electricity tariff referred to as "Base Rate of Electricity Tariff" is INR ..... per kWh.
ITB 3.14(a)	Bid Validity Period: ……. [36]days
ITB 4.2 (a)	Bidders shall submit their Bids on-line only. e-procurement portal for bid submission: www.---------- Deadline for online bid submission: Date : _____ Time: _____ Hrs. The address for submission of sealed envelope with hardcopy of bid security, power of attorney etc. as per ITB 4.1 (b) is: **OFFICE OF THE ---------** ----------

[33] *This amount should be fixed as per guidance note provided in the footnote in the IFB. In case of NCB, amount should be in INR only.*

[34] *Price Adjustment shall be applied, if the completion period for construction of the STP/Network exceeds18 months. Price adjustment shall be applied either for both STP & Network or for neither of the two.*

[35] *Footnote for BDS 3.11 b (1) refers.*

[36] *Normally provide 120 days*

ITB SECTION REFERENCE	REQUIRED INFORMATION
	EMAIL: ---------- PHONE: ---------- Deadline for sealed envelope submission: Date : _____ Time: _____ Hrs **Bidders shall submit their Bids electronically only** (The Documents uploaded shall only be considered. No physical submission of documents is acceptable except the documents specified in Clause 4.1. b). The Bidders shall submit the Bid online with all pages numbered serially and by giving an index of submissions. Each page of the submission shall be initialled by the Authorised Representative of the Bidder as per the terms of the tender. The Bidder shall be responsible for documents accuracy and correctness as per the Bid document uploaded by the Representative and shall ensure that there are no changes caused in the content of the downloaded document. The bidder shall follow the following instructions for online submission: • Bidder who wants to participate in bidding will have to procure digital certificate as per IT Act to sign their electronic bids. Offers which are not digitally signed will not be accepted. Bidder shall submit their offer in electronic format on above mentioned website after digitally signing the same. • Cost of bid document is -------- whereas the Bid Processing **fee is ---------**[37] • The Procuring Entity or the Representative will not be responsible for any mistake occurred at the time of uploading of bid or thereafter. • If holiday is declared on physical submission (depositing documents in hard copy) & opening date of tender the scheduled activity will take place on next working day. The Bid security shall be paid in the name of ----------as stipulated in tender document.
ITB 5.1 (a)	The address where opening of the bid shall take place is: _____ _____ _____

[37] *This maybe modified as per the state IT Act/e-Procurement rules.*

ITB SECTION REFERENCE	REQUIRED INFORMATION
ITB 6.5	Amount of Performance Security (9%+1%): 9 % of the total Contract Price, which will be determined as under: Contract Price = 1) à Design and Build part as per BOQ Prices for STP + BOQ Prices for New/Replace Outfall/Interceptor sewer Line & SPSs + 2) à O&M part for O&M for STP for __ years + O&M for the Network & SPSs for __ year. *(As per scope, years)* Amount of Environmental, Social, Health and Safety (ESHS) Performance Security = 1% of the total Contract Price to be determined as above. • Performance Securities can be submitted by the bidder separately: (i) for the Contract Price of Design and Build part as per BOQ Prices for STP + BOQ Prices for New/Replace Outfall/Interceptor sewer Line & SPSs, and (ii) For the Contract Price of O&M part for O&M for STP for __ years + O&M for the Network & SPSs for __ year. *(As per scope, years)* Performance Security for Design and Build Part shall cover the period for design and build plus the first 3 years of O&M after completion of construction work. Performance Security for the O&M Part shall be in three years intervals to be extended/renewed up to the entire O&M period. Each O&M performance security shall be extended/renewed within 120 days prior to the expiry of the previous performance security.
ITB 6.7	Name of the Adjudicator proposed by the Owner: _____ (Daily fee for the Adjudicator: Rs._____ /day)) *[CV of the proposed Adjudicator shall be added to the bidding document.]*
ITB 6.9.1	If a Bidder wishes to make a Procurement-related Complaint, the Bidder should submit its complaint, in writing (by the quickest means available, that is either by email or fax), to: **For the attention**: *[insert full name of person receiving complaints]* **Title/position**: *[insert title/position]* **Employer:** *[insert name of Employer]* **Email address***: [insert email address]* **Fax number**: *[insert fax number]* ***delete if not used*** In summary, a Procurement-related Complaint may challenge any of the following: **1.** the terms of the Bidding Documents; and the Employer's decision to award the contract.

Annexure A to the Bidding Documents

a. Bidder's Bid Form
b. Bidder's Price Schedules
c. Form of Bid Security
d. Form of Performance Security
e. Format of Curriculum Vitae for Proposed Key Staff
f. Form for Clarification Questions
g. List of Eligible Countries
h. Qualification Criteria
i. Information Forms
j. Declaration Format for Deemed Export Benefits
k. Form of Letter of Intent by JV Partners
l. Form of Power of Attorney for Joint Venture
m. Form of undertaking by JV Partners

Annexure A – Part a

BIDDER'S BID FORM

Date:

Contract No:

[Name of Contract]: (i) design and build sewage treatment plant of installed capacity …. Mld and all appurtenant structures and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or diversion works with interception sewer of about …. km length including survey, design, construction of …. No. pumping stations and all appurtenant structures and allied works; and (iii) operation & maintenance of the complete works of sewage treatment plant, sewerage network and/or Interception & Diversion Works and pumping stations for a period of 15 years in ……., State of……., India.

To: [Name and address of Owner]

Gentlemen,

Having examined the Bidding Documents, including Addendum Numbers ***[insert numbers]***, the receipt of which is hereby acknowledged, **we, the undersigned, offer to** (i) Design, Build, Test, pre-commission and commission the STP; (ii) Review the Design, Build, Test, pre-commission and commission the Sewerage Network and/or Interception and Diversion works; and (iii) perform the subsequent Operation and Maintenance services under the above-named Contract in full conformity with the said Bidding Documents **for the amounts** specified in the Bidder's Financial Bid.

We meet the eligibility requirements and have no conflict of interest in accordance with ITB 1.2.2.

We have not been suspended nor declared ineligible by the Employer based on execution of a Bid Securing Declaration in the Owner's country in accordance with ITB 1.2.5.

We undertake, if our Bid is accepted, to commence the construction of STP and Sewerage Network and/or Interception & Diversion Works and to achieve Completion within the respective times stated in the Bidding Documents.

If our Bid is accepted, we undertake to provide an advance payment security and the Performance Security *and an Environmental, Social, Health and Safety (ESHS) Performance Security* in the form, in the amounts, and within the times specified in the Bidding Documents.

We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 1.2.2 (e), other than alternative bids submitted in accordance with ITB 3.13;

We, including any of our subcontractors or suppliers for any part of the contract, have not been declared ineligible by the Owner, under the Owner's country laws or official regulations;

We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 1.2.4;

We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount
---	---	---	---
---	---	---	---
---	---	---	---
---	---	---	---

(If none has been paid or is to be paid, indicate "none.")

[We accept the appointment of *[name proposed in Bid Data Sheet]* as the Adjudicator.]

or

[We do not accept the appointment of *[name proposed in Bid Data Sheet]* as the Adjudicator, and we propose instead that *[name]* be appointed as Adjudicator, whose résumé and hourly fees are attached.]

We agree to abide by this Bid, which consists of this letter and the other documents listed in ITB Section 3.14 (a), for ..... days, the period identified in the Bid Data Sheet as the length of the Bid Validity Period, and it shall remain binding upon us and may be accepted by you at any time before the expiration of that period.

Until a formal contract is prepared and executed between us, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding contract between us.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption.

We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this ____day of _____, *[Year]*.

_____

[signature]

In the capacity of _____

[position]

Duly authorized to sign this bid for and on behalf of _____

[name of Bidder]

Appendix to Bid

Schedule of Adjustment Data

[Where the Contract Period (excluding the Operation and Maintenance Period) exceeds eighteen (18) months, it is normal procedure that prices payable to the Operator shall be subject to adjustment during the performance of the Contract to reflect changes occurring in the cost of labor and material components. In such cases the bidding documents shall include a formula for price adjustment in SCC 5.1.

Where Contracts are of a shorter duration than eighteen (18) months or in cases where there is to be no Price Adjustment, the following provision shall not be included.]

Bidders' attention is drawn to the following definition provided in Schedule 8 of the Contract.

Base Date: For the purpose of Price Adjustment Clause, 'Base Date' shall be the date 28 days prior to the deadline for submission of bids for the contract.

In Tables "A (STP) and "B (Network and I & D)" below, the Bidder shall (a) indicate its amount of local currency payment, and (b) indicate its proposed source and base values of indices for the different foreign currency elements of cost.

Table A (STP).

Index code*	**Index description***	**Source of index***	**Base value and date***	**Bidder's related currency amount**	**Bidder's proposed weighting[38]**
A	Nonadjustable	-	—	—	a = 0.15
B	Labor - Consumer price index for industrial workers for .....centre	Labour Bureau, Ministry of Labour & Employment, Government of India	-	-	b = 0.25 – 0.35
C	Material[39] - All India Wholesale Price Index (all commodities)	Economic Advisor to the Government of India, Ministry of Commerce and Industry			c = 0.50 -0.60
			Total	a + b + c	**1.00**

The Bidder shall specify a value in the last column of the Table within the range indicated therein such that the total weighting = 1.00

[38] *The Owner should insert appropriate possible ranges for weighting of index*

[39] ** The Owner may revise the Index, if this is not appropriate and indicate the source of index [reference Schedule 8]*

Table B (Network and I & D).

Index code	Index description	Source of index	Base value and date	Bidder's related currency amount	Bidder's proposed weighting[40]
1.	Nonadjustable	-	-	-	**0.15**
2.	Labour - Pl				* - *
3.	Cement - Pc				* - *
4.	Steel - Ps				* - *
5.	Bitumen - Pb				* - *
6.	POL - Pf				* - *
7.	Plant & Machinery Spares - PP				* - *
8	Other materials - Pm[41]				* - *
			Total		**1.00**

Notes:

1. Source of Index for respective Indices shall be the same as indicated under Para 4.2 of "Schedule 8 - Price Adjustment" attached to the Contract.

2. The Bidder shall specify a value in the last column of the Table within the range indicated therein such that the total weighting = 1.00

[40] *The Owner should insert appropriate possible ranges for weighting of index [reference Schedule 8]*
[41] * *The Owner may revise the Index and should indicate the source of index[reference Schedule 8]*

Indicative Flow Rate for STP and SPSs

Indicative Flow Rate for the purpose of evaluation of bids in accordance with ITB 5.6 (c) (v) & (vi) during the Operation Period shall be as follows:

For STP & MPS

Year of Operations	**Indicative Sewage Flow Rate for STP & MPS (MLD)**
Year One	……
Year Two	……
Year Three	……
Year Four	……
Year Five	……
Year Six	……
Year Seven	……
Year Eight	……
Year Nine	……
Year Ten	……
Year Eleven	……
Year Twelve	……
Year Thirteen	……
Year Fourteen	……
Year Fifteen	……

"Indicative Flow Rate for STP" means the rate of sewage flow which is projected by the Owner to be available for treatment in the STP facility for each of the 15 years of the O&M period.

For Network

Year of Operations	**Indicative Sewage Flow Rate for SPS (MLD)**		
	SPS A	**SPS B**	**SPS C**
Year One	……	……	……
Year Two	……	……	……
Year Three	……	……	……
Year Four	……	……	……

Year Five	……	……	……
Year Six	……	……	……
Year Seven	……	……	……
Year Eight	……	……	……
Year Nine	……	……	……
Year Ten	……	……	……
Year Eleven	……	……	……
Year Twelve	……	……	……
Year Thirteen	……	……	……
Year Fourteen	……	……	……
Year Fifteen	……	……	……

"Indicative Flow Rate for SPS" means the rate of sewage flow which is projected by the Owner to be available for handling in the respective SPSs for each of the 15 years of the O&M period.

Annexure A – Part b

BIDDER'S PRICE SCHEDULES

1.1 The Price Schedules do not give a full description of the STP, Network, and O & M for 15 years and other services, to be supplied and the Services to be performed under each item. Bidders are deemed to have read the Draft Contract, including the Technical Specifications Schedule, consisting of the Design-Build Services Schedule, Operations Services Schedule and Technical Standards Schedule, and other sections of the Bidding Documents to ascertain the full scope of the requirements of the Contract included in each item prior to filling in the prices. The entered prices are deemed to include the full scope as aforesaid, including overheads and profit.

1.2 If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with the Instructions to Bidders in the Bidding Documents prior to submitting their Bid.

1.3 Prices shall be filled in indelible ink, and any alterations necessary due to errors shall be initialled by the Bidder. As specified in the Bid Data Sheet, prices shall be fixed and firm for the duration of the Contract, except if as adjusted in accordance with the Contract.

1.4 The Bid Price shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Documents. For each item, Bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

1.5 Bidder shall submit with its bid details evidencing that the cost claimed for the payment is based on a realistic assessment of setting up the STP and Sewerage Network and/or Interception & Diversion Works. The Owner shall have the option to seek further details including details of costs of similar contracts executed by the Bidder in the past.

1.6 Prices given in the Schedules Part A to Part E against each item shall be for the scope covered by that item as detailed in the Draft Contract or elsewhere in the Bidding Documents.

1.7 The Owner will make payments in INR only.

1.8 The Bidder shall provide separate table giving details of taxes, duties, levies and other applicable taxes considered by him and included in the prices offered under different Parts of the Price Schedules. Goods and Service Tax shall not be included in the prices and the same shall be paid separately by the Owner if applicable against proof of applicability and payment.

SEWAGE TREATMENT PLANT& NETWORK AND/OR I&D WORKS

Grand Summary

SN	Component	Price[42]
1.	Total Bid Price for STP (Design-Build of STP and NPV of 15 years' O&M of STP for the "Indicative Flow Rate for STP")	
2	Cost of Land required for STP)	
3.	Total Bid Price for Network and/or I&D & SPSs (Design-Build of Network and/or I&D & SPSs and NPV of 15 years' O&M of Network & SPSs for the "Indicative Flow Rate for SPSs")	
Grand Total Bid Price in figures		
Grand Total Bid Price in words		

Note: Figures in Table are arrived at from figures in Tables Ab1 and Ab5

SEWAGE TREATMENT PLANT

Table Ab1 - Bid Price Summary STP[43]

No.	Component	Price
1.	Price Schedule: Part A (STP) – Design-Build price	
2.	Price Schedule: Part B & C (STP) – NPV of Total O & M Price for 15 years	
3	Cost of Land required for setting up STP	
Total Bid Price in figures		
Total Bid Price in words		

Note: Figures in Table Ab1 are arrived at from Tables Ab2 and Ab3.

Table Ab2 - Price Schedule: PART A (STP) – Design-Build Price

[42] *Total price in INR only.*
[43] *Price to be quoted in INR only.*

S.N.	Works Activity	Design-Build Price[44]
1	Design, development, supply of equipment, erection of equipment, civil, electro mechanical and instrumentation control works, including testing, commissioning of ___ MLD STP in ___ with appropriate and cost effective technology.	
Break-up of Price of item 1 above		
1A	Civil and Structural Works (including that required for disposal and reuse of treated effluent)	
1B	Installation, testing and commissioning of Electro – mechanical and Instrumentation equipment and accessories including equipment for electricity generation from solar photovoltaic arrangement.	
1C*	Ancillary works like approach roads, bridges, compound wall with gates, internal roads, area grading etc.	
1D**	Implementation of Environmental Management Plan and ESHS-MSIP, as per Appendix 1 of Schedule 2 (Design Build Services)	
	Total Design Build Price	
	Amount in Words	

* *[EA should enter details for item 1C as per actual scope of work to be covered by the Contract]*

[44] *Price to be quoted in INR only.*

Table Ab3 - Price Schedule

PARTS B & C (STP) - Annual O&M Price and Additional O&M Price

Year of Operations	**Currency (INR)**[45]	**PART B** **Annual O & M Price for treatment of Threshold Sewage Flow of __ MLD** **(Amount)** **(a)**	**PART C** **Additional O&M Price for treatment of additional sewage in excess of the Threshold on a per MLD basis** **(b)** **(Amount Per MLD)**	**Total O&M Price -** assuming Indicative Sewage Flow reaching the STP **c = a + b* x (x = indicative flow minus threshold sewage flow)** **(c)**	**NPV Factor** (Based on discount factor of 10% p.a.) **(d)**	**NPV of O&M Price** **e = c * d**
1					0.909	
2					0.826	
3					0.751	
4					0.683	
5					0.621	
6					0.564	
7					0.513	
8					0.467	
9					0.424	
10					0.386	
11					0.350	
12					0.319	
13					0.290	
14					0.263	
15					0.239	
NPV of Total O&M Price for 15 years assuming "Indicative Flow Rate" in figures: In words:						

[45] *Price to be quoted in INR only*.

Cost of Land required for setting up STP

(For the purpose of Price Evaluation as per ITB Section 5.6)

S. N.	Component	Area/Price
1.	Area of Land required for STP as per ITB Section 3.3 (c) - in **Sq M**	
2.	Price of Land as per BDS - ITB 3.3 (c) – in **INR** per square meter	
Cost of land required for STP: (SN 1) x (SN 2) – in **INR** In figures: In words:		

Guaranteed Electricity Consumption for STP

The Electricity Consumption guaranteed by the bidder during the O&M period, for the purpose of ITB 3.11 (c) shall be as under:

Table Ab4 - Part G (STP) Guaranteed Electricity Consumption

Year of Operations	***Guaranteed Electricity Consumption (KWh / MLD)***
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

.

SEWERAGE NETWORK AND/OR I&D WORKS

Table Ab5 - Bid Price Summary (Network and/or I&D works & SPSs)[46]

No.	Component	Price
1.	Price Schedule: Part D 1 (Network/I&D Works) – Design-Build Price	
2.	Price Schedule: Part D2 (... Nos. SPSs) – Design-Build Price	
3.	Price Schedule: Part E (Network/I&D Works & ....SPSs) – NPV of Total O & M Price for 15 years	
Total Bid Price in figures		
Total Bid Price in words		

Note: Figures in Table Ab5 are arrived at from figures in Table Ab6.

Price Schedule - Part D 1 - Bills of Quantities[47]

Table Ab6 - Abstract of Prices quoted by the Bidder[48]

Sl. No.	Description	Cost of complete work	
		In Figures	**In words**
1	2	**3**	**4**
Part 1 – Construction works			
A	**Sewerage Network**		
	Undertaking Preparatory Survey, Reviewing the design and redesigning, if necessary, for the Sewerage Network& design of SPSs		
1	Supply & Laying of lateral/ branch/ main/ trunk Sewers including house connections by open cut method.		
2	Supply & Laying of lateral/ branch/ main/ trunk Sewers including house connections by trenchless method.		
3	De-silting & Rehabilitation of existing trunk sewer.		

[46] *Price to be quoted in INR only.*
[47] *This is an indicative BOQ as an example. Provide a detailed BOQ in accordance with the DPR*
[48] *Price to be quoted in INR only.*

B	**I&D WORKS**		
	Undertaking Preparatory Survey, Reviewing the design and redesigning, if necessary, for the I&D works & design of SPSs		
1	Tapping and Diversion Structure		
2	Laying of Gravity Intercepting Sewer		
C	**Laying of Rising Mains**		
I	Supply & Laying of rising mains		
D	**Restoration of roads**		
	Restoration of roads damaged due to sewer laying work		
	Part D 2 - Bills of Quantities - Sewage Pumping Stations		
1	Construction of Sewage Pumping Station A		
2	Construction of Sewage Pumping Station B		
3	Construction of Sewage Pumping Station C.		
	Part D3 - Implementation of Environmental Management Plan and ESHS-MSIP, as per *** of particular conditions of contract		
Total (Construction work (Part D1+Part D2+Part D3)			
Part 2 – 15 Years O & M works.			
15 Years O & M Cost of sewer network and/or I&D Works, all the SPS and related rising mains.			
Total (Bid Price)			

Note: Figures in Table Ab6 are arrived at from figures in Tables Ab7 and Ab8.

[EA may please examine and correct the table numbers assigned for detailed tables below as per requirements.]

Signature of Bidder
Name of Bidder
Rubber stamp with Designation
Date
Place :

Signature of Engineer:
Name of Engineer
Designation
Date
Place :

SEWERAGE NETWORK and/or I&D Works

Table Ab7 - Abstract of Bid Prices (Capital works)

Sl. No.	Description of Items	Tendered Cost[49]		
		Civil Works	E& M Works	Total
1	2	3	4	5
Part 1 – Construction works				
A	**Sewerage Network** and/or I&D Works			
	Undertaking Preparatory Survey, Review the design and Redesign for the Sewerage Network and/or I&D Works & Design of SPSs.			
1	Supply & Laying of lateral/ branch/ main/ trunk Sewers including house connections by open cut method.		-	
2	Supply & Laying of lateral/ branch/ main/ trunk Sewers including house connections by trenchless method.		-	
3	Construction of I&D works including interception sewer upto SPS.			
4	De-silting & Rehabilitation of existing trunk sewer		-	
B	**Sewage Pumping Stations.**			
1	Construction of Sewage Pumping Station A.			
2	Construction of Sewage Pumping Station B.			
3	Construction of Sewage Pumping Station C.			
C	**Laying of Rising mains**			
	Supply & of Laying of rising mains		-	
D	**Restoration of roads**			
	Restoration of roads damaged due to sewer laying work		-	
E	Implementation of Environmental Management Plan and ESHS-MSIP, as per *** of particular conditions of contract	**Lump Sum**		
Total (Construction work)				

Note: Figures in Table Ab7 are arrived at from figures in Tables Ab9 and Ab10.

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation
Date

Signature of the Engineer
Name of the Engineer
Designation
Date

[49] *Price to be quoted in INR only*

SEWERAGE NETWORK and/or I&D Works

Table Ab8 - Abstract of Tendered Cost (15 Years O&M cost)

Sl. No.	Description of Items	Tendered Cost[50]		
		Civil Works	E& M Works	Total
1	2	3	4	5
i	O&M cost of sewer network and/or I&D Works of lateral/ branch/ main/ trunk Sewers including house connections		-	
iia	Sewage Pumping Station A with its rising mains			
iib	Sewage Pumping Station B with its rising mains			
iic	Sewage Pumping Station C with its rising mains			
iii	Rising mains			
Total				
Total Amount in Words				

Note: Figures in Table Ab8 are arrived at from figures in Table Ab13.

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation

Signature of the Engineer
Name of the Engineer
Designation

Date

[50] *Price to be quoted in INR only*

SEWERAGE NETWORK and/or I&D WORKS

TABLE AB9 - BILL OF QUANTITIES OF CIVIL WORKS

Part-1 Construction Civil Works

S.No.	Item of Work	Unit	Quantity	Rate[51] In Figure	Total Amount
1	2	3	4	5	6
A Sewerage Network					
1 Sewer Laying work by open cut method					
1	Supply & laying of following sizes of HDPE Class PN 6/ R.C.C. Hume pipe NP3 Class Socket / spigot pipes, rubber rings jointing materials and specials from store to the work lowering the same in to the trenches up to depth as specified below G.L. true to alignment and gradient including barricading of site, traffic diversion arrangement, dismantling of roads, mechanical/ manual excavation, dewatering (as per requirement), shoring & timbering with mild steel/ wooden planks, construction of required class beddings, construction of RCC/ brick masonry circular/ rectangular or precast manholes in accordance with the provisions laid down in latest version of IS 4111 (Part 1), refilling of trenches with proper compaction including disposal of surplus earth with in 8 km radius, temporary reinstatement of dismantled roads, cost of all jointing material, testing & commissioning etc. complete including supply (except HDPE/ RCC Pipe) of all material, labour, T&P etc. required for proper completion of work.				
(i)	900mm dia NP3 Pipe				
	3.0 to 4.50m BGL	m			
	4.5 to 6.00m BGL	m			
(ii)	800mm dia NP3 Pipe				
	0 to 1.50m BGL	m			
	1.5 to 3.00m BGL	m			
	3.0 to 4.50m BGL	m			
	4.5 to 6.00m BGL	m			
	6.0 to 7.50m BGL	m			
(iii)	700mm dia NP3 Pipe				
	0 to 1.50m BGL	m			
	1.5 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
	6.00 to 7.50m BGL	m			
(iv)	600mm dia NP3 Pipe				
	0 to 1.50m BGL	m			
	1.5 to 3.00m BGL	m			
	3.0 to 4.50m BGL	m			
	4.5 to 6.00m BGL	m			

[51] *Price to be quoted in INR only.*

S.No.	Item of Work	Unit	Quantity	Rate[51] In Figure	Total Amount
(v)	500mm dia NP3 Pipe				
	0 to 1.50m BGL	m			
	1.5 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
	6.00 to 7.50m BGL	m			
(vi)	400mm dia NP3 Pipe				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
	6.00 to 7.50m BGL	m			
(vii)	350mm dia RCC NP3				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
	6.00 to 7.50m BGL	m			
(viii)	300mm dia RCC NP3				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
(ix)	250mm dia RCC NP3				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
(x)	200mm dia RCC NP3				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
(xi)	280mm (OD) dia HDPE Pipe				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
(xii)	225mm (OD) dia HDPE Pipe				
	0 to 1.50m BGL	m			
	1.50 to 3.00m BGL	m			
	3.00 to 4.50m BGL	m			
	4.50 to 6.00m BGL	m			
xiii	Construction of house connecting / inspection chambers in the vicinity of last property line including pipe & connection of House connection chamber to nearby manhole.	Nos			
xiv	Making House connections with the sewer line	Nos.			
Sub Total (1)					

S.No.	Item of Work	Unit	Quantity	Rate[51] In Figure	Total Amount
2 Laying of Gravity Sewers by Trench less method					
1	Supply of mild steel pipes of required thickness and Installation of product pipe by Guided Auger Bored method including making of entry and exit pits, all related civil works like excavation, shoring/strutting, etc., shielded excavation through auger boring process, lowering of pipe segments in the jacking pit, laying and jointing of product pipeline through jacking process from the jacking pit, construction of required manholes and restoration of site after project completion.				
	200 mm	m			
	250 mm	m			
	300 mm	m			
	350 mm	m			
	700 mm	m			
	800 mm	m			
	Sub Total (2)				
3 – Desilting and Rehabilitation of Gravity Sewers					
i	De-silting of the old trunk sewer of the following sizes using high pressure water jetting equipment and super sucker machines including plugging of manholes, by passing of sewage through alternate route, dewatering of isolated sewer section and disposal of silt at suitable place as per direction of Engineer in-charge including all labour , T&P equipment and safety measures etc. all complete.				
	1000 x 1150 mm	m			
ii	Inspection/ Condition assessment of old trunk sewer by CCTV with high optical and colour resolution able to view either side of pipe to view lateral connections and pipe barrel with fish view eye.				
	1000 x 1150 mm	m			
iii	Preparation of Internal surface of following size of sewer (Falling in the section), CIPP? GRP lining designed for suitable rehabilitation of the sewer/manholes to act with existing sewer fabric and annulus grout to form a composite structure inclusive of including all labour, T&P equipment and safety measures etc. required for completion of work also including testing and commissioning of the rehabilitated sewer section.				
	1000 x 1150 mm	m			
iv	Final CCTV survey after completion of lining work for verification.				
	1000 x 1150 mm	m			
v	Rehabilitation of Manholes	No.			
	Sub Total (3)				
	Total A(1+2+3)				
B **I&D WORKS**					
1 Tapping and Diversion Structure					
1	Making of earthen bund across the existing				

S.No.	Item of Work					Unit	Quantity	Rate[51] In Figure	Total Amount
	drain for diversion of flow.								
	Tapping for Nala A					cum			
	Tapping for Nala B					cum			
	Tapping for Nala C					cum			
2	Excavation of earth in ordinary soil (loan, clay and sand) for diversion of drain, chamber for depth upto 1.50m below G.L. including watering, ramming, dressing, filling back between wall and foundation and disposal of surplus earth with 50M including supply of all labours and T&P etc. required for the proper completion of work.								
		Nala A	Nala B	Nala C	Total				
	0-1.5 m					cum			
	1.5 – 3.0 m					cum			
	3.0-4.5 m					cum			
3	Concrete in 1:4:8 with cement, coarse sand and 40mm gauge stone ballast including supply of all materials labours and T&P etc. required for the proper completion of work.								
	Tapping for Nala A					cum			
	Tapping for Nala B					cum			
	Tapping for Nala C					cum			
4	Reinforced cement concrete M-25 with cement coarse sand and 20mm stone grit in foundation footing etc. excluding supply of reinforcement and its bending but including its fixing, binding the same with 0.50mm thick binding wire (to be supplied by the contractor) including of all materials, labour, and T&P etc. required for the proper completion of work								
	Tapping for Nala A					cum			
	Tapping for Nala B					cum			
	Tapping for Nala C					cum			
5	Mild steel or iron work in plane work such as in R.C.C work (When not included in over all rates) wrought to the required shape as necessary including bending for the completion of work and including supply of all materials, labours, T&P etc. complete.								
	1.5% of Total R.C.C quantity								
	Tapping for Nala A					kg			
	Tapping for Nala B					kg			
	Tapping for Nala C					kg			
	Sub Total (1)								
2 Laying of Gravity Intercepting Sewer									
1	Supply & laying of following sizes of HDPE Class PN 6/ R.C.C. Hume pipe NP3 Class Socket								

S.No.	Item of Work					Unit	Quantity	Rate[51] In Figure	Total Amount
	/ spigot pipes, rubber rings jointing materials and specials from store to the work lowering the same in to the trenches up to depth as specified below G.L. true to alignment and gradient including barricading of site, traffic diversion arrangement, dismantling of roads, mechanical/ manual excavation, dewatering (as per requirement), shoring & timbering with mild steel/ wooden planks, construction of required class beddings, construction of RCC/ brick masonry circular/ rectangular or precast manholes in accordance with the provisions laid down in latest version of IS 4111 (Part 1), refilling of trenches with proper compaction including disposal of surplus earth with in 8 km radius, temporary reinstatement of dismantled roads, cost of all jointing material, testing & commissioning etc. complete including supply (except HDPE/ RCC Pipe) of all material, labour, T&P etc. required for proper completion of work.								
(i)	…..mm dia NP…. Pipe	Nala A	Nala B	Nala C	Total				
	….. to …..m BGL					m			
	….. to …..m BGL					m			
	Sub Total (2)								
	Total B (1+2)								
C	**Sewage Pumping Stations**								
1	**Construction of SPS A of ….. mld Average Capacity**								
i	Construction of wet well					LS			
ii	Construction of Screen Channels					LS			
iii	Valve chamber					LS			
iv	Construction of MEP Building					LS			
v	Construction of HT panel/ metering room.					LS			
vi	Construction of transformer yard with mild steel grill around it.					m			
vii	Construction of platform for Diesel Generator including mild steel grill around, shed over the generators and generator foundation.					LS			
viii	3.6 m Approach road					m			
ix	Boundary wall & fencing with 2 gates					LS			
x	Firefighting arrangements, land scaping, site development etc.					LS			
xi	Construction of Type B staff quarters (Each of Plinth area 58.50 m^2)					Nos			
	Sub Total (1)								
2	**Construction of SPS B of …….. mld average Capacity**								
i	Construction of wet well					LS			
ii	Construction of Screen Channels					LS			
iii	Valve chamber					LS			

S.No.	Item of Work	Unit	Quantity	Rate[51] In Figure	Total Amount
iv	Construction of MEP Building	LS			
v	Construction of HT panel/ metering room.	LS			
vi	Construction of transformer yard with mild steel grill around it.	m			
vii	Construction of platform for Diesel Generator including mild steel grill around, shed over the generators and generator foundation.	LS			
viii	3.6 m Approach road	m			
ix	Boundary wall & fencing with 2 gates	LS			
x	Firefighting arrangements, landscaping, site development etc.	LS			
xi	Construction of Type B staff quarters (Each of Plinth area 58.50 m^2)	Nos			
	Sub Total (2)				
3	**Construction of SPS C of …… mld average Capacity**				
i	Construction of wet well	LS			
ii	Construction of Screen Channels	LS			
iii	Valve chamber	LS			
iv	Construction of MEP Building	LS			
v	Construction of HT panel/ metering room.	LS			
vi	Construction of transformer yard with mild steel grill around it.	m			
vii	Construction of platform for Diesel Generator including mild steel grill around, shed over the generators and generator foundation.	LS			
viii	3.6 m Approach road	m			
ix	Boundary wall & fencing with 2 gates	LS			
x	Firefighting arrangements, landscaping, site development etc.	LS			
xi	Construction of Type B staff quarters (Each of Plinth area 58.50 m^2)	Nos			
	Sub Total (3)				
	Total C(1+2+3)				
D	**Laying of Rising main**				
i	Supply of following diameter DI K9 Socket / spigot pipes, rubber rings jointing materials and specials from store to the work lowering the same in to the trenches up to depth as specified below G.L. true to alignment dismantling of roads, mechanical/ manual excavation, dewatering, shoring & timbering, if required, with mild steel/ wooden planks, refilling of trenches with proper compaction including disposal of surplus earth with in 8 km radius, temporary reinstatement of dismantled roads, cost of all jointing material, testing & commissioning including supply (except DI Pipe) of all material, labour, T&P etc. required for proper completion of work including supply & fixing of same size sluice valves & 100/ 150 mm size air valves.				
	450 mm DI K9 pipe from SPS A to the sewer line	m			

S.No.	Item of Work	Unit	Quantity	Rate[51] In Figure	Total Amount
	350 mm DI K9 pipe from SPS B to the sewer line	m			
	700 mm DI K9 pipe from SPS C to the sewer line	m			
ii	Construction of special manhole chamber of 2.00m diameter, and its interconnection with adjacent manhole of the sewer line with the appropriate size of sewer pipe of RCC NP3 pipe.	Nos			
	Total (D)				
E Restoration of roads					
1	Class A roads e.g. National Highways / State Highways (Maintained by State PWD)				
(a)	Sub Base, Base course and load bearing crust (in trench portion)	m^2			
(b)	Top surfacing in full with of single lane of road)	m^2			
2	Class B roads e.g. MDR/ ODR/ Village roads(in trench portion)				
(a)	Sub Base, Base and load bearing crust (in trench portion)	m^2			
(b)	Top surfacing in full with of single lane of road)	m^2			
3	Cement Concrete roads	m^2			
4	Interlocking cement concrete blocks (Considering reuse of 75% of the old concrete blocks and 25% new concrete blocks)	m^2			
5	Brick on edge (Considering reuse of 50% of the old bricks and 50% new bricks)	m^2			
E.	Implementation of Environmental Management Plan and ESHS-MSIP, as per *** of particular conditions of contract	LS			
	Total (E)				
	Total Civil Works (A+B+C+D+E)				
	Total Amount in Words				

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation

Signature of the Engineer
Name of the Engineer
Designation

Date

SEWERAGE NETWORK AND/OR INTERCEPTION & DIVERSION WORKS

BILL OF QUANTITIES OF ELECTRO MECHANICAL WORKS

Table No. Ab10 – Abstract Of Electromechanical Works

S. No.	Name of Pumping Station	Quoted Bid Price[52]	
		In Figure	in Words
1	I&D A		
2	I&D B		
3	I&D C		
4	SPS A		
5	SPS B		
6	SPSC		
	Total		

Note: Figures in Table Ab10 are arrived at from figures in Table Ab11.

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation

Signature of the Engineer
Name of the Engineer
Designation

Date

[52] *Price to be quoted in INR only.*

Table Ab11[53] - Bill of Quantity For Electricals And Mechanicals Works S.P.S. A and/or I&D A

Sl. No.	Description	Unit	Qty	Rate in Figures[54]	Total Amount
1	2	3	4	5	6
A	**Supply, Storage, Testing, installation, commissioning and trial run of 3 month of following.**				
	Sub Station				
1	Power Connection	Job			
1.1	Transformer including H.T. panels-(incoming &Outgoing)	Nos			
1.2	Main L.T. Panel including incoming Panel, bus coupler, APFC Panel Load Distribution Panel	Lot			
	Power Wiring				
1.3	3x95mm² XLPE, H.T Cable	m			
1.4	2x3½x150mm² LT cable(2 run for each transformer)	m			
1.5	Jointing material	lot			
	Earthing				
1.6	**G.I.Plate earthing**	Nos			
1.7	Earthing strip (25x3mm)	m			
2	**Pumping Plant**				
2.1	Pumping Plant(Submersible) with pump, motor & starter and S.S Guide rail system and composite control panel	Set			
3	**Main Piping and Valves**				
3.1	Main piping and Valve (Sluice Valve, Reflex valve, S.S. Nut bolt washer with rubber packing, Pipings with common header.				
4	**Metering apparatus**				
4.1	Gauges	Nos			
4.2	Electro Magnetic flow meter	No			

[53] EA to insert a separate table for each SPS
[54] *Price to be quoted in INR only.*

5	**Lifting arrangement**				
5.1	Lifting arrangement including H.O.T. crane with travelling trolley & chain pulley block.	Lot			
6	**Spares**				
6.1	Necessary Spare parts of pumps.	Lot			
6.2	Tools and plant(For Pumping Plant and Substation-1 lot each)	Lot			
7	M.S. trusses	kg			
7.1	Chequered plate and Guards	kg			
8	Light wiring(Internal and external complete)	Job			
9	**D.G.SET**				
9.1	Diesel generating set rating 125KVA/0.400 KV with control panel	Set			
	Power wiring and earthing				
9.2	3½x150mm² LT cable	Lot			
9.3	Jointing material	Lot			
9.4	Plate earthing	Set			
9.5	G.I. Strips(25x3mm size)	Job			
9.6	Electric Resistance rubber sheets.	kg			
10	**Painting**				
10.1	Painting of all pumps piping and Valves etc.	Job			
11	Bar Screens (Manual and mechanical) and sluice gate	Lot			
B	E&M Works for I&D at Tapping of Nalas				
1	Providing and fixing of M.S. coarse screen of 40mm opening 8mm thick flat including supply of all materials labour and T&P etc for proper completion of work.				
2	Supply & fixing of following size CI sluice Gate of following sizes				
	……mm X ……mm				

	……mm X ……mm				
				Total Cost	
				Amount in Words	

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation

Signature of the Engineer
Name of the Engineer
Designation

Date

SEWERAGE NETWORK and/or I&D WORKS - SPS

Table Ab12 - Guaranteed Electricity Consumption for SPS[55]

The Electricity Consumption guaranteed by the bidder, for the purpose of ITB 3.11 (c), shall be as under:

Year of Operations	***Guaranteed Electricity Consumption (KWh / MLD of Sewage pumped)***
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation
Date

Signature of the Engineer
Name of the Engineer
Designation

[55] This Table should be retained if operation of an SPS is included in the scope of work.

SEWERAGE NETWORK and/or I&D WORKS & SEWAGE PUMPING STATIONS

Table Ab13 - PART E (Network) – Annual O&M Prices

O&M Price for Operation and Maintenance of the Sewerage Network, and/or I&D works, Rising Mains, Sewage Pumping Stations etc. for each of the 15 years of the Operations Period as provided in the table below

Year of Operations	**Currency (INR)**[56]	**Quoted Bid Price for 15 Years Operation and Maintenance**					Factors for working out of NPV of O & M Price to Date of Commencement of O&M	NPV of O & M Price **(7) x (8)**
		Sewer network & rising mains	SPS….A	SPS….B	SPS….C	Total Price (3+4+5+6)		
1	2	3	4	5	6	7	8	9
1							0.909	
2							0.826	
3							0.751	
4							0.683	
5							0.621	
6							0.564	
7							0.513	
8							0.467	
9							0.424	
10							0.386	
11							0.350	
12							0.319	
13							0.290	

[56] *Price to be quoted in INR only.*

14							0.263	
15							0.239	
Total 15 years' O&M Price								
NPV of Total 15 years' O&M Price for Network & SPSs **In figures** **In words**								

Note: Figures in Table Ab13 are arrived at from figures in Tables Ab14 and Ab15.

Note:

a. The Bidder shall provide with his bid, calculations showing total land requirement for Pumping Stations etc.

b. The bidder shall furnish break-up of the O&M prices as under for each year along with the respective calculation sheets in support of the Part B (lump-sum) prices quoted in the Table above.
[i] O&M charges for as applicable for each size of sewerage line separately on per Km basis;
[ii] O&M charges for the each set of pumping stations; and
[iii] O& M charges for other assets, if any.

c. The break-up of charges quoted by the bidder (Operator) shall be basis for determining the variation in the O&M payments for any period during which the scope of O&M services of the Operator is varied by the Owner owing to variation in the lengths of sewerage lines and number of pumping stations to be operated and maintained during the contract term, (Please refer Article 2 of Schedule 6 to the contract relating to Terms and procedure of Payment.)

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation
Date

Signature of the Engineer
Name of the Engineer
Designation

SEWERAGE NETWORK and/or I&D WORKS

Table Ab14 - Price for Operation & Maintenance of ….km sewerage network and/or I&D works **for 15 years**

Sl. No.	Description	Lump Sum Price[57]														
		1ST Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year	11th Year	12th Year	13th Year	14th Year	15th Year
1	Total Price for O&M of sewer network and/or I&D works and rising main for the 1st to 10th year including T& P charged & spares, Manpower, Cost of civil works, repair & maintenance including preventive maintenance, Cost of operating jetting cum suction machine including silt disposal and any other cost.															
	Total O&M Price for 15 years															
	Amount in Words															

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation

Signature of the Engineer
Name of the Engineer
Designation

Date

[57] *Price to be quoted in INR only.*

SEWAGE PUMPING STATION**Table Ab15 - Price for Operation & Maintenance of SPS…A[58] for 15 years**

Sl. No.	Description	Lump Sum Price[59]														
		1ST Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year	11th Year	12th Year	13th Year	14th Year	15th Year
	Fixed Price															
1	O & M cost including Spare Parts, tools and tackles Manpower, repair & maintenance of civil works, electromechanical works and all other costs related to operation and maintenance of SPS facility but excluding energy consumption.															
	Variable Price															
2	Cost of Energy per MLD of sewage pumped (Guaranteed Energy Consumption per MLD x Base Rate of Electricity Tariff.)															
3	Sewage to be pumped per year ("Indicative Flow Rate for SPS") *[EA to insert year wise figures]*															
4	Cost of Energy* (2x3)															
5	Total O & M Price (Fixed Price as per SN 1 + Variable Price as per SN 4)															
Total Price for O&M of SPS…..A for 15 years																
Amount in Words																

* Cost of energy is to be quoted based on the indicative sewage flow for the purpose of bid evaluation only. However payment of O & M charges to the Operator shall take into account the cost of energy calculated as per actual quantity of sewage pumped as detailed in Para 6 (d) of Schedule 6.

[58] EA to insert a separate table for each SPS
[59] *Price to be quoted in INR only.*

Signature of the Bidder
Name of the Bidders
Rubber stamp with Designation

Signature of the Engineer
Name of the Engineer
Designation

Date

Annexure A – Part c

FORM OF BID SECURITY (BANK GUARANTEE)

WHEREAS, ...(*name of Bidder including names of all Joint Venture Participants*) (hereinafter called "the Bidder") has submitted its Bid (hereinafter called the "Bid") dated (*date*) for the performance of (*name of Contract*).

KNOW ALL PEOPLE by these presents that We ..... (name of Bank) of

..... (name of country) having our registered office at ..... (hereinafter called "the Bank") are bound unto ..... (hereinafter called "the Owner") in the sum of .....for which payment well and truly to be made to the said Owner, the Bank binds itself, its successors, and assigns by these presents.

[The Bidder should insert the amount of the guarantee in words and in figures. This figure should be the same amount as set out in ITB Section 3.4 (a) and the Bid Data Sheet. The details related to the Bid Security are set out in the same ITB Section 3.4.]

The CONDITIONS of this obligation are:

a. if the Bidder withdraws its Bid during the Bid Validity Period; or

b. if the Bidder, having been notified of the acceptance of its Bid by the Owner during the period of Bid validity,

    1. fails to sign the Form of Contract in accordance with and when required by ITB Section 6.4; or

    2. fails to provide the performance security to the Owner in accordance with and when required by ITB Section 6.5.

We undertake to pay to the Owner up to the above amount upon receipt of its first written demand, without the Owner having to substantiate its demand, provided that in its demand the Owner will note that the amount claimed by it is due to it owing to the occurrence of one or more of the conditions set out above, specifying the occurred condition or conditions.

This Guarantee will remain in full force up to and including 45 days after the expiry of the Bid Validity Period and it may be extended by the Owner in accordance with the Bidding Documents, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date or the extended date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

.

SEALED with the Common Seal of the said

Bank this ..... day of ....., *[Year]*.

_____	_____
WITNESS	SIGNATURE OF THE BANK
(signature, name and address)	SEAL
	Name: _____
	Position: _____

Annexure A – Part d

FORM OF PERFORMANCE SECURITY

_____ *[Bank's Name, and Address of Issuing Branch or Office]*

Beneficiary: _____ *[Name and Address of Owner]*

Date: _____

PERFORMANCE GUARANTEE NO.: _____

We have been informed that _____*[name of Operator]* (hereinafter called "the Operator") has entered into Contract No. _____*[reference number of the contract]* dated _____with you, concerning a contract to Design, build, operate and transfer STP, Sewerage Network, Pumping Stations, all appurtenant structures and allied works in ……..*[city and State]*(hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Operator, we _____*[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____*[amount in figures]* (____) *[amount in words]*, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Operator is in breach of its obligations under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the earlier of:

(a) six months after the End Date, as defined in the Contract; or

(b) six months after the date of termination of the Contract pursuant to its terms.

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

Yours truly,

*[Name of Bank]*_____

Authorised Signature

Annexure A – Part d1

Environmental, Social, Health and Safety (ESHS) Performance Security

ESHS Performance Security

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of* Employer*]*

Date: _ *[Insert date of issue]*

ESHS PERFORMANCE GUARANTEE No.: *[Insert reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ (hereinafter called "the Applicant") has entered into Contract No. _____ dated _____ with the Beneficiary, for the execution of _____ (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ ( ),[1] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its Environmental, Social, Health and/or Safety (ESHS) obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the …. Day of ……, 2… [2], and any demand for payment under it must be received by us at this office indicated above on or before that date.

---

[1] *The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any, and denominated either in the currency (cies) of the Contract or a freely convertible currency acceptable to the Beneficiary.*

[2] *Insert the date twenty-eight days after the expected completion date as described in GC Clause 11.9. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period*

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

_____

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

---

not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

Annexure A – Part e

FORMAT OF CURRICULUM VITAE (CV) FOR PROPOSED KEY STAFF

Proposed Position: _____

Name of Firm: _____

Name of Staff: _____

Profession: _____

Date of Birth: _____

Years with Firm/Entity: _____ Nationality: _____

Membership in Professional Societies: _____

_____

Detailed Tasks Assigned: _____

_____

Key Qualifications:

[Give an outline of staff member's experience and training most pertinent to tasks on assignment. Describe degree of responsibility held by staff member on relevant previous assignments and give dates and locations. Use about half a page.]

_____

Education:

[Summarize college/university and other specialized education of staff member, give names of schools, dates attended, and degrees obtained. Use about one quarter of a page.]

_____

Employment Record:

[Starting with present position, list in reverse order every employment held. List all positions held by staff member since graduation, giving dates, names of employment organizations, titles of positions held, and locations of assignments. For experience in last ten years, also give types of activities performed and client references, where appropriate. Use about two pages.]

Languages:

[For each language indicate proficiency: excellent, good, fair or poor in speaking, reading and writing.]

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience. I also certify that I have only given permission for my CV to be included in the Bid submitted by

[Fill in name of Bidder here.]

Date:

[Signature of staff member and authorized representative of the firm]
Day/Month/Year

Full name of staff member:

Full name of authorized representative:

Annexure A – Part f

FORM FOR CLARIFICATION QUESTIONS

Bidder's Name: _____

Bidder's Address: _____			Date Submitted: _____	
Item No.	**Section Reference**	**Page No.**	**Section or Article No.**	**Question / Query / Clarification / Comment**
1.				
2.				
3.				
4.				
5.				
6.				

Annexure A – Part g

Eligible Countries

Eligibility for the Provision of Goods, Works and Non Consulting Services

In reference to ITB 1.3, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under 1.3: None

Annexure A – Part h

QUALIFICATION CRITERIA

Section 1. QUALIFICATION CRITERIA

1.1. General

a. Evaluation of the Bidders' qualifications will be based on compliance with all the following minimum pass-fail criteria regarding their general Design, build, construct, operation and maintenance experience of Sewage Treatment Plant and Sewerage Network, and/or Interception & Diversion Works, financial strength, personnel and management capabilities, and other relevant information as demonstrated by the Bidders' responses in the Information Forms that they submit as per the attached Bid Forms. Additional requirements for joint ventures are given in Section 2.

b. Bidders may submit the Bid either as,

   1. A stand-alone firm, company, legal entity formed as per the applicable law; or

   2. A joint venture of up to a maximum of 4 partners[60],

   provided that they meet the requirements of the Bidding Documents. For the purpose of assessing some qualification criteria, the qualifications and experience of Sub-Contractors may be included and the specific provisions in this regard are set out in Section 1.3.

1.2. Subcontracting

a. Bidders will be evaluated based on the qualifications of,

   1. the Bidder; and

   2. nominated Sub-Contractors and Sub-Consultants only with respect to the experience evaluation as set out in Section 1.3, and only if the Sub-Contractors and Sub-Consultants are nominated for the purpose of this bid.

   For the purposes of Section 1.6, Bidders may nominate personnel of Sub-Contractors and Sub-Consultants to fill the key positions, during the Design-Build Period and O&M period, as listed/referred to in the BDS - ITB 3.3 (h) (4).

b. The Bidder shall provide a detailed list of all nominated Sub-Contractors and Sub-Consultants and a record of their experience and qualifications in the applicable Information Forms. The Operator under the Contract shall be prohibited from entering into a contract or contracts that will result in the Operator exceeding the maximum

[60] *Maximum number of JV partners may be changed depending on specific requirements of the work and the figure should be consistent with BDS – ITB 1.2.1.*

percentage of subcontracting and sub-consulting permitted by the Owner, as set out in the BDS - ITB 3.3 (h) (6).

c. Bidders will not be permitted to change the Sub-Contractors and Sub-Consultants nominated in their Bid.

1.3. Operator's Responsibility

After award of the Contract, the subcontracting of any part of the work, except for those Sub-Contractors and Sub-Consultants nominated in the Bid, shall require the prior written consent of the Owner. Notwithstanding such consent, the Operator shall remain responsible for the acts, defaults, and neglects of all Sub-Contractors and Sub-Consultants during Contract implementation.

1.4. Experience in Construction and Operation and Maintenance of Sewage Treatment Plant and Sewerage Network and/or Interception & Diversion Works

For the purpose of determining a bidder's compliance with the qualification criteria specified in Annexure A – Part h, following definitions shall apply:

"Sewage Treatment Plant (STP) means a treatment facility designed, developed and constructed, and operated for primary and secondary treatment of sewage for its safe disposal complying with the regulatory norms. Waste stabilization pond / other pond process will not be covered under this definition"; and

"Sewerage Network" means the pipe line network laid for collecting the Sewage from consumer connections including 'nallaha', main, trunk, secondary lines from the individual take over points of the Consumers up to the Sewage Treatment Plant and including Sewage lifting and pumping stations and all appurtenant structures forming a part of both the New Sewerage Network and the Existing Sewerage Network".

"Interception & Diversion Works" means the diversion structure across nallah/drain along with intercepting sewer laid for conveying the sewage from nallah/drains up to the Sewage Treatment Plant and including Sewage lifting and pumping stations and all appurtenant structures forming a part of both the New/Existing Sewerage Infrastructure.

(a) The Bidder shall provide evidence that

1. The Bidder shall provide evidence that it has Designed, developed, built, tested and commissioned during last 7 years preceding the month of publication of NIT, STPs as *per following criteria:*
   1.a) <50 MLD Capcity: ***[Nearest lower integer]***
   1 STP – 80 % of Total capacity *(MLD)*
   2 STP – 60 % of Total capacity *(MLD)*
   3 STP – 40 % of Total capacity *(MLD)*

1.b) 51-100 MLD Capacity: ***[Nearest lower integer]***
1 STP – 60 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 30 % of Total capacity *(MLD)*

1.c) 100-150 MLD Capacity: ***[Nearest lower integer]***
1 STP – 50 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 25 % of Total capacity *(MLD)*

1.d) >150 MLD Capacity:
Case to Case basis

In case of special treatments, tertiary treatment etc. The Qualification Criteria maybe suitably modified on case to case basis

2. The bidder or his nominated sub-contractor has successfully commissioned at least one Sewage Treatment Plant with the same technology as proposed for this contract for the lowest STP capacity mentioned in clause 1.4 (a) 1. above, operating successfully for a period of 1 year during the last 7 years preceding the month of publication of NIT. *In case of special treatments, tertiary treatment etc. The Qualification Criteria maybe suitably modified on case to case basis*
3. The Bidder has the experience in operating and maintaining successfully STPs a*s per following criteria* during 1 year over the last 7 years preceding the month of publication of NIT

1.a) <50 MLD Capacity: ***[Nearest lower integer]***
1 STP – 80 % of Total capacity *(MLD)*
2 STP – 60 % of Total capacity *(MLD)*
3 STP – 40 % of Total capacity *(MLD)*

1.b) 51-100 MLD Capacity: ***[Nearest lower integer]***
1 STP – 60 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 30 % of Total capacity *(MLD)*

1.c) 100-150 MLD Capacity: ***[Nearest lower integer]***
1 STP – 50 % of Total capacity *(MLD)*
2 STP – 40 % of Total capacity *(MLD)*
3 STP – 25 % of Total capacity *(MLD)*

1.d) >150 MLD Capacity:
Case to Case basis
In case of special treatments, tertiary treatment etc. The Qualification Criteria maybe suitably modified on case to case basis

4. The treatment technology proposed for this contract has been adopted (not necessarily built by the bidder) in at least 3 locations during last 7 years preceding the month of publication of NIT and that such STP has been operating successfully (meeting the required performance standards and environmental norms specified in the Contract) for a period of minimum 2 years over a period of last 7 years preceding the month of publication of NIT.

5. It has designed, developed, built, tested and commissioned Sewerage Network and Pumping Station(s) of 80% length of the total scope of sewerage network collectively from maximum 3 projects during the last 7 years preceding the month of publication of NIT; of which 50 % should be above the pipe diameter (mm) of the highest dimension as proposed in the project scope as per the following criteria:

   - Up to 500mm – same dia or any higher diameter
   - 500-1000mm – next lower dia (Maximum by 100mm) or higher diameter
   - 1000 – 1500mm – next to next lower dia (Maximum by 200 mm) or higher diameter
   - >1500mm- Case to case basis shall be decided

6. The bidder or his nominated sub-contractor has operated and maintained Sewerage Network and Pumping station of 80% length of the total scope of sewerage network collectively from maximum 3 projects during 1 year over the last 7 years preceding the month of publication of NIT

7. [61] The bidder or his nominated sub-contractor has designed, built and commissioned Sewerage Network using trenchless technology for a minimum of 50% of the proposed length of the network to be laid using trenchless technology, during the last 7 years preceding the month of publication of NIT.

1.5. Financial Capabilities[62]

c. The Bidder shall demonstrate that it possesses a net worth equivalent to minimum of INR _____[63] Cr. or US$ .....in each of the last three financial years preceding the date of submission of bid.

d. The Bidder shall demonstrate by submitting along with its bid, a banker's certificate that it has available cash credit facility equivalent

[61] *This clause 1.4(a) (3) is to be included only if trenchless technology is required to be used in the work.*

[62] *Specify amounts in INR only in case of NCB*

[63] *The net worth is recommended to be 25% of the estimated Capital Cost for which the bids are being invited.*

to minimum INR .... million or US $ ..... million[64] as on the date of submission of bid.

e. The Bidder's audited balance sheets or, if not required by the laws of the Bidder's country, other financial statements acceptable to the Owner, for the last five years shall be submitted and must demonstrate the current soundness of the Bidder's financial position and indicate its prospective long-term profitability. If deemed necessary by the Owner, the Owner shall have the authority to make inquiries with the Bidder's bankers.

1.6. Personnel Capabilities

The Bidder shall supply general information on the management structure of the firm, and shall make provision for suitably qualified personnel to fill the key positions listed/referred to in the BDS – ITB 3.3 (h) (4), as required during Contract implementation. The Bidder shall supply information on a candidate for each key position, who shall meet the experience requirements specified. The Bidder may nominate personnel of sub-contractors and sub consultants to fill key positions listed/referred to in the BDS – ITB 3.3 (h) (4).

1.7. Litigation History, Legal Matters and ESHS Performance

The Bidder shall provide accurate information on the "Historical Contract Non-Performance Form" and "Environmental Social Health and Safety (ESHS) Performance Declaration" about contract non-performance, pending litigation and ESHS performance with respect to contracts completed or ongoing under its execution over the last five years. A consistent history of awards against the Bidder or any Partner of a joint venture may result in rejection of the Bid.

1.8. Right to Waive

The Owner reserves the right to waive minor deviations in the qualification criteria if they do not materially affect the capability of a Bidder to perform the Contract.

Section 2. JOINT VENTURES

2.1. Qualification Criteria

a. The Joint Venture partners shall together satisfy the criteria specified in Sections 1.4 (a) (1), 1.4(a) (3) and 1.4 (a) (5).

b. The joint venture partners or nominated sub-contractor(s) shall satisfy the requirements specified in Sections 1.4(a) (2), 1.4 (a) (6) and 1.4 (a) (7).

---

[64] *This amount should be equivalent to estimated average cash flow for 3 months in construction period.*

c. The Joint Venture partners shall jointly satisfy all the requirements specified in Section 1.4 of Qualification Criteria.

d. For the purpose of satisfying the qualification criteria set out in Section 1.5, Joint Venture partners must satisfy the following qualification criteria :

   1. financial soundness

      a. as stated in Section 1.5(a) for all partners jointly

      b. as stated in Section 1.5 (c) in respect of each partner of the JV;

   2. adequate sources to meet financial commitments as set out in Section 1.5 (b) for all partners jointly;

   3. personnel capabilities as stated in Section 1.6 for all partners jointly; and

   4. legal disclosure as stated in Section 1.7 for each partner of the JV.

e. Each partner of a joint venture Bidder shall provide the information to evidence compliance with the criteria set out in Sections 2.2(a) to (d).

2.2. (a) Lead Partner

One of the joint venture Partners who is responsible for performing a key function in contract management or in executing a major component of the proposed Contract shall be nominated as being in charge during the bidding process and, in the event of a successful bid, during Contract execution (the "Lead Partner"). The Lead Partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture. This authorization shall be evidenced by the submission of a power of attorney signed by legally authorized signatories of each of the joint venture Partners as per proforma enclosed in Annexure A - Part L, as part of the Bid.

(b) All Partners

All partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a copy of the undertaking as per format provided under Annexure A - Part M signed by the joint venture partners shall be submitted with the bid.

Annexure A – Part i

INFORMATION FORMS

Information Form (1)

General Information

All individual firms and each participant in a joint venture submitting the bids are required to complete the information in this form. Nationality information should be provided for all Bidders that are partnerships or individually owned firms.

If the Bidder proposes to use nominated sub-contractors or sub-consultants, the following information should also be supplied for the sub-contractor(s) and sub-consultant(s).

1.	Name of firm	
2.	Head office address	
3.	Telephone	Contact
4.	Fax	Telex
5.	Place of incorporation / registration	Year of incorporation / registration

Nationality of Owners[1]		
Name		Nationality
1.		
2.		
3.		
4.		
5.		

1. To be completed by all Owners of partnerships or individually owned firms.

INFORMATION FORM (2)

(ref. Annexure A Part h Section 2)

General Design, Build, Operation and Management Experience Information

Name of Bidder or participant of a joint venture

All individual firms and all participants of a joint venture are requested to complete the information in this form with regard to their experience in Designing, building, operating, managing and maintaining Sewage Treatment Plants and Sewerage Networks and/or Interception and Diversion Works

Description of Contract/ STP and Sewerage Network and/or Interception and Diversion Works Components along with its Capacity and appurtenant structures	
Name of Joint Venture Participant Responsible	
Name of City	
Country	
Population served	
Contract Role (joint venture participant, sub-contractor, sub consultant, lead, etc.) and percentage share in the total contract	
Nature, role and extent of participation (describe fully)	
Date of contract commencement	
Date of contract termination	
Contract value (INR)	
Individual for reference	
Address, Telephone, Fax for reference	

INFORMATION FORM (2A)

(Ref. Annexure A Part h Section 1.5)

Financial Capability Information[#]

Name of Bidder or participant of a joint venture

All individual firms and all participants of a joint venture are requested to complete the information in this form with regard to their experience in Designing, building, operating, managing and maintaining STPs and Sewerage Networks and/or Interception and Diversion Works. The information supplied should be the annual turnover of the Bidder (or each partner of a joint venture) in terms of the amounts billed to clients for each year for work in progress or completed, converted to INR at the rate of exchange at the end of the period reported. The annual periods should be calendar years, with partial accounting for the year up to the date of submission of Applications.

Use a separate sheet for each participant of a joint venture.

Bidders should not enclose testimonials, certificates, and publicity material with their Application as they will not be taken into account in the evaluation of qualifications.

Annual financial data (in the area of infrastructure development and engineering construction).			
Year	Turnover (Rs. Million)	Net Worth (Rs. Million)	Net Cash Accruals (Rs. Million)
[Year]			
[Year]			
[Year]			
[Year]			
[Year]			

Instructions and Applicable Conditions:

1. The applicant shall provide details of its own financial capacity;
2. The Applicant / its constituent Joint Venture Partners shall attach copies of balance sheets, financial statements and Annual report for 5 (five) years preceding the Application due date. The financial statements shall:
    a. Reflect the financial situation of the Bidder or Joint Venture Partners,
    b. Be audited by a statutory auditor
    c. Be complete including all notes to the Financial statements; and
    d. Correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted)
3. Net Worth (The definition of Net Worth shall be as follows: Based on the type of the Applicant whether a company, partnership firm, etc. the net worth is defined as follow:
    a. In case of a company registered under Companies Act, 1956: Net worth shall mean the sum of subscribed and paid up equity share capital and reserves from which shall be deducted the sum of revaluation reserves,

miscellaneous expenditure not written off and reserves not available for distribution to equity share holders.

For the company = (Subscribed and Paid-up Equity + Reserves) less (Revaluation reserves + miscellaneous expenditure not written off + reserves not available for distribution to equity share holders).

b. In case of a Partnership firm: Net worth shall mean the sum of Aggregate of partners' capital account and Reserves from which the aggregate of drawings by partners and aggregate of advances to partners shall be deducted.

For Partnership Firm = Aggregate of partners' capital account + Reserves - Aggregate of drawings by partners - Aggregate of advances to partners

c. In case of a Trust / Society: Net worth shall mean the sum of corpus and the returns not set aside for any particular purpose.

For Trust / Society = corpus + returns not set aside for any particular purpose

4. Net Cash Accruals shall be defined as follows: Net Cash Accruals = Profit after Tax + Depreciation;

5. Year 1 will be the latest completed financial year, preceding the bidding. Year 2 shall be immediately preceding year 1 and so on. In case the Bid Submission date falls within 3 (three) months of the close of the latest financial year of the applicant, it shall ignore such financial year for the purpose of its bid and furnish all its information and certification with reference to the 5 (five) years preceding its latest financial year. For the avoidance of doubt, financial year shall, for the purpose of the Bid hereunder, mean the accounting year followed by the Bidder in the course of its normal business.

6. The Bidder shall provide an Auditor's Certificate specifying the Net Worth and Net Cash Accruals of the Bidder and also specifying the methodology adopted for calculating such net worth in accordance with the formula mentioned in point 3 and 4 above.

7. The Bidder shall provide from its concerned client (s) or Statutory Auditor, certificate(s) stating the payments made / received or works commissioned, as the case may be, during the past 5 (five) years in respect of the Projects specified in Information Forms 2, 3A and 3B.

INFORMATION FORM (2B)

Joint Venture Summary

Names of all participants of a joint venture
1. Lead Participant
2. Participant
3. Participant
4. Participant

Annual turnover data (in the area of infrastructure development and engineering construction).						
Participant	Information Form (2A) page no.	*[Year]*	*[Year]*	*[Year]*	*[Year]*	*[Year]*
1. Lead Participant						
2. Participant						
3. Participant						
4. Participant						
Totals						

Bidders shall append to Form 2B:

a. A document confirming the percentage shareholding of each joint venture participant in the company to be established including the financial stake of each partner in the JV partnership; and

b. A description of the role and responsibility of each joint venture participant. (Bidders shall make the precise role of each joint venture participant clear in this description).

Bidders are reminded to submit the appropriate powers of attorney as required by Section 2.2 of Annexure A – Part h. The Joint Venture Bidders may also note the requirements mentioned in ITB Section 3.6 for compliance while submitting the Bid.

INFORMATION FORM (3A)

(Ref. Annexure A - Part h Section1.4 (a) 1.)

Design, development, construction, testing and commissioning of STP and Sewerage Network and/or Interception and Diversion Works**.**

Name of Bidder or participant of a joint venture

Description of Contract/ STP and Sewerage Network and/or Interception and Diversion Works	
Name of Joint Venture Participant Responsible	
Name of City	
Country	
Capacity of STP and Sewerage Network	
Population served	
Contract Role (joint venture participant, sub-contractor, sub consultant, lead, etc.) and percentage share in the total contract	
Nature, role and extent of participation (describe fully)	
Date of contract commencement	
Date of contract termination	
Contract value in INR or equivalent to US$	
Individual for reference	
Address, Telephone, Fax for reference	

Provide a complete description of the services provided under this contract demonstrating that the definition of a STP in Section 1.4 of Annexure A Part h to Bidding documents has been met.

Information Form (3b)

(Ref. Annexure A Part h Section 1.4 (a) 3)

Successful experience in Operating and Maintaining STP and Sewerage Network and/or Interception and Diversion Works

Name of Bidder or participant of a joint venture

Description of Contract/ STP and Sewerage Network and/or Interception and Diversion Works	
Name of Joint Venture Participant Responsible	
Name of City/Urban area	
Country	
Capacity of STP and Sewerage Network	
Number of years operated (with period)	
Population served	
Contract Role (joint venture participant, sub-contractor, sub consultant, lead, etc.) and percentage share in the total contract	
Nature, role and extent of participation (describe fully)	
Date of contract commencement	
Date of contract termination	
Contract value in INR or equivalent to US$	
Individual for reference	
Address, Telephone, Fax for reference	

Provide a complete description of the services provided under this contract demonstrating that the definition of a Sewage Treatment Plant and Sewerage Network in Section 1.4 of Annexure A Part h to Bidding documents has been met.

Information Form (4)

Financial Capabilities

Name of Bidder or participant of a joint venture

Bidders, including each partner of a joint venture, shall provide financial information to demonstrate that they meet the requirements stated in the Schedule to ITB. Each Bidder or participant of a joint venture shall complete this form. If necessary, separate sheets shall be used to provide complete banker information. A copy of the audited balance sheets shall be attached.

Banker	Name of banker	
	Address of banker	
	Telephone	Contact name and title
	Fax	Telex

Summarize actual assets and liabilities in INR or equivalent to U.S. dollar (at the rates of exchange current at the end of each year) for the previous five calendar years. Based upon known commitments, summarize Projected assets and liabilities in INR or equivalent to U.S. dollar for the next two calendar years, unless the withholding of such information by stock market listed public companies can be substantiated by the Bidder.

Financial information in INR or equivalent to US$	Actual: Previous five years					Projected: Next two years	
	[Year]	*[Year]*	*[Year]*	*[Year]*	*[Year]*	*[Year]*	*[Year]*
1. Total assets							
2. Current assets							
3. Total liabilities							
4. Current liabilities							
5. Profits before taxes							
6. Profits after taxes							

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject Contract or contracts as indicated in Schedule to ITB 1.4(2).

Source of Financing	Amount in INR or equivalent to US $
1.	
2.	
3.	
4.	

Attach audited financial statements—including, as a minimum, profit and loss account, balance sheet, and explanatory notes—for the period stated in Section 1.5 of Annexure A Part h to Bidding documents (for the individual Bidder or each participant of a joint venture).

If audits are not required by the laws of Bidders' countries of origin, partnerships and firms owned by individuals may submit their balance sheets certified by a registered accountant, and supported by copies of tax returns.

Information Form (5)

(ref. Annexure A Part h - Section 1.6)

Personnel Capabilities

Name of Bidder or participant of a joint venture

For specific positions noted below, Bidders must provide the names of a candidate qualified to meet the specified requirements stated for each position. The data on their experience should be supplied on separate sheets using one Form (5A) for each candidate.

Bidders may propose alternative management and implementation arrangements requiring different key personnel, whose experience records should be provided.

1.	Title of position*
	Name of candidate
2.	Title of position*
	Name of candidate
3.	Title of position*
	Name of candidate
4.	Title of position*
	Name of candidate
5.	Title of position*
	Name of candidate
6.	Title of position*
	Name of candidate

**As listed in BDS - ITB 3.3 (e) 8 & 3.3 (e) 9in respect of* Section 1.6 of Annexure A part h to Bidding documents.

Information Form (5A)

(ref. Annexure A – Part h – Section 1.6)

Candidate Summary

Name of Bidder or participant of a joint venture

Position		Candidate
Candidate Information	Name of Candidate	Date of Birth
	Professional qualifications	
Present Employment	Name of Owner	
	Address of Owner	
	Telephone	Contact (manager/personnel officer)
	Fax	Telex
	Job title of candidate	Years with present Owner

Summarize professional experience over the last twenty years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the Project.

From	To	Company/Project/Position/Relevant technical and management experience

Contractor's Representative and Key Personnel Schedule

Bidders should provide the names and details of the suitably qualified Contractor's Representative and Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

Contractor' Representative and Key Personnel

1.	**Title of position:** Contractor's Representative	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
2.	**Title of position:** *[Environmental Specialist]*	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
3.	**Title of position:** *[Health and Safety Specialist]*	
	Name of candidate:	

	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
4.	**Title of position:** *[Social Specialist]*	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
5.	**Title of position:** *[insert title]*	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]

Form ……:
Resume and Declaration
Contractor's Representative and Key Personnel

Name of Bidder

Position [#*1*]: [*title of position from Form PER-1*]		
Personnel information	**Name:**	**Date of birth:**
	Address:	**E-mail:**
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency:*[language and levels of speaking, reading and writing skills]*	
Details		
	Address of employer:	

	Telephone:	**Contact (manager / personnel officer):**
	Fax:	
	Job title:	**Years with present employer:**

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Project	**Role**	**Duration of involvement**	**Relevant experience**
[main project details]	*[role and responsibilities on the project]*	*[time in role]*	*[describe the experience relevant to this position]*

Declaration

I, the undersigned *[insert either "Contractor's Representative" or "Key Personnel" as applicable]* , certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Bid:

Commitment	**Details**

Commitment to duration of contract:	*[insert period (start and end dates) for which this Contractor's Representative or Key Personnel is available to work on this contract]*
Time commitment:	*[insert period (start and end dates) for which this Contractor's Representative or Key Personnel is available to work on this contract]*

I understand that any misrepresentation or omission in this Form may:

(a) be taken into consideration during Bid evaluation;

(b) result in my disqualification from participating in the Bid;

(c) result in my dismissal from the contract.

Name of Contractor's Representative or **Key Personnel: [*insert name*]**

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Bidder:

Signature: _____

Date: (day month year): _____

Information Form (6)

Historical Contract Non-Performance

(ref. Section 1.7 of Annexure A part h to Bidding documents)

[The following table shall be filled in for the Bidder and for each partner of a Joint Venture]

Bidder's Legal Name: *[insert full name]*

Date: *[insert day, month, year]*

Joint Venture Party Legal Name: *[insert full name]*

ICB No. and title: *[insert ICB number and title]*

Page *[insert page number]* of *[insert total number] pages*

Non-Performing Contracts in accordance with Section 1.7 of Annexure A Part h to ITB			
Contract non-performance did not occur during the [number] years specified in Section 1.7 of Annexure A Part h to ITB. Contract(s) not performed during the [number] years specified in Section 1.7 of Annexure A Part h to ITB.			
Year	**Non performed portion of contract**	**Contract Identification**	**Total Contract Amount (current value in** INR or equivalent **US$)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for non-performance: *[indicate main reason(s)]*	*[insert amount]*
Pending Litigation, in accordance with Section 1.7 of Annexure A Part h of Bidding documents.			
☐ No pending litigation in accordance with Section 1.7 of Annexure A Part h of Bidding documents ☐ Pending litigation in accordance with Section 1.7 of Annexure A Part h of Bidding documents			

Information Form (7)

Environmental, Social, Health, and Safety Performance Declaration

[The following table shall be filled in for the Bidder, each member of a Joint Venture and each Specialized Subcontractor]

Bidder's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member's or Specialized Subcontractor's Name: *[insert full name]*

Environmental, Social, Health, and Safety Performance Declaration in accordance with Section 3, Qualification Criteria, and Requirements			
☐ **No suspension or termination of contract**: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental, Social, Health, or Safety (ESHS) performance since the date specified in Section 3, Qualification Criteria, and Requirements, Sub-Factor 2.5. ☐ **Declaration of suspension or termination of contract**: The following contract(s) has/have been suspended or terminated and/or Performance Security called by an employer(s) for reasons related to Environmental, Social, Health, or Safety (ESHS) performance since the date specified in Section 3, Qualification Criteria, and Requirements, Sub-Factor 2.5. Details are described below:			
Year	**Suspended or terminated portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and US$ equivalent)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination:	*[insert amount]*

		[indicate main reason(s)]	
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination: *[indicate main reason(s)]*	*[insert amount]*
…	…	*[list all applicable contracts]*	…
Performance Security called by an employer(s) for reasons related to ESHS performance			
Year		Contract Identification	Total Contract Amount (current value, currency, exchange rate and US$ equivalent)
[insert year]		Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for calling of performance security: *[indicate main reason(s)]*	*[insert amount]*

Annexure A - Part j

Declaration regarding customs/excise duty exemption for materials to be purchased for use in setting up the facility

(Bidder's Name and Address)

To:

Dear Sir:

Ref: Setting up the Sewerage Network and/or Interception and Diversion Works and STP facility of …… MLD capacity at …… – Certificate for Import/Procurement of Goods and materials/Construction Equipment.

1. We confirm that we are solely responsible for obtaining GST/customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Owner will not compensate us.

5. We agree that the certificate will be issued only to the extent considered reasonable by the Owner for the work, based on the bid submitted by us, construction programme and methodology furnished along with the bid.

6. We confirm that the goods will be exclusively used for the construction of the above work. We are aware that exemption will be issued to only goods/material/equipment which form part of the work on permanent basis but not for the goods/material/equipment which are used by the Operator for execution of project and after completion of the project, the goods remain with the Operator being Owners of such goods for further deployment in other projects.

Date: _____ (Signature) _____

Place: _____ (Printed Name) _____

(Designation) _____

(Common Seal) _____

Annexure A - Part K

FORM OF LETTER OF INTENT BY JV PARTNERS TO ENTER INTO JV AGREEMENT

THIS LETTER OF INTENT signed on this..... day of..... Two Thousand and .....by..... a company incorporated under the laws of ..... and having its Registered Office at .....(hereinafter called the "Party No.1" which expression shall include its successors, executors and permitted assigns) and M/s ..... a company incorporated under the laws of ..... and having its Registered Office at .....(hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns) and M/s.. .. .. a Company incorporated under the laws of ..... and having its Registered Office at ..... (hereinafter called the "Party No.3" which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" (in case of award) against the work for the design and build Sewage Treatment Plant and Sewerage Network and/or Interception and Diversion works and all Appurtenant Structures and Allied Works, and O & M of Complete Works associated with …….. ……..(hereinafter called the "Owner").

WHEREAS the Party No.1, Party No.2 and Party No.3 intend to enter into a Joint Venture Agreement

AND WHEREAS the Owner invited bids as per the above mentioned Specification to design and build Sewage Treatment Plant and Sewerage Network and all Appurtenant Structures and Allied Works, and O & M of Complete Works stipulated in the bidding documents.

AND WHEREAS ITB Clause 3.6 and Annexure A Part h Qualification Criteria forming part of the bidding documents, inter-alia, stipulates that two or more qualified partners, meeting the requirements of 'Qualification Requirement of the Bidder', as applicable may bid, provided, they submit a Letter of Intent to enter into Joint Venture Agreement and the Joint Venture Partners fulfill all other requirements under ITB Clause 5.7 ‘Qualification of the Bidder’ and in such a case, the Letter of Bid (Bid Form) shall be signed by the Partner - In Charge so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract by entering into Joint Venture Agreement as per proforma submitted with the Bid in accordance with ITB 3.6 which will be legally binding on all partners and all obligations hereunder.

The above clause further states that this Letter of Intent shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Owner vide proposal No.....dated..... by Party No.1 based on this letter of Intent between all the parties; under these presents and the bid has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH
AS UNDER:

In consideration of the above premises and agreements all the parties of this letter of Intent do hereby declare and undertake:

1. In requirement of the award of the Contract by the Owner to the Joint Venture Partners, we, the Parties do hereby undertake that M/s..... the Party No.1, shall act as lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Owner for the successful performance of the Contract and shall be fully responsible for the design and build Sewage Treatment Plant and Sewerage Network and/or Interception and Diversion works and all Appurtenant Structures and Allied Works, and O & M of Complete Works accordance with the Contract for which we shall enter into Joint Venture Agreement as per proforma submitted with the Bid which will be legally binding on all partners:
2. If the Contract is awarded to Joint Venture then in case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party(s) will be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.
3. Further, if the Owner suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents will promptly make good such loss or damages caused to the Owner, on its demand without any demur. It shall not be necessary or obligatory for the Owner to proceed against lead Partner to these presents before proceeding against or dealing with the other Party(s), the Owner can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Owner.
4. The financial liability of the Parties of the Deed of Undertaking to the Owner in the event of award of Contract on the Joint Venture, with respect to any of the claims a rising out of the performance or non-performance of the obligations set forth in the Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of the Deed of Undertaking.
5. It is expressly understood and agreed between the Parties to this Letter of Intent that the responsibilities and obligations of each of the Parties shall be as delineated in Appendix- I (to be suitably appended by the Parties along with this Letter of Intent in its bid). It is further undertaken by the parties

that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract in the event of award on Joint Venture.

6. It is also understood that this Letter of Intent is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract if awarded and that this Letter of Intent shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Letter of Intent or on the Joint Venture, other than the express provisions of the Contract.
7. *This Letter of Intent shall be construed and interpreted in accordance with the provisions of the Contract.*
8. *In case of an award of a Contract, we the parties to this Letter of Intent do hereby agree that we shall enter into Joint Venture Agreement as per proforma submitted with the Bid which will be legally binding on all partners and we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favor of the Owner in the currency/currencies of the Contract.*
9. It is further agreed that this Letter of Intent shall be irrevocable and shall form an integral part of the bid. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Letter of Intent have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated	For Lead Partner (Party No.-1) For and on behalf of M/s
Name …….	
Designation ……	
Signature ……	Signature of the authorized representative)

WITNESS:

I…….

II…….

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated .....

Name …….

Designation ……

Signature ……

For Party No.-2 For and on behalf of M/s

Signature of the authorized representative)

WITNESS:

I…….

II…….

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated .....

Name …….

Designation ……

Signature ……

For Party No.-3 For and on behalf of M/s

Signature of the authorized representative)

WITNESS:

I…….

II…….

Annexure A - Part L

FORM OF POWER OF ATTORNEY FOR JOINT VENTURE

(On Non-judicial Stamp Paper of Appropriate value, if required as per laws of the country of the bidder, to be purchased in the Name of Joint Venture)

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Partners whose details are given hereunder ..... have formed a Joint Venture under the laws of ..... (*)/ intend to form a Joint Venture (*) [(*) delete whichever is not applicable] and having our Registered Office(s)/Head Office(s) at..... (hereinafter called the 'Joint Venture' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting through M/s ..... being the Partner in-charge do hereby constitute, nominate and appoint M/s..... a Company incorporated under the laws of ..... and having its Registered/Head Office at ..... as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorized Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Joint Venture in regard to work for the bids for which have been invited by ……..., …….. (hereinafter called the 'Owner') to undertake the following acts:

i) To sign and submit proposal and participate in the aforesaid Bid Specification of the Owner on behalf of the "Joint Venture".

ii) To negotiate with the Owner the terms and conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the Owner for and on behalf of the "Joint Venture".

iii) To do any other act or submit any document related to the above.

iv) To receive, accept and execute the Contract for and on behalf of the "Joint Venture".

For the above purpose, the person(s) authorized by the Partner In-charge shall be the person(s) authorized to act on behalf of the "Joint Venture" as per the Power of Attorney given to him/her/them by the Partner In-Charge,

It is clearly understood that all the partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and the Partner In-charge (Lead Partner) shall ensure performance of the Contract(s) and if one or more Partner fail to perform their respective portions of the Contract(s), the same shall be deemed to be a default by all the Partners.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Design Build as well as the Operations and Maintenance Period in terms of the Contract.

The Joint Venture hereby agrees and undertakes to ratify and confirm all the whatsoever the said Attorney/Authorized Representatives/Partner in-charge quotes in the bid, negotiates and signs the Contract with the Owner and/or proposes to act on behalf of the Joint Venture by virtue of this Power of Attorney and the same shall bind the Joint Venture as if done by itself.

IN WITNESS THEREOF the Partners Constituting the Joint Venture as aforesaid have executed these presents on this .....day of .....under the Common Seal(s) of their Companies.

For and on behalf of the
Partners of Joint Venture

The Common Seal of the above Partners of the Joint Venture:

The Common Seal has been affixed there unto in the presence of: WITNESS

1. Signature.....

   Name.....

   Designation.....

   Occupation.....

2. Signature.....

   Name.....

   Designation.....

   Occupation.....

Annexure A - Part M

FORM OF UNDERTAKING BY THE JOINT VENTURE PARTNERS

(On Non-Judicial Stamp Paper of Appropriate Value, if required as per laws of the country of the bidder, to be purchased in the Name of Joint Venture)

THIS JOINT DEED OF UNDERTAKING executed on this .....day of .....Two

Thousand and .....by ..... a company incorporated under the laws of ..... and having its Registered Office at..... (hereinafter called the "Party No.1. which expression shall include its successors, executors and permitted assigns) and M/s ..... a company incorporated under the laws of ..... and having its Registered Office at ..... (hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns) and M/s ..... a Company incorporated under the laws of ..... and having its Registered Office at ..... (hereinafter called the "Party No.3" which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" (in case of award) against the work to design and build Sewage Treatment Plant and Sewerage Network and/or Interception and Diversion works and all Appurtenant Structures and Allied Works, and O & M of Complete Works associated with …… (hereinafter called the "Owner").

WHEREAS the Party No.1, Party No.2 and Party No.3 have entered into an Agreement dated.....

AND WHEREAS the Owner invited bids as per the above mentioned Specification to design and build Sewage Treatment Plant and Sewerage Network and all Appurtenant Structures and Allied Works, and O & M of Complete Works stipulated in the bidding documents.

AND WHEREAS ITB Clause 3.6 and Annexure A Part h Qualification Criteria forming part of the bidding documents, inter-alia, stipulate that an undertaking of two or more qualified partners, meeting the requirements of 'Qualification Criteria of the Bidder', as applicable may bid, provided, the Joint Venture fulfills all other requirements under Clause 5.7 'Qualification of the Bidder' and in such a case, the Letter of Bid (Bid Form) shall be signed by the Partner - In Charge so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract and all obligations

hereunder.

The above clause further states that this Undertaking shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Owner vide proposal No.....dated..... by Party No.1 based on this Undertaking between all the parties; under these presents and the bid in accordance with the requirements of ITB Clause 3.6 and Annexure A Part h Qualification Criteria, has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Deed of Undertaking do hereby declare and undertake:

1. In requirement of the award of the Contract by the Owner to the Joint Venture Partners, we, the Parties do hereby undertake that M/s..... the Party No.1, shall act as Lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Owner for the successful performance of the Contract and shall be fully responsible to design and build Sewage Treatment Plant and Sewerage Network and/or Interception and Diversion works and all Appurtenant Structures and Allied Works, and O & M of Complete Works in accordance with the Contract.
2. In case of any breach or default of the said Contract by any of the parties to the Joint Venture, the parties do hereby undertake to be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.
3. Further, if the Owner suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents undertake to promptly make good such loss or damages caused to the Owner, on its demand without any demur. It shall not be necessary or obligatory for the Owner to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(s), the Owner can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Owner.
4. The financial liability of the Parties of this Deed of Undertaking to the Owner, with respect to any of the claims arising out of the performance or non-performance of the obligations set forth in this Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of this Deed of Undertaking.
5. It is expressly understood and agreed between the Parties to this Undertaking that

the responsibilities and obligations of each of the Parties shall be as delineated in Appendix - I (to be suitably appended by the Parties along with this undertaking in its bid). It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract.

6. It is also understood that this Undertaking is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract if awarded and that this Undertaking shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Undertaking or on the Joint Venture, other than the express provisions of the Contract.
7. This Undertaking shall be construed and interpreted in accordance with the provisions of the Contract.
8. In case of an award of a Contract, we the parties to this Deed of Undertaking do hereby agree that we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favour of the Owner in the currency/currencies of the Contract.
9. It is further agreed that this Deed of Undertaking shall be irrevocable and shall form an integral part of the bid and shall continue to be enforceable till the Owner discharges the same or upon the completion of the Contract in accordance with its provisions, whichever is earlier. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Deed of Undertaking have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated	For Lead Partner (Party No.-1) For and on behalf of M/s
Name ……..	
Designation ……	
Signature ……	Signature of the authorized representative)
	For Party No.-2
	For and on behalf of M/s……...

WITNESS:

I…….

II…….

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated .....

Name …….

Designation ……

Signature ……

For Party No.-2 For and on behalf of M/s

Signature of the authorized representative)

WITNESS:

I…….

II…….

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated .....

Name …….

Designation ……

Signature ……

For Party No.-3 For and on behalf of M/s

Signature of the authorized representative)

WITNESS:

I…….

II…….

Annex B to the Bidding Documents

The Draft Contract

a. Form of Contract

b. General Conditions of the Contract

c. Schedules attached to the Contract

Government of [*][65]

[66]

AGREEMENT NO. _____

INTERNATIONAL/ NATIONAL COMPETITIVE BIDDING[67]

TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.

_____

[Name of the designated officer and address of Owner]

[65] *Name of the State in which the Project is being implemented.*
[66] *Specify the Name of the Owner.*
[67] *If the value of the Project is less than USD 40 Million, National Competitive bidding can also be adopted.*

CONTRACT TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA._____

FORM OF CONTRACT

THIS CONTRACT is made and entered into this ____ day of _____, *[Year]*

Between

_____, a corporation _____ under _____ law and having its principal place of business at _____

(hereafter the "Owner")

– and –

[Name of Joint Venture formed by the Successful Bidder or the Individual successful Bidder goes here] with its principal place of business at *[Address of the Operator]*

(hereafter the "Operator")

WHEREAS:

a. The Owner has the jurisdiction to enter into the Contract, as defined in Section 1.1 below, pursuant to the Applicable Law;

b. The Owner has received all requisite approvals necessary and has conformed with all requisite laws in accordance with the Applicable Law to permit the Owner to enter into the Contract;

c. The Owner desires to engage the Operator to (i) design and build sewage treatment plant of installed capacity …. Mld and all appurtenant structures and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or Diversion works with Intercepting Sewer of about …. km length including survey, design, construction of …. No. pumping stations and all appurtenant structures and allied works; and (iii) operation & maintenance of the complete works of sewage treatment plant, sewerage network and/or Interception and Diversion Works and pumping stations for a period of 15 years in ……. City and ensure the effectiveness and sustainability of the said facility;

d. The Operator has represented to the Owner that it has the skills and ability to (i) design and build sewage treatment plant of installed capacity …. Mld and all appurtenant structures and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or Diversion works with Intercepting Sewer of about …. km length including survey, design, construction of …. No. pumping stations and all appurtenant structures and allied works; and (iii) operation & maintenance of the complete works of sewage treatment plant, sewerage network and/or Interception and Diversion Works and pumping stations for a period of 15 years in ……. City and ensure the effectiveness and sustainability of the said facility in an economical and effective manner and agrees to do so upon and subject to the terms and conditions of the Contract Documents;

e. The Operator responded to the Bidding Documents dated…….. [xx.xx.xx] organized by the Owner and was selected as the recommended Operator to fulfil the Design-Build and Operating Services set out in the Technical Standards Schedule;

f. The Operator has the corporate capacity and authority to enter into the Contract;

NOW THEREFORE, in consideration of the mutual covenants and Agreements hereinafter set forth, the Owner and the Operator agree as follows:

ARTICLE 1. CONTRACT DOCUMENTS

1.1. Contract Documents

This Contract to (i) design and build sewage treatment plant of installed capacity …. Mld and all appurtenant structures including infrastructure for reuse of treated effluent and allied works; (ii) survey, review the designs, redesign where necessary, and build new underground sewerage network and/or Diversion Works with Interception Sewers of about …. km length including survey, design, construction of …. No. pumping stations and all appurtenant structures and allied works; and (iii) operation & maintenance of the complete works of sewage treatment plant, sewerage network and/or

Interception and Diversion Works and pumping stations for a period of 15 years in ……. between the Owner and the Operator (the "Contract") consists of the following documents (collectively, the "Contract Documents"), and each of the following shall be read and construed as an integral part of the Contract:

a. Form of Contract
b. Letter of Acceptance
c. Corrigenda Nos. ___
d. Minutes of Pre bid conference dated _____
e. Special Conditions of Contract (Schedule 1 to GCC)
f. General Conditions of Contract
g. Schedule "2" – Design Build Services ("the Design Build Services Schedule")
h. Schedule "3" – Operations and Maintenance Services ("the Operations and Maintenance Services Schedule")
i. Schedule "4" – Description of Site and Service Area
j. Schedule "5" – Operator's Price Schedule
k. Schedule "6" – Terms and Procedure of Payment
l. Schedule "7" – Liquidated Damages - Operations
m. Schedule "8" – Price Adjustment
n. Schedule "9" - Schedule of Performance Guarantee & Advance Payment Guarantee
o. Schedule "10" – Technical Specifications
p. Schedule "11" - Allowed and Suggested alignments / locations for design of the Sewerage Network and/or Interception and Diversion Works

1.2. Order of Precedence

a. In the event of any ambiguity or conflict between the Contract Documents listed in Section 1.1 of this Form of Contract, the order of precedence shall be the order in which the Contract Documents are listed in Section 1.1 of this Form of Contract.

b. Notwithstanding Section 1.2(a) of this Form of Contract and any other term or condition in the Contract Documents, if any statement or provision in Operator's Bid incorporated in the Contract is not consistent with or conflicts with any other term or condition in the remainder of the Contract Documents, the remainder of the Contract Documents shall govern.

1.3. Definitions

Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions of Contract and various Schedules attached to the Contract.

ARTICLE 2. OPERATOR'S COMPENSATION AND TERMS OF PAYMENT

2.1. Operator's Compensation

The Owner hereby agrees to pay to the Operator the Contract Price, in consideration of the performance by the Operator of its obligations hereunder, and the Contract Price is specified in Schedule 5 of the Contract (Operator's Price Schedule).

2.2. Terms of Payment

The terms and procedures of payment by which the Owner will compensate the Operator are set out in the General Conditions of the Contract.

ARTICLE 3. EFFECTIVE DATE AND STARTING DATES

3.1. Effective Date and Starting Date

The Effective Date, the Design-Build Starting Date and Operations Starting Date for the Contract shall be determined in accordance with the General Conditions of the Contract.

IN WITNESS WHEREOF the Owner and the Operator have caused this Form of Contract to be duly executed by their duly authorized representatives.

EXECUTED as of the date first written above.

[The Owner]

By:

_____

Name:

_____

Title:

_____

Witness:

_____

[The Operator]

By:

_____

Name:

_____

Title:

_____

Witness:

_____

Annexure B to the bidding document

The Draft Contract

NAMAMI GANGE PROJECT

AGREEMENT NO. _____

General Conditions of Contract (GCC)

GENERAL CONDITIONS

FOR A CONTRACT

TO (I) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (II) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWERS OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. NO. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (III) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……..

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GENERAL CONDITIONS OF CONTRACT

ARTICLE 1. CONTRACT AND INTERPRETATION

1.1. Definitions

Unless the context otherwise requires, the following terms wherever used in this Contract have the following meanings:

"**Adjudicator**" means the person that is named in the SCC;

"**Applicable Law**" means the laws and any other instruments having the force of law in the Country specified in the SCC, as they may be issued and in force from time to time, including any decree of the President or government of the Country;

"**Appointing Authority**" is the authority specified in the SCC;

"**Authorities**" means the Owner, ULB and the Country as specified in the SCC;

"**Background Information Document**" means the Background Information Document provided to the Operator by the Owner during the bidding process that preceded this Contract;

"**Bidding Documents**" means the documents issued by the Owner in respect of the bidding process for the selection of an operator to Design, build and operate the Project Facility and to perform the Services;

"**Capital Investment Program**" means the capital investment program of the Owner, if any, referred to in OSA Section 10.2(2);

"**Change**" is defined in GC Section 10.1.1(1);

"**Change Order**" is defined in GC Section 10.1.2(4);

"**Completion**" means that the Project Facility and all Design-Build Services have been completed operationally and structurally and put in a tight and clean condition in accordance with the Technical Standards Schedule, and the Operator is entitled to have an Operational Acceptance Certificate issued in respect of the Project Facility, or part thereof, in accordance with DBSS Section 6.3;

"**Operational Acceptance Certificate**" means a certificate issued by the Design-Build-Operations Engineer in accordance with DBSS Section 6.3;

"**Contract**" means the agreement between the Owner and the Operator which consists of the Contract Documents;

"**Contract Documents**" means the Form of Contract, General Conditions, and all appendices to the General Conditions as set out in GC Section 1.2;

"**Contract Price**" is defined in Section 2.1 of the Form of Contract;

"**Contract Records**" is defined in GC Section 1.8.1(1);

"**Contract Term**" means the term of the Contract, including any renewals approved by the Owner, commencing on the Effective Date and continuing to, and including, the End Date;

"**Costs**" means all expenditures reasonably incurred, or to be incurred, by the Operator including overhead but excluding profit;

"**Country**" means the country specified in the SCC;

"**Customers**" mean all persons to which the Operator provides services, including those customers in existence as of the Operations Starting Date and persons who become customers after the Operations Starting Date;

"**Data Room**" means the data room which may be established by the Owner in the bidding process as set out in the Bidding Documents;

"**DBSS Section**" means Design-Build Services Schedule Section;

"**Design-Build Documents**" means the plans, specifications, designs, models, electronic models and other documents and materials relating to the design and construction of the Site and Project Facility as may be set out or contemplated in the Design-Build Services Schedule or agreed to by the Parties from time to time during the Contract Term;

"**Design-Build-Operations Engineer**" means the Consultant or Owner's representative retained by the Owner to supervise the Operator, in accordance with the Contract Documents, in carrying out the Design-Build and Operations Services;

"**Design-Build Period**" is defined in GC Section 2.2(a);

"**Design-Build Services**" means the Design-build services to be performed by the Operator as contemplated by the General Conditions and the Design-Build Services Schedule;

"**Design-Build Starting Date**" is defined in GC Section 2.1.3(1);

"**Discharge Point**" means the point at which the Residual Treated Water is discharged from the treatment plant, and where the sample of the Residual Treated Water shall be drawn periodically for the purpose of testing it for conformity with the Discharge Standards;

"**Effective Date**" means the date on which this Contract comes into force and effect pursuant to GC Section 2.1.1;

"**End Date**" is defined in GC Section 2.1.2;

"Environmental Management Plan (EMP)'' – A set of mitigation measures to be implemented by the DBO Operator as indicated in *[Please insert reference of the Schedule/Section of the bidding document where EMP have been specified]* which shall be implemented by the Operator;

"**Environmental, Social, Health and Safety Management Plan**"- A set of mitigation and management measures to be implemented by the DBO operator as indicated in

Appendix 1 Schedule 2 (design Build Services) which shall be implemented by the Operator;

"Existing Sewerage Network"[68] shall mean the existing Sewerage Network in location specified in SCC and of length indicated in SCC that is included in the scope of work for repair and refurbishment/ integration with proposed network as a part of the Contract.

"**Extension Date**" is defined in GC Section 2.4.3;

"**Force Majeure**" is defined in GC Section 9.8(1);

"**GC Section**" means General Conditions of Contract Section;

"**including**" means including without limitation and "**includes**" means includes without limitation, unless expressly stated otherwise;

"Indicative Flow Rate for STP" means the rate of sewage flow which is projected by the Owner to be available for treatment in the STP facility for each of the 15 years of the O&M period.

"Indicative Flow Rate(s) for SPS" means the rate of sewage flow which is projected by the Owner to be available for handling in respective SPSs for each of the 15 years of the O&M period;

"Interception & Diversion Works" means the diversion structure across nallah/drain along with intercepting sewer laid for conveying the sewage from nallah/drains up to the Sewage Treatment Plant and including Sewage lifting and pumping stations and all appurtenant structures forming a part of both the New/Existing Sewerage Infrastructure."**Liquidated Damages – Delay**" is defined in GC Section 2.3.6(2);

"**Liquidated Damages – Operations**" is as defined in GCC Clause 5.4 read with SCC Clause 5.4;

"**Manager**" is defined in GC Section 8.2(3);

"**Monthly Operations Payment**" is defined in Para 4 of Schedule 6 of the Contract;

"New Sewerage Network" shall mean the new Sewerage Network in .....[insert the name of the City] of approx. .....Km length including ….Number Sewage Pumping Station(s) of specified capacity and all appurtenant structures which shall be designed and built by the Operator as a part of the Contract.

"**Operations Period**" is defined in GC Section 2.2(b);

"**Operations Starting Date**" is defined in GC Section 2.1.3(2);

"**Operational Acceptance**" means the acceptance by the Owner of the Project Facility, or part thereof, in accordance with DBSS Section 6.3;

[68] *Retain this definition, if relevant.*

"**Operations Services**" means the Operations Services to be performed by the Operator as contemplated by the General Conditions and the Operations Services Schedule;

"**Operator**" means the Sewerage Treatment Plant and Network Operator, and retained by the Owner to carry out the Services and is the Party named as the Operator in the Form of Contract;

"**Operator's Equipment (Design-Build)**" means all machinery, apparatus, vehicles and other equipment required for the execution and completion of the Design-Build Services and the remedying of any defects, but does not include material, machinery, apparatus and other equipment forming part of the Plant and Equipment of the Project Facility;

"**Operator's Equipment (Operations)**" means all things of any kind whatsoever, including the equipment, materials, supplies, vehicles and consumables required to operate, maintain and repair the Site and Project Facility;

"**Operator's Personnel**" is defined in GC Section 8.3(1);

"**Operator's Representative**" is defined in GC Section 8.1.2(1);

"**OSA Section**" means Operations Services Schedule Section;

"**Owner**" means the Party named as Owner in the Form of Contract;

"**Owner's Representative**" is defined in GC Section 8.1.1(1);

"**Party**" means the Owner or the Operator, as the case may be, and "Parties" means both of them;

"**Performance Security**" is defined in GC Section 5.5.1(1);

"**Plant and Equipment**" means the permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and intended to permanently form or forming part of the Project Facility;

"Project Facility" means the Sewerage Treatment Plant, the Sewerage Network and Pumping Stations Designed, Built, refurbished, Operated and Maintained by the Operator pursuant to this Contract;

"**Services**" means the Design-Build Services and the Operations Services to be performed by the Operator as set out in the General Conditions and the Appendices to the General Conditions;

"Sewage" or "Wastewater" means the night soil and other discharges from water closets, latrines, privy, urinals, cesspools or drains and polluted water from sinks, bathroom, stables, cattle sheds and other like places and includes domestic sewage and wastewater effluents and discharges from manufacturers of all kinds;

"Sewage Treatment Plant" or "STP" means the new plant for treatment and processing including safe disposal of treated wastewater which shall be designed, built, operated and maintained by the Operator in accordance with the provisions of this Contract;

"Sewerage Network" shall mean the pipe line network laid for collecting the Sewage from consumer connections including 'nallaha', main, trunk, secondary lines from the individual take over points of the Consumers up to the Sewage Treatment Plant and including Sewage lifting and pumping stations and all appurtenant structures forming a part of both the New Sewerage Network and the Existing Sewerage Network;

"**Site**" means the physical area as set out in the Site Schedule identified for the location of the Project Facility;

"**Site Information**" is defined in GC Section 3.5(1);

"**Subcontract**" means any contract, whether written or verbal, entered into by the Operator and a Sub-contractor for the performance of any part of the Services;

"**Sub-contractor**" means any person or entity to which the Operator subcontracts or sub-consults any part of the Services in accordance with the provisions of GC Section 8.6, including any person or entity engaged for the supply of any Plant and Equipment, Operator's Equipment (Design-Build) or Operator's Equipment (Operations) or for the provision of any Services;

"**Submission Deadline**" means the last date for the submission of bids, as stated in the Bidding Documents;

"**Subsequent Operator**" means the operator that is to assume the provision of the Services upon termination or completion of the Contract and may include one of the Authorities;

"**Taxes**" is defined in GC Section 5.6;

"**Technical Standards**" is defined in the Technical Standards Schedule;

"**Tests on Completion**" means those tests set out in Attachment 1 to the Technical Standards Schedule as conducted pursuant to DBSS Section 6.2;

"Testing, Trial and Commissioning Period" shall have the meaning as defined in Clause 2.3.2 of Special Conditions of Contract, Schedule 2;

"**Third Party**" means any person or entity other than the Parties;

"Threshold Sewage Flow Rate" means the expected level of sewage flow available for treatment immediately on completion of the STP facility.

"**Time for Completion**" is defined in GC Section 2.3.2;

"**Time Schedule**" is defined in GC Section 2.3.3(1);

"**Transition Assistance**" is defined in GC Section 2.4.2;

"**TSS Section**" means Technical Standards Schedule Section;

"**Unforeseeable**" means not reasonably foreseeable on the Submission Deadline by an experienced operator that conducted or should have conducted the inspections and examinations or who knew or should have known the information described in GC Section 3.5; and

"**War Risks**" is defined in GC Section 9.9(1).

1.2. Contract Documents

Subject to the Form of Contract provisions, all documents forming part of the Contract, and all parts thereof, are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole. The following schedules which are incorporated by reference into the Contract shall be referred to as follows:

Schedule "1" – Special Conditions of Contract (the "SCC")

Schedule "2" – Design Build Services ("the Design Build Services Schedule")

Schedule "3" – Operations and Maintenance Services ("the Operations and Maintenance Services Schedule")

Schedule "4" – Description of Site and Service Area

Schedule "5" – Operator's Price Schedule

Schedule "6" – Terms and Procedure of Payment

Schedule "7" – Liquidated Damages – Operations

Schedule "8" – Price Adjustment

Schedule "9" - Schedule of Performance Guarantee & Advance Payment Guarantee

Schedule "10" – Technical Specifications

Schedule "11" – MoU between the Central Government, the State Government and the ULB [Deleted]

Schedule "11" – Allowed and Suggested alignments/ locations for design of the Sewerage Network

1.3. Interpretation

1.3.1. Language

(1) All Contract Documents, all correspondence and communications to be given, and all other documentation to be prepared and supplied under the Contract shall be written in the language specified in the SCC and the Contract shall be construed and interpreted in accordance with that language.

(2) If any of the Contract Documents, correspondence or communications are prepared in any language other than the governing language under GC Section 1.3.1(1), the translation of such documents, correspondence or communications into the governing language shall prevail in matters of interpretation.

1.3.2. Singular or Plural

The singular shall include the plural and the plural shall include the singular except where the context otherwise requires.

1.3.3. Headings

The headings in the Contract Documents are included for ease of reference and shall neither constitute a part of the Contract nor affect its interpretation.

1.3.4. Persons

Words importing persons or entities shall include firms, corporations and government entities.

1.3.5. Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of the Parties there under shall be prescribed by Incoterms 2010. Incoterms means international rules for interpreting trade terms published by the International Chamber of Commerce, 38 Cours Albert 1er, 75008 Paris, France.

1.3.6. Entire Agreement

This Contract constitutes the entire agreement between the Owner and the Operator with respect to the subject matter of the Contract and supersedes all communications, negotiations and agreements, whether written or oral, made by the Parties with respect thereto made prior to the date of the Contract.

1.3.7. Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract and is signed by a duly authorised representative of each Party to the Contract.

1.3.8. Number of Days

Except as expressly stated to the contrary elsewhere herein, in computing the number of days for the purposes of the Contract all days shall be counted, including Saturdays, Sundays and legal holidays in the Country, provided, however, that if the final day of any period shall fall on a Saturday, Sunday, or legal holiday in the Country, then the final day shall be deemed to be the next day which is not a Saturday, Sunday or legal holiday in the Country.

1.3.9. Independent Operator

(1) The Operator shall be an independent Operator in its performance of the Contract. The Contract does not create any agency, partnership, joint venture or other joint relationship between the Owner and the Operator or its Shareholders.

(2) Subject to the provisions of the Contract, the Operator shall be solely responsible for the manner in which the Contract is performed. All employees, agents, representatives or Sub-contractors engaged by the Operator in connection with the performance of the Contract shall be under the complete control of the Operator and shall not be deemed to be employees of the Owner, and nothing contained in the Contract, or in any Subcontract awarded by the Operator, shall be construed to create any contractual relationship or legal obligation between the Operator's employees, agents, representatives or Sub-contractors and the Owner.

1.3.10. Joint Venture

(1) If the Operator consists of a joint venture of more than one person, all the Partners hereby authorise the representative named in the SCC to act on their behalf in exercising all the Partner's and Operator's rights and obligations toward the Owner under this Contract, including the receiving of approvals, consents, orders, certificates, instructions and payments from the Owner, amendment of the Contract and in all other matters under the Contract, including the settlement of disputes.

(2) If the Operator is a joint venture of two or more Partners, each Partner of the joint venture, shall be jointly and severally bound to the Owner for the fulfilment of the provisions of the Contract by the Operator.

(3) The composition, control or constitution of the Operator shall be in accordance with the Operator's Bid and shall not be altered without the prior consent of the Owner.

1.3.11. Non-waiver

(1) Subject to GC Section 1.3.11(2), no relaxation, waiver, forbearance, delay or indulgence by either Party in enforcing any of the terms and conditions of the Contract or the granting of time by either Party to the other shall prejudice, affect or restrict the rights of that Party under the Contract, nor shall any waiver by either Party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

(2) To be a valid waiver, any waiver of a Party's rights, powers or remedies under the Contract shall,

(a) be in writing;

(b) be dated and signed by the Owner's or Operator's Representative, whichever is granting such waiver; and

(c) specify the right, power or remedy being waived and the extent to which it is being waived.

1.3.12. Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability

shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

1.3.13. Country of Origin

"Origin" means the place where the materials, equipment and other supplies for the Project Facility are mined, grown, produced or manufactured, and from which the services are provided.

1.3.14. Survival of Obligations

Upon the termination or expiration of the Contract pursuant to the Contract, all rights and obligations of the Parties hereunder shall cease, except those noted in the SCC.

1.4. Notice

(1) All notices to be given under the Contract shall be in writing and shall be sent by personal delivery, courier or facsimile to the address for notice of the relevant Party as set out in the SCC and the following provisions apply:

(a) Any notice sent by facsimile shall be confirmed by the sender no later than two days after dispatch by a notice sent by courier;

(b) Any notice sent by courier shall be deemed to have been delivered 10 days after dispatch. In proving the fact of dispatch, it shall be sufficient to show that the envelope containing such notice was properly addressed, with proper payment for the courier, and conveyed to the courier service for transmission; and

(c) Any notice delivered personally or sent by facsimile shall be deemed to have been delivered on the date of dispatch.

(2) A Party may change its address for notice pursuant to this Contract by giving the other Party notice of change in accordance with this GC Section 1.4.

(3) The Operator's address for the purpose of giving notice pursuant to this GC Section 1.4 shall be in the Country named in the SCC.

(4) Notices shall be deemed to include any approvals, consents, instructions, orders, certificates and similar communications to be given under the Contract.

1.5. Governing Law

This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.

1.6. Settlement of Disputes

1.6.1. Adjudicator

(1) If any dispute of any kind whatsoever arises between the Owner and the Operator in connection with or arising out of the Contract including,

(a) any question regarding the existence, validity or termination of the Contract; and

(b) any matter related to the performance of the Services,

the Parties shall seek to resolve any such dispute or difference by mutual consultation. If the Parties fail to resolve such a dispute or difference by mutual consultation, the dispute shall be referred in writing, by either the Operator or the Owner, to the Adjudicator with a copy to the other Party or Parties.

(2) GC Section 1.6.1(1) shall apply,

(a) during the execution of the Services and after the completion of the Services; and

(b) before and after the termination, abandonment or breach of the Contract.

(3) The Adjudicator shall give its decision in writing to both Parties no later than 30 days after the referral of a dispute. If the Adjudicator has rendered its decision within the 30 day time limit, and no notice of intention to commence arbitration has been given by either the Owner or the Operator prior to the expiration of 60 days after the reference of the dispute to the Adjudicator, the Adjudicator's decision shall become final and binding upon the Owner and the Operator. Any decision that has become final and binding shall be implemented by the Parties forthwith.

(4) The Adjudicator shall be paid a fee at the rate specified in the SCC plus reasonable expenditures incurred in the execution of its duties as Adjudicator, and these costs shall be divided equally between the Owner and the Operator.

(5) If the Adjudicator resigns or dies, or the Owner and the Operator agree that the Adjudicator is not fulfilling its functions in accordance with the provisions of the Contract, a new Adjudicator shall be jointly appointed by the Owner and the Operator. If the Owner and the Operator cannot agree on a new Adjudicator within 30 days after the resignation, death or removal of the existing Adjudicator, the new Adjudicator shall be appointed at the request of either Party by the Appointing Authority specified in the SCC.

1.6.2. Arbitration

(1) If either the Owner or the Operator is dissatisfied with the Adjudicator's decision, or if the Adjudicator fails to give a decision within 30 days after a dispute being referred to it, then either the Owner or the Operator may, within 60 days after such reference, give notice to the other Party, with a copy for information to the Adjudicator, of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

(2) Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GC Section 1.6.2(1), shall be finally settled by arbitration.

(3) Arbitration proceedings shall be conducted in accordance with the rules of procedure Designated in the SCC.

1.6.3. Obligations during Arbitration

Notwithstanding any reference to the Adjudicator or arbitration herein,

(a) the Parties shall continue to perform their respective obligations under the Contract unless they otherwise agreed; and

(b) the Owner shall pay the Operator any monies due to the Operator.

1.7. Assignment

(1) The Operator shall not assign to any Third Party the Contract, or any part thereof, or any right, benefit, obligation or interest therein or thereunder without the prior consent of the Owner, which consent may not be unreasonably withheld.

(2) The Operator may assign, absolutely or by way of charge, any monies due and payable to it or that may become due and payable to it under the Contract.

(3) To be a valid assignment which has been approved by the Owner pursuant to GC Section 1.7(1), the assignment must,

(a) be in writing;

(b) be dated and signed by the Owner's Representative; and

(c) state the specific details of the assignment.

1.8. Contract Records, Accounting and Auditing

1.8.1. Contract Records

(1) Except as provided in GC Section 6.1, all data, information, documentation, account, plans, programs, reports, surveys and guidelines of any kind whatsoever (the "Contract Records") prepared by the Operator in performing the Services shall become and remain the property of the Owner and the Operator shall deliver all Contract Records and a detailed inventory of those Contract Records to the Owner no later than the date of termination or expiration of the Contract, except in respect of such Contract Records that are required to be delivered at an earlier date.

(2) The Contract Records shall include,

(a) information of any kind whatsoever related to the finances, revenues or expenditures of the Owner's operations;

(b) all files, documents, plans, drawings, specifications, notes, minutes of meetings and minutes of conversations;

(c) all the plans, programs, reports, surveys and guidelines prepared by the Operator in carrying out the Operations Services;

(d) the accounts of the Sewerage Treatment operations at the Project Facility;

(e) all manuals, reports, condition surveys, safety records, audit records, inventories, laboratory test results, procurement records, customer information, financial information, financial statements, invoices, accounting records, subcontracts and personnel records; and

(f) the Design-Build Documents, whether stored in hard copy or electronically.

(3) The Operator shall provide the Owner with unrestricted access to the Contract Records during the term of the Contract, including the right to make and retain copies.

(4) The Operator may retain a copy of the Contract Records but shall not use them for purposes unrelated to this Contract without the prior approval of the Owner. This GC Section 1.8.1(4) does not in any way relieve the Operator of its obligation of confidentiality pursuant to GC Section 6.2.

(5) Except as provided in GC Section 6.1, the Operator acknowledges that the Owner, as Owner of the Contract Records, may deal with the Contract Records in any way it determines, including making the Contract Records publicly available and making them available to prospective Bidders who may be involved in the process to select a Subsequent Operator.

1.8.2. Accounting

The Operator shall keep accurate and systematic accounts in respect of the Services and the Contract in accordance with internationally accepted accounting principles.

1.8.3. Auditing the Operator's Own Accounts and the Contract Records

(1) The Owner may, in its sole discretion, audit,

(a) the Operator's own accounts, financial information, financial statements and technical information at any reasonable time and with 24 hours' notice to the Operator; and

(b) the Contract Records and Design-Build Documents at any reasonable time and without notice to the Operator,

in respect of any matters related to the Contract.

(2) The Owner may complete the audit or audits itself or may retain an independent auditor, at the Owner's expense, to complete the audit or audits.

1.8.4. Operator's Audited Accounts

The Operator shall submit to the Owner, no later than 90 days after the end of the Operator's fiscal year, the annual audited accounts of its own finances for each of the Operator's fiscal years that occur during the Contract Term.

1.8.5. Inspections and Audit by the NMCG

The Operator shall permit the NMCG and/or persons appointed by the NMCG to inspect the Site and/or the Owner's accounts and records relating to the performance of the Contract and to have such accounts and records audited by auditors appointed by the NMCG if required by the NMCG.

1.9. Operator's Claims during the Design-Build Period

(1) If the Operator considers itself to be entitled to any extension of the Time for Completion or any additional payment, under any section related to the Design-Build Services of these General Conditions, the Operator shall give notice to the Design-Build-Operations Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and no later than 30 days, after the Operator became aware, or should have become aware, of the event or circumstance.

(2) If the Operator fails to give notice of a claim within such period of 30 days, the Time for Completion shall not be extended, the Operator shall not be entitled to additional payment, and the Owner shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this GC Section 1.9 shall apply.

(3) The Operator shall also submit any other notices related to the Design-Build Services which are required by the Contract, and supporting particulars for the claim, that are relevant to such event or circumstance.

(4) The Operator shall keep such contemporary records as may be necessary to substantiate any claim related to the Design-Build Services, either on the Site or at another location acceptable to the Design-Build-Operations Engineer. Without admitting the Owner's liability, the Design-Build-Operations Engineer may, after receiving any notice under this GC Section 1.9, monitor the record-keeping or instruct the Operator to keep further contemporary records. The Operator shall permit the Design-Build-Operations Engineer to inspect all these records, and shall, if instructed, submit copies to the Design-Build-Operations Engineer.

(5) No later than 42 days after the Operator became aware, or should have become aware, of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Operator and approved by the Design-Build-Operations Engineer, the Operator shall send to the Design-Build-Operations Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect,

(a) this fully detailed claim shall be considered as interim;

(b) the Operator shall send further interim claims at monthly intervals, giving the accumulated delay or amount claimed, and such further particulars as the Design-Build-Operations Engineer may reasonable require; and

(c) the Operator shall send a final claim no later than 30 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Operator and approved by the Design-Build-Operations Engineer.

(6) No later than 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Design-Build-Operations Engineer and approved by the Operator, the Design-Build-Operations Engineer shall respond with approval, or with disapproval and detailed comments. The Design-Build-Operations Engineer may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

(7) Each invoice sent by the Operator shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Operator shall only be entitled to payment for such part of the claim as it has been able to substantiate.

(8) The Operator shall proceed in accordance with GC Section 7.2.6 to request,

(a) an extension, if any, of the Time for Completion before or after its expiry in accordance with GC Section 2.3.4; or

(b) an additional payment, if any, to which the Operator believes it is entitled under the Contract.

(9) The requirements of this GC Section 1.9 are in addition to those of any other provision which may apply to a claim. If the Operator fails to comply with this or another provision in relation to any claim, any extension of or additional payment shall take account of the extent, if any, to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under GC Section 1.9(2).

(10) This GC Section 1.9 shall apply only in respect of the Design-Build Services excluding the Existing Operations Services.

ARTICLE 2. CONTRACT TERM, TIMING AND COMPLETION

2.1. General

2.1.1. Effectiveness of Contract

The Form of Contract shall be signed by the Operator, and all partners, if the Operator is a joint venture company, prior to its signing by the Owner. The Contract shall come into force and effect on the date the Form of Contract is signed by the Owner (the "Effective Date").

2.1.2. Expiration of Contract

This Contract shall terminate on either,

(1) the specified number of months after the Operations Starting Date named in the SCC;

(2) the Extension Date pursuant to GC Section 2.4.3; or

(3) the date of Contract termination pursuant to GC Section 11.2,

(the "End Date"), whichever is applicable.

2.1.3. Commencement of Services

(1) Unless otherwise stated in the SCC, the Design-Build Starting Date shall be no later than 30 days after the Effective Date and the Owner shall give the Operator at least seven days prior notice of the Design-Build Starting Date.

(2) The "Operations Starting Date" shall be the date of the Operational Acceptance Certificate.

2.2. Design-Build Period and Operations Period

The Contract Term shall be divided into two periods as follows:

(a) the period commencing on the Effective Date and ending on the day immediately prior to the Operations Starting Date (the "Design-Build Period"); and

(b) the period commencing on the Operations Starting Date and ending on the End Date (the "Operations Period"), namely the date of completion of the Operation and Maintenance period of 15 years, commencing from the date of Operational Acceptance of the STP, Network, Pumping Stations and all appurtenant and allied works.

2.3. Design-Build Period – Commencement, Delays and Suspension

2.3.1. Commencement of the Design-Build Services

The Operator shall commence the Design-Build Services no later than the Design-Build Starting Date, and shall then proceed with the Design-Build Services with due expedition and without delay.

2.3.2. Time for Completion

The Operator shall complete the whole of the Design-Build Services in accordance with the time for completion set out in the SCC ("Time for Completion") for the Design-Build Services including,

(a) successfully completing the Tests on Commissioning; and

(b) completing all of the Design-Build Services such that the completed Project Facility can be used as a fully operational Project Facility in accordance with the Contract.

2.3.3. Design-Build Time Schedule

(1) The Operator shall submit a detailed time programme (the "Time Schedule") to the Design-Build-Operations Engineer no later than 30 days after the Design-Build Starting Date. The Operator shall also submit a revised Time Schedule whenever the previous Time Schedule is inconsistent with actual progress or with the Operator's obligations. Each Time Schedule shall include a description of,

(a) the order in which the Operator intends to carry out the Design-Build Services, including the anticipated timing of each stage of Design, Design-Build Documents, procurement, manufacture, inspection, delivery to the Site, construction, erection, testing and commissioning;

(b) the periods for review and any other submissions, approvals and consents specified in the Contract;

(c) the sequence and timing of inspections and tests specified in the Contract;

(d) the scheduled Time for Completion, the planned Time for Completion and the planned Operations Starting Date;

(e) all major events and activities in the production of Design-Build Documents; and

(f) all major phases and milestones of the Design-Build Services.

(2) The Design-Build-Operations Engineer shall review each Time Schedule and provide comments to the Operator as to whether the Time Schedule complies with the Contract. If the Design-Build-Operations Engineer fails to provide such comments prior to the expiration of 21 days after receiving a Time Schedule, the Operator shall proceed in accordance with the Time Schedule, subject to its other obligations under the Contract. The Operator shall be entitled to rely upon the Time Schedule when planning its activities.

(3) The Operator shall promptly give notice to the Design-Build-Operations Engineer of specific probable future events or circumstances which may adversely affect the Design-Build Services or delay the execution of the Design-Build Services. The Design-Build-Operations Engineer may require the Operator to submit an estimate of the anticipated effect of the future event or circumstances, or a proposal under GC Section 10.1.3.

(4) If, at any time, the Design-Build-Operations Engineer gives notice to the Operator that a Time Schedule fails, to the extent stated, to comply with the Contract or to be consistent with actual progress and the Operator's stated intentions, the Operator shall submit a revised Time Schedule to the Design-Build-Operations Engineer in accordance with this GC Section 2.3.3.

2.3.4. Extension of the Time for Completion

(1) The Time for Completion shall be extended if the Operator is delayed or impeded in the performance of the Design-Build Services by reason of any of the following:

(a) a Change, unless the Parties have already agreed to an adjustment to the Time for Completion as part of the applicable Change;

(b) an occurrence of Force Majeure as provided in GC Section 9.8, Unforeseeable physical conditions as provided for in GC Section 9.7, or loss or damage as a result of the occurrences set out in GC Section 9.4(2);

(c) any suspension order given by the Owner pursuant to GC Section 11.1.1;

(d) any change in the Applicable Law in accordance with GC Section 9.10;

(e) any default or breach of the Contract by the Owner or any activity, act or omission of any other Operators employed by the Owner; or

(f) any other matter specifically mentioned in the Contract.

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the actual delay or impediment sustained by the Operator.

(2) The Operator shall submit, to the Design-Build-Operations Engineer, any notice of a claim for an extension of the Time for Completion in accordance with GC Section 10.1.3.

(3) The Operator shall, at all times, use reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

2.3.5. Rate of Progress

(1) If, at any time, the Operator's progress in respect of the Design-Build Services,

(a) is too slow to complete the Design-Build Services in accordance with the Time for Completion; or

(b) has fallen, or will fall, behind the current Time Schedule

other than as a result of a cause listed in GC Section 2.3.4, then the Design-Build-Operations Engineer may instruct the Operator to submit a revised Time Schedule and supporting report describing the revised methods which the Operator proposes to adopt in order to expedite progress and complete the Design-Build Services.

(2) Unless the Design-Build-Operations Engineer notifies otherwise, the Operator shall adopt the revised methods referred to in GC Section 2.3.5(2), which may require increases in,

(a) the working hours or in the numbers of Operator's Personnel, or both; or

(b) Plant and Equipment,

at the risk and cost of the Operator. If these revised methods cause the Owner to incur additional costs, the Operator shall, subject to GC Section 1.9, pay these costs to the Owner, in addition to delay damages, if any, under GC Section 2.3.6.

2.3.6. Delay of Completion – Liquidated Damages - Delay

(1) The Operator guarantees that it shall attain Completion of the Project Facility in accordance with the Time for Completion specified in the SCC and GC Section 2.3.2 or in accordance with an extension of the Time for Completion granted to the Operator in accordance with GC Section 2.3.4.

(2) If the Operator fails to attain Completion of the Project Facility within the Time for Completion, or any extension thereof in accordance with GC Section 2.3.4, the Operator shall pay to the Owner liquidated damages in the amount specified in the SCC ("Liquidated Damages-Delay"). The aggregate amount of Liquidated Damages - Delay shall in no event exceed the amount specified as "Maximum" in the SCC. The Owner may terminate the Contract pursuant to GC Section 11.2.3 if the Operator reaches the "Maximum" level for Liquidated Damages – Delay.

(3) The payment or payments by the Operator of Liquidated Damages – Delay shall completely satisfy the Operator's obligation to attain Completion of the Project Facility within the Time for Completion or any extension thereof pursuant to GC Section 2.3.4.

(4) The payment or payments by the Operator of Liquidated Damages – Delay shall not in any way relieve the Operator of its obligations to complete the Project Facility or any other obligations and liabilities of the Operator under the Contract.

(5) If the Operator attains Completion of the Project Facility before the Time for Completion or any extension thereof pursuant to GC Section 2.3.4, and if the Owner intends to pay a bonus to the Operator for early completion, the amount of the bonus is as set out in the SCC. The aggregate amount of such bonus shall in no event succeed the amount specified as "Maximum" in the SCC.

2.3.7. Design-Build Period –(Special operation requirements) Deleted

2.4. Operations Period

2.4.1. Commencement of the Operations - Services

The Operator shall commence the Operations Services no later than the Operations Starting Date and shall then proceed with the Operations Services with due exception and without delay.

2.4.2. Services after the End Date

The Operator, upon written request by the Owner no later than 60 days prior to the End Date, shall provide assistance to the Owner, at no cost to the Owner, during a transitional period of up to 60 days after the End Date (the "Transition Assistance"). The purpose of the Transition Assistance is to ensure a smooth transition between the Operator and a Subsequent Operator of the Project Facility. The Transition Assistance shall be related to only transition services and shall not be the full range of Services as set out in the Operations Services Schedule.

2.4.3. Extension of the Contract

If both Parties agree, this Contract may be extended for a period of up to 5 years after the End Date. The Owner shall notify the Operator no later

than 6 months prior to the End Date if it wishes to enter into negotiations in order to extend the duration of the Contract. The date on which the Contract is to expire as a result of an extension shall be the Extension Date.

ARTICLE 3. OBLIGATIONS OF THE OPERATOR

3.1. General – Services and Standards of Performance

The Operator shall,

(a) perform the Design-Build Services set out in the Design-Build Services Schedule;

(b) perform the Operations Services set out in the Operations Services Schedule; and

(c) perform the Services in accordance with the Technical Standards set out in the Technical Standards Schedule,

3.2. Law Governing Services

The Operator shall comply with the Applicable Law and shall ensure that the Operator's Personnel and Sub-contractors comply with the Applicable Law. The Operator shall indemnify and hold harmless the Owner from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from violation of the Applicable Law by the Operator, the Operator's Personnel the Sub-contractors and the Sub-contractors' personnel.

3.3. Conflict of Interest

(1) The compensation of the Operator pursuant to GC Article 5 shall constitute the Operator's sole compensation in connection with this Contract and, except as provided in GC Article 5, the Operator shall not accept for its own benefit any trade commission, discount or similar payment in connection with activities pursuant to this Contract or in the discharge of its obligations hereunder, and the Operator shall use its best efforts to ensure that the Operator's Personnel, Sub-contractors, and the Sub-contractors' employees and agents, similarly shall not receive any such additional remuneration.

(2) The Operator, Sub-contractors and any entity affiliated with the Operator or the Sub-contractors, shall be disqualified, during the Contract Term from providing goods, works or services, other than the Services, with respect to,

(a) the goods, works and services purchased from the Contingency Fund; and

(b) the Capital Investment Program.

(3) The Operator, Operator's Personnel, Sub-contractors and the employees and affiliates of the Sub-contractors shall not engage, either directly or indirectly, in any business or professional activities which would conflict with the activities assigned to them under this Contract.

(4) The Operator and its Shareholders shall not participate in any discussions or work and shall not provide any services or advice to the Owner related to,

(a) except with respect to their responsibilities as set out in the Operations Services Schedule, institutional restructuring or reorganisation of the Owner or a utility or department of the Owner;

(b) the development or review of bidding documents to retain any Subsequent Operator; or

(c) the preparations for the procurement process to retain any Subsequent Operator.

(5) Failure of the Operator or the Shareholders to comply with this GC Section 3.3, in addition to constituting a breach of this Contract, may result in the disqualification of the Operator and the Shareholders from bidding in the procurement process to retain any Subsequent Operator.

3.4. Plant and Equipment, Operator's Equipment (Design-Build) and Operations Equipment (Operations)

(1) Any Plant and Equipment, Operator's Equipment (Design-Build) and Operator's Equipment (Operations) that will be incorporated in or be required for the Site and Project Facility or the Operation Services shall have their origin as specified under GC Section 1.1 ("Country of Origin").

(2) The Operator shall prepare a list of all Operator's Equipment (Design-Build) and Operator's Equipment (Operations) (the "Operator's Equipment Lists"). The Operator shall update the Operator's Equipment Lists on an annual basis and shall provide the updated Operator's Equipment Lists to the Owner no later than 30 days after the end of each of the Operator's fiscal years during the Contract Term.

3.5. Site Information and Investigation

(1) The Operator acknowledges that the Owner made available to the Operator, during the bidding process, either directly or by placing the data in the Data Room and Background Information Document, all available data on hydrological and sub-surface conditions of the Site, and studies on environmental impact that had been obtained by or on behalf of the Owner from investigations in anticipation of the Design-Build and Operations Services (the "Site Information"). The Operator shall be responsible for interpreting all data about the Site that is provided to it by the Owner.

(2) The Operator shall be deemed to have inspected and examined the Site, its surroundings, the Site Information and other available information, and to have satisfied itself before entering into the Contract, as to,

(a) the form and nature of the Site, including the sub-surface conditions;

(b) the applicable hydrological, hydro-geological and climatic conditions;

(c) the extent and nature of the work, Plant and Equipment, Operator's Equipment (Design-Build) and Operator's Equipment (Operations) necessary for the execution and completion of the Services, and the remedying of any defects; and

(d) the Operator's requirements for access to the Site, accommodation, personnel, power, transport, water and other services.

(3) The Operator shall be deemed to have obtained all necessary information as to risks, contingencies and all other circumstances that may influence or affect the performance of its obligations under the Contract.

(4) "The Operator shall not commence any Works, including mobilization and/or pre-construction activities (e.g. limited clearance for haul roads, site accesses and work site establishment, geotechnical investigations or investigations to select ancillary features such as quarries and borrow pits), unless the Engineer is satisfied that appropriate measures are in place to address environmental, social, health and safety risks and impacts. At a minimum, the Operator shall apply the Management Strategies and Implementation Plans and Code of Conduct, submitted as part of the Bid and agreed as part of the Contract. The Operator shall submit, on a continuing basis, for the Engineer's prior approval, such supplementary Management Strategies and Implementation Plans as are necessary to manage the ESHS risks and impacts of ongoing works. These Management Strategies and Implementation Plans collectively comprise the Operator's Environmental and Social Management Plan (O-ESMP). The O-ESMP shall be approved prior to the commencement of construction activities (e.g. excavation, earth works, bridge and structure works, stream and road diversions, quarrying or extraction of materials, concrete batching and asphalt manufacture). The approved O-ESMP shall be reviewed, periodically (but not less than every six (6) months), and updated in a timely manner, as required, by the Operator to ensure that it contains measures appropriate to the Works activities to be undertaken. The updated O-ESMP shall be subject to prior approval by the Engineer.

(5) To the extent the Operator did not make any of the interpretations, investigations or examinations, or did not satisfy itself, or did not obtain such information as called for in this GC Section 3.5, the Operator represents and warrants that it is willing to assume and does hereby assume responsibility for any and all loss and damage from any cause whatsoever which the Operator's interpretations, investigations, examinations and obtaining of information may have avoided and agrees to indemnify the Owner from all risk thereof and from conditions arising or developing in the course of performing the Services which may make the performance of the Services more onerous and more expensive to fulfil or perform than was contemplated on the Effective Date. Notwithstanding anything in the Contract to the contrary, the Operator acknowledges and declares that in entering into the Contract it did not and does not rely upon any information or report provided by or on behalf of the Owner or its agents, representatives or employees.

3.6. Access to the Site and Project Facility

(1) The Operator shall, during both the Design-Build Period and the Operations Period, provide free and open access to the Site and the Project Facility at the Owner's request. The Owner shall make reasonable efforts to provide reasonable notice to the Operator prior to the Owner's access but such notice is not mandatory. The Owner's representative on the Site, or at the Project Facility shall observe all safety and health regulations and reasonable instructions of the Operator.

(2) The Operator shall give all reasonable access to any other Operators employed by the Owner on or near the Site to carry out their work.

(3) If the Operator makes available to other Operators any roads or ways the maintenance for which the Operator is responsible, permits the use by such other Operators of the Operator's Equipment (Design-Build) and Operator's Equipment (Operations), or provides any other service of whatsoever nature for such other Operators, the Owner shall fully compensate the Operator for any loss or damage caused or occasioned by such other Operators in respect of any such use or service, and shall pay to the Operator reasonable remuneration for the use of such equipment or the provision of such services.

(4) The Operator shall also arrange to perform its work so as to minimize, to the extent possible, interference with the work of other Operators. The Design-Build-Operations Engineer shall determine the resolution of any difference or conflict that may arise between the Operator and other Operators and the workers of the Owner in regard to their work.

(5) The Operator shall notify the Design-Build-Operations Engineer, as applicable, promptly of any defects in the other Operators' work that come to its notice, and that could affect the performance of the Services by the Operator. The Design-Build-Operations Engineer, as applicable, shall determine the corrective measures, if any, required to rectify the situation after inspection of the Site, the STP and the Netwok. Decisions made by the Design-Build-Operations Engineer, as applicable, shall be binding on the Operator.

3.7. Safety

Procedures

The operator shall:

(a) comply with all applicable safety regulations,

(b) take care for the safety of all persons entitled to be on the Site,

(c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,

(d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and

(e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

3.8. Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Operator shall take reasonable precautions to prevent Operator's Personnel or other persons from removing or damaging any of these findings.

The Operator shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Operator suffers delay and/or incurs Cost from complying with the instructions, the Operator shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 1.9 [Contractor's Claims] to:

(a) an extension of time for any such delay, if completion is or will be delayed, under GCC clause 2.3.4 [Extension of Time for Completion], and

(b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with GC Section 7.2.6 to agree or determine these matters.

ARTICLE 4. OBLIGATIONS OF THE OWNER

4.1. Owner's Assistance to the Operator

Owner shall obtain consent from the respective pollution control board/authority and all other requisite clearances to establish and operate the STP unless the same have been obtained already.

The Owner shall use reasonable efforts to,

(a) provide the Operator, Sub-contractors and Operator's Personnel with work permits and such other documents as shall be necessary to enable the Operator, Sub-contractors or Operator's Personnel to perform the Services;

(b) arrange for Operator's Personnel and, if appropriate, their eligible dependants to obtain promptly all necessary entry and exit visas, residence permits, exchange permits and any other documents required for their stay in the Country;

(c) facilitate the prompt clearance through customs of any property required for the Services and of the personal effects of the Operator's Personnel and their eligible dependants; and

(d) issue to officials, agents and representatives of the Owner all such instructions as may be necessary or appropriate for the prompt and effective implementation of the Services.

4.2. Access to the Site and Project Facility

the Owner shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto and for providing possession and access to all other areas reasonably required for the proper execution of the Contract including all requisite rights of way. The Owner shall provide the Operator, free of charge, full possession of the Site and the Project Facility during the term of the Contract.

4.3. Reviews and Approvals of Submissions

(1) Except as otherwise provided in the Contract, if the Operator submits a plan, report or other documentation to the Owner in writing, and the Owner, or the Design-Build-Operations Engineer, is required to approve that submission, the Design-Build-Operations Engineer as applicable, shall review and either approve or provide written comment on the Operator's submission no later than 14 days after the day of submission by the Operator to the Design-Build-Operations Engineer.

(2) If the Design-Build-Operations Engineer, as applicable, fails to approve or refuses to approve the Operator's submission in accordance with GC Section 4.3(1), the Operator shall notify the Owner in writing that it has not received a response to its submission.

(3) If the Design-Build-Operations Engineer, as applicable, fails to respond to the Operator's written notification pursuant to GC Section 4.3(2) within 14 days after the receipt by the Design-Build-Operations Engineer, as applicable, of the Operator's written notification, the Operator's submission shall be deemed to be approved.

ARTICLE 5. CONTRACT PRICE AND PAYMENT

5.1. Contract Price

(1) The Contract Price shall be as specified in the Price Schedules offered by the Operator and accepted by the Owner while awarding the Contract. These prices have been incorporated in Schedule 5 of the Contract.

(2) Subject to GC Section 9.7, the Operator shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract, including all costs and expenses for the Design, Building, Successful Commissioning, Operation & Maintenance of the Project Facility in accordance with the provisions of this Contract.

(3) Unless indicted in the SCC, the contract price shall not be subject to any alteration except in the event of a change to the design build services in accordance with GC section 10.1 or a change to the operations services in accordance with GC Section 10.2 and 10.3.

5.2. Terms of Payment

(1) The Contract Price shall be paid as specified in the SCC.

(2) No payment made by the Owner herein shall be deemed to constitute acceptance by the Owner of the Project Facility or any part thereof.

(3) In the event that the Owner fails to make any payment by its respective due date or within the period of 60 days, the Owner shall pay to the Operator interest on the amount of such delayed payment at the rate shown in the SCC and as specified in the SCC for the period of delay until payment has been made in full.

(4) The currency or currencies in which payments are made to the Operator under this Contract shall be specified in the SCC, subject to the general principle that payments will be made in the currency or currencies in which the Contract Price has been stated in the Operator's Bid.

(5) All payments shall be made in the currency or currencies specified in the Article 2 of the Contract.

(6) if the Operator was, or is, failing to perform any ESHS obligations or work under the Contract, the value of this work or obligation, as determined by the Engineer, may be withheld until the work or obligation has been performed, and/or the cost of rectification or replacement, as determined by the Engineer, may be withheld until rectification or replacement has been completed. Failure to perform includes, but is not limited to the following:

(i) failure to comply with any ESHS obligations or work described in the Works' Requirements which may include: working outside site boundaries, excessive dust, failure to keep public roads in a safe usable condition, damage to offsite vegetation, pollution of water courses from oils or sedimentation, contamination of land e.g. from oils, human waste, damage to archeology or cultural heritage features, air pollution as a result of unauthorized and/or inefficient combustion;

(ii) failure to regularly review C-ESMP and/or update it in a timely manner to address emerging ESHS issues, or anticipated risks or impacts;

(iii) failure to implement the C-ESMP;

(iv) failing to have appropriate consents/permits prior to undertaking Works or related activities;

(v) failure to submit ESHS report/s (as described in Appendix 1 of Schedule 2 (Design Build Services), or failure to submit such reports in a timely manner;

(vi) failure to implement remediation as instructed by the Engineer within the specified timeframe (e.g. remediation addressing non-compliance/s).

5.3. Performance Incentive Compensation

If the Owner intends to pay the Operator performance incentive compensation, the Owner will pay such compensation at the end of the Operations Period and in accordance with the Performance Incentive Compensation Schedule.

5.4. Liquidated Damages - Operations

The Operator shall pay the Owner liquidated damages for failure to meet Technical and Operational Standards as set out in SCC.

5.5. Securities

5.5.1. Performance Security

(1) The Operator shall provide a security for the Operator's proper performance of the Contract to the Owner no later than the date specified in the Bidding Documents (the "Performance Security").

(2) The Performance Security shall be,

(a) in the amount specified in the SCC;

(b) denominated in the currency or currencies of the Contract, or in a freely convertible currency acceptable to the Owner; and

(c) shall be in the form specified in the Bidding Documents or in another form approved by the Owner.

(3) The Performance Security is a bank guarantee and shall be issued by either,

(a) a bank or insurance company located in the Country; or

(b) a foreign bank or insurance company through a correspondent bank or insurance company located in the Country.

(4) The Performance Security shall be valid until 180 days after the End Date, or any extension to the End Date.

(5) The Owner shall release the Performance Security for the Design and Build Part after 3 years of completion of Design and Build work certified by the Owner and submission of the first 3 years O&M performance security.

(6) The cost of complying with this GC Section 5.5.1 shall be borne by the Operator.

5.5.2. Advance Payment Security

(1) The Operator shall provide a security in an amount equal to the advance payment calculated in accordance with the Terms and Procedures of Payment Schedule and in the same currency or currencies.

(2) The mobilization advance paid to the Operator by the Owner shall be recovered commencing from the date on which the payment to the Operator has reached 25% of the part A and Part D price and shall be fully recovered by completion of 90% of the time for completing the works under part A and Part D.

5.6. Taxes and Duties

(1) Except as otherwise specifically provided in the Contract, the Operator shall bear and pay all taxes, duties, levies and charges (the "Taxes") assessed on the Operator, its Sub-contractors or their employees by all municipal, state or national government authorities in connection with the Services in and outside of the Country.

(2) Service Tax if applicable shall be reimbursed by the Owner against evidence of applicability and payment.

(3) If any tax exemptions, reductions, allowances or privileges and benefits may be available to the Operator in the Country, the same shall be passed on by the operator to the Owner.

ARTICLE 6. COPYRIGHT : DESIGN-BUILD DOCUMENTS

6.1. Copyright – Design-Build Documents

(1) As between the Parties, the Operator shall retain the copyright and other intellectual property rights in the Design-Build Documents made by or on behalf of the Operator.

(2) The Operator shall be deemed, by signing the Contract, to give the Owner a non-terminable, transferable, non-exclusive, royalty-free licence to copy, use and communicate the Design-Build Documents, including making and using modifications of them. This licence shall,

(a) apply throughout the actual or intended working life, whichever is longer, of the relevant parts of the Site or Project Facility;

(b) entitle any person in proper possession of the relevant part of the Site or Project Facility to copy, use and communicate the Design-Build Documents for the purposes of completing, managing, operating, maintaining, altering, adjusting, and repairing the Project Facility;

(c) in the case of Design-Build Documents which are in the form of computer programs and other software, permit their use on any computer on the Site or at the Project Facility and other places as envisaged by the Contract, including replacements of any computers supplied by the Operator; and

(d) entitle the Owner to make the Design-Build Documents available for inspection by a prospective Bidder who may be involved in the process to select a Subsequent Operator.

(3) The Owner shall not, without the Operator's consent, use, copy or communicate the Design-Build Documents to a Third Party by, or on behalf of, the Owner for purposes other than those permitted under GC Section 6.1(2).

6.2. Confidentiality

(1) The Operator shall keep confidential and shall not, without the written consent of the Owner, divulge to any Third Party any documents, data or other information arising directly or indirectly from the performance of Services under the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding this GC Section 6.2(1), the Operator may furnish to its Sub-contractors such documents, data and other information to the extent required for the Sub-contractors to perform their work under the Contract, in which event the Operator shall obtain from such Sub-contractors an undertaking of confidentiality similar to that imposed on the Operator under this GC Section 6.2(1).

(2) The Operator shall not use such documents, data and other information received from the Owner for any purpose other than the Services as are required for the performance of the Contract. The Operator shall not publish, permit to be published, or disclose any particulars of the Services, Site or Project Facility in any trade or technical paper or advertising materials without the prior written consent of the Owner.

(3) The obligations of the Operator under GC Sections 6.2(1) and 6.2(2), shall not apply to that information which,

(a) now or hereafter enters the public domain through no fault of the Operator;

(b) can be proven to have been possessed by the Operator at the time of disclosure and which was not previously obtained, directly or indirectly, from the Owner; or

(c) otherwise lawfully becomes available to the Operator from a Third Party that has no obligation of confidentiality.

ARTICLE 7. CONTRACT ADMINISTRATION AND SUPERVISION DURING THE DESIGN-BUILD AND OPERATIONS PERIODS

7.1. General

The Parties acknowledge that two separate approaches to contract administration and supervision will be in place during the Contract Term as follows:

(a) from the Effective Date until the Operations Starting Date, the Design-Build Supervision approach will be put in place by the Owner; and

(b) from the Operations Starting Date until the End Date, the Operations Supervision approach will be put in place by the Owner.

7.2. Design-Build Supervision

7.2.1. Supervision during the Design-Build Period

GC Section 7.2 shall apply only during the Design-Build Period.

7.2.2. Design-Build-Operations Engineer's Duties and Authority (Design-Build Period)

(1) The Owner shall appoint the Design-Build-Operations Engineer who shall be responsible for day to day contract management and supervision during the Design-Build Period. The Design-Build-Operations Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

(2) The Design-Build-Operations Engineer shall have no authority to amend the Contract.

(3) Except, as specifically provided otherwise in the Contract, the Design-Build-Operations Engineer may exercise the authority attributable to the Design-Build-Operations Engineer as specified in or necessarily to be implied from the Contract. The Owner undertakes not to impose further constraints on the Design-Build-Operations Engineer's authority, except as agreed with the Operator.

(4) If the Design-Build-Operations Engineer is obligated to obtain the approval of the Owner before exercising a specific authority, these restrictions shall be shall be set out in the SCC. If the Design-Build-Operations Engineer exercises a specified authority for which the Owner's approval is required then, for the purposes of the Contract, the Owner shall be deemed to have given approval.

(5) Except as otherwise stated in the Contract,

(a) if the Design-Build-Operations Engineer carries out duties or exercises authority, specified in or implied by the Contract, the Design-Build-Operations Engineer shall be deemed to act for the Owner;

(b) the Design-Build-Operations Engineer has no authority to relieve any Party of any duties, obligations or responsibilities under the Contract; and

(c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test or similar act by the Design-Build-Operations Engineer, including absence of disapproval, shall not relieve the Operator from any responsibility it has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

7.2.3. Delegation by the Design-Build-Operations Engineer

(1) The Design-Build-Operations Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, or independent inspectors appointed to inspect or test items of Plant or Equipment. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. Unless otherwise agreed by both Parties, the Design-Build-Operations Engineer shall not delegate the authority to determine any matter in accordance with GC Section 7.2.6.

(2) Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in GC Section 1.3.1.

(3) Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Operator to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Design-Build-Operations Engineer. However,

(a) any failure to disapprove any work or Plant and Equipment shall not constitute approval, and shall therefore not prejudice the right of the Design-Build-Operations Engineer to reject the work or the Plant and Equipment; and

(b) if the Operator questions any determination or instruction of an assistant, the Operator may refer the matter to the Design-Build-Operations Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

7.2.4. Instructions of the Design-Build-Operations Engineer

(1) The Design-Build-Operations Engineer may issue to the Operator, at any time during the Design-Build Period, instructions which may be necessary for the execution of the Design-Build Services and the remedying of any defects, all in accordance with the Contract. The Operator shall only take instructions from the Design-Build-Operations Engineer, or from an assistant to whom the appropriate authority has been delegated under GC Section 10.1.

(2) The Operator shall comply with the instructions given by the Design-Build-Operations Engineer or delegated assistant, on any matter related to the Contract. These instructions shall be given in writing.

7.2.5. Replacement of the Design-Build-Operations Engineer

If the Owner intends to replace the Design-Build-Operations Engineer, the Owner shall, not less than 42 days before the intended date of replacement, give notice to the Operator of the name, address and relevant experience of the intended replacement Design-Build-Operations Engineer. The Owner shall not replace the Design-Build-Operations Engineer with a person against whom the Operator raises reasonable objection by notice to the Owner, with supporting particulars.

7.2.6. Determinations by the Design-Build-Operations Engineer

(1) Whenever the Contract provides that the Design-Build-Operations Engineer shall proceed in accordance with this GC Section 7.2.6 to agree or determine any matter, the Design-Build-Operations Engineer shall consult with each Party in an endeavour to reach agreement. If agreement is not achieved, the Design-Build-Operations Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

(2) The Design-Build-Operations Engineer shall give notice to the Parties of each agreement or determination, with supporting particulars. Each Party shall give effect to each agreement or determination unless and until revised under GC Section 1.9.

7.3. Operations Supervision

7.3.1. Supervision during the Operations Period

This GC Section 7.3 shall apply only during the Operations Period and the period of time immediately after the End Date solely for the purpose of resolving transition issues and any outstanding issues arising during the Operations Period.

7.3.2. The Owner shall appoint its Representative for supervision of the "Operations' during the O & M period of 15 years in accordance with SCC clause 8.1.1 (1) (b).

ARTICLE 8. REPRESENTATIVES, STAFF AND SUBCONTRACTING

8.1. Representatives

8.1.1. Owner's Representative

(1) The Owner's representative (the "Owner's Representative") shall be as follows:

(a) during the Design-Build Period, the Owner's Representative shall be the Design-Build-Operations Engineer; and

(b) during the Operations Period, the Owner's Representative shall be the as mentioned in SCC

(2) The Owner shall name its representative,

(a) no later than 14 days after the Effective Date for the Design-Build-Operations Engineer; and

(3) The Owner may change its representative from time to time and shall give notice of the change without delay. The Owner shall not change its representative at a time and in such a manner as to impede the progress of either the Design-Build Services or the Operations Services.

(4) The Owner's Representative shall represent and act for the Owner at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract by the Owner shall be given by the Design-Build-Operations Engineer as applicable, except as herein otherwise provided.

(5) All notices, instructions, information and other communications given by the Operator to the Owner under the Contract shall be given to the Design-Build-Operations Engineer as applicable, except as herein otherwise provided.

8.1.2. Operator's Representative

(1) If the Operator's representative is not named in the SCC, the Operator shall name its representative (the "Operator's Representative") no later than 14 days after the Effective Date and shall request the Owner to approve the proposed Operator's Representative. If the Owner makes no objection to the proposed Operator's Representative, the Operator's Representative shall be deemed to have been approved.

(2) If the Owner objects to the proposed Operator's Representative before the expiration of 14 days after the proposal, the Operator shall propose a replacement no later than 14 days after receiving the Owner's objection and reasons for the objection and GC Section 8.1.2(1) shall apply to the proposed replacement.

(3) The Operator's Representative shall represent and act for the Operator at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract by the Operator shall be given by the Operator's Representative, except as herein otherwise provided.

(4) All notices, instructions, information, and other communications given by the Owner to the Operator under the Contract shall be given to the Operator's Representative as established pursuant to this GC Section 8.1.2.

(5) The Operator shall not revoke the appointment of the Operator's Representative without the Owner's prior written consent, which shall not be unreasonably withheld. If the Owner consents thereto, the Operator shall appoint some other person as the Operator's Representative, pursuant to the procedure set out in this GC Section 8.1.2.

(6) The Operator's Representative may, subject to the approval of the Owner, which shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Operator's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Owner and the Design-Build-Operations Engineer.

(7) Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with GC Section 8.1.2(6) shall be deemed to be an act or exercise by the Operator's Representative.

8.2. Operator's Superintendence

(1) Throughout the term of the Contract, the Operator shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the Services.

(2) Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications as set out in the SCC and of the operations to be carried out, including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents, for the satisfactory and safe execution of the Services.

(3) The Operator's Representative shall appoint a suitable person as construction or operations manager as applicable (the "Manager"). The Manager shall supervise all work done at the Site and Project Facility by the Operator and shall be present at the Site or Project Facility through normal working hours except when on leave, sick or absence connected with the proper performance of the Contract. Whenever the Manager is absent from the Site Project Facility, a suitable person shall be appointed to act as his or her deputy.

8.3. Operator's Personnel

(1) The Operator shall provide and employ on the Site for the performance of the Services such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution of the Contract (the "Operator's Personnel"). The Operator is encouraged to use local labour that has the necessary skills. The Operator shall provide all expertise needed to carry out the Services including the Key Staff with the expertise specified in the SCC for the design build services.

(2) Unless otherwise provided in the Contract, the Operator shall be responsible for the recruitment, employment, transportation, accommodation and catering of all labour, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

(3) The Operator shall be responsible for obtaining all necessary permits and visas from the appropriate authorities for the entry of all labour and personnel to be employed on the Site into the Country.

(4) The Operator shall at its own expense provide the means of repatriation to all of its and its Sub-contractor's personnel employed on the Contract at the Site to their various home countries. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Operator defaults in providing such means of transportation and temporary maintenance, the Owner may provide the same to such personnel and recover the cost of doing so from the Operator.

(5) The Operator shall at all times during the progress of the Contract use its best endeavours to prevent any unlawful, riotous or disorderly conduct or behaviour by or amongst its employees and the labour of its Sub-contractors.

(6) The Operator shall, in all dealings with its labour and the labour of its Sub-contractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labour.

8.4. Replacement of Operator's Personnel

The Owner or Design-Build-Operations Engineer may require the Operator to remove and replace any member of the Operator's Personnel who,

(a) persists in any misconduct or lack of care;

(b) carries out duties incompetently or negligently;

(c) fails to comply with any provision of the Contract; or

(d) persists in any conduct which gives the Owner reasonable cause to be dissatisfied with him or her. Or undertakes behavior which breaches the Code of Conduct (ESHS) (e.g. spreading communicable diseases, sexual harassment, gender based violence, illicit activity or crime)."

"*If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.*"

"The Contractor's Personnel includes Key Personnel. If the Contractor intends to replace a Key Personnel, the Contractor shall, not less than 30 days before the intended date of replacement, give notice to the Engineer, the name, address, academic qualifications and relevant experience of the intended replacement Key Personnel. The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Key Personnel or appoint a replacement."

8.5. Existing Staff

If the Operator is obliged to retain staff employed by the Owner as stated in the SCC, it shall do so in accordance with the Existing Staff Schedule.

8.6. Sub-contractors

(1) The Operator shall not enter into any contract or contracts that will result in the Operator exceeding the maximum percentage of subcontracting permitted by the Owner in respect of the Design-Build Services and the Operations Services, as set out in the Bidding Documents.

(2) Except with respect to the Sub-contractors named in the Operator's Bid, the Operator shall not enter into a contract with any Sub-contractor without the prior consent of the Owner.

(3) The Operator shall be responsible for the observance by Sub-contractors of the terms and conditions of the Contract and shall ensure that all relevant terms of the Contract are included in the Operator's contracts with Sub-contractors.

(4) Subcontracting by the Operator shall not relieve the Operator of any of its obligations under the Contract and the Operator shall be responsible for the acts, omissions and defaults of all Sub-contractors, and the Sub-contractors, employees, agents and sub-sub-contractors, as fully as if they were acts, omissions or defaults of the Operator or the Operator's Personnel.

ARTICLE 9. LIABILITY AND RISK DISTRIBUTION

9.1. Defect Liability -

(1) The Operator warrants that the Site and Project Facility or any part thereof shall be free from defects in the Design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

(2) The Defect Liability Period shall be 24 months after the date of Completion of the STP and successful completion of three months trial run of the Project Facility, whichever first occurs, unless specified otherwise in the SCC.

(3) If during the Defect Liability Period any defect should be found in the Design, engineering, materials and workmanship of the Site, Project Facility or Plant and Equipment supplied or of the work executed by the Operator, the Operator shall promptly, in consultation and agreement with the Owner regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good, as the Operator shall, at its discretion, determine, such defect as well as any damage to the Project Facility caused by such defect. The Operator shall not be responsible for the repair, replacement or making good of any defect or of any damage to the Project Facility arising out of or resulting from normal wear and tear.

(4) The Operator's obligations under this GC Section 9.1 shall not apply to,

(a) any Designs, specifications or other data Designed, supplied or specified by or on behalf of the Owner; and

(b) any other materials supplied or any other work executed by or on behalf of the Owner, except for the work executed by the Owner under GC Section 9.1(10).

(5) The Owner shall give the Operator a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Owner shall give all reasonable opportunity for the Operator to inspect any such defect.

(6) The Owner shall give the Operator all necessary access to the Project Facility and the Site to enable the Operator to perform its obligations under this GC Section 9.1.

(7) The Operator may, with the consent of the Owner, remove from the Site any Plant and Equipment, Operator's Equipment (Design-Build) and Operator's Equipment (Operations) or any part of the Project Facility that are defective if the nature of the defect, or any damage to the Project Facility caused by the defect, is such that repairs cannot be expeditiously carried out at the Site.

(8) If the repair, replacement or making good is of such a character that it may affect the efficiency of the Project Facility or any part thereof, the Owner may give to the Operator a notice requiring that tests of the defective part of the Project Facility shall be made by the Operator immediately upon completion of such remedial work, whereupon the Operator shall carry out such tests.

(9) If such part fails the tests, the Operator shall carry out further repair, replacement or making good, as the case may be, until that part of the Project Facility passes such tests. The tests shall be agreed upon by the Owner and the Operator.

(10) If the Operator fails to commence the work necessary to remedy such defect or any damage to the Project Facility caused by such defect within a reasonable time, which shall in no event be considered to be less than 15 days, the Owner may, following notice to the Operator, proceed to do such work, and the reasonable costs incurred by the Owner in connection therewith shall be paid to the Owner by the Operator or may be deducted by the Owner from any monies due the Operator or claimed under the Performance Security.

(11) If the Project Facility or any part thereof cannot be used by reason of such defect or making good of such defect, the Defect Liability Period of the Project Facility or such part, as the case may be, shall be extended by a period equal to the period during which the Project Facility or such part cannot be used by the Owner because of any of the aforesaid reasons.

(12) Except as provided in GC Sections 9.1 and 9.5, the Operator shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Project Facility or any part thereof, the Plant and Equipment, Design or engineering or work executed that appear after Completion of the Site, the Project Facility or any part thereof, except where such defects are the result of the gross negligence, fraud, criminal or wilful action of the Operator.

(13) The Operator shall also provide an extended warranty for any such component of the Project Facility and during the period of time as may be specified in the SCC. Such obligation shall be in addition to the Defect Liability Period specified under GC Section 9.1(2).

9.2. Limitation of Liability

Except in cases of criminal negligence or wilful misconduct,

(a) the Operator shall not be liable to the Owner in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits of interest costs, provided that this exclusion shall not apply to any obligation of the Operator to pay liquidated damages to the Owner; and

(b) the aggregate liability of the Operator to the Owner, whether under the Contract, in tort or otherwise, shall not exceed the aggregate of the total Contract Price (including the Monthly payment during the Operations Period) and the total available Performance Incentive Compensation, provided that this limitation shall not apply to any obligation of the Operator to indemnify the Owner with respect to patent infringement.

9.3. Transfer of Ownership and Existing Equipment and Materials

9.3.1. Transfer of Ownership

(1) Ownership of the Plant and Equipment, including spare parts, to be imported into the Country shall be transferred to the Owner upon delivery at the Site.

(2) Ownership of the Plant and Equipment procured in the Country shall be transferred to the Owner when the Plant and Equipment are brought on to the Site.

(3) Ownership of any Plant and Equipment in excess of the requirements of the Project Facility shall revert to the Operator upon Completion of the Project Facility or such earlier time if the Owner and the Operator agree that the Plant and Equipment in question are no longer required for the Project Facility.

(4) Subject to GC Section 9.3.1(5), Ownership of the Operator's Equipment (Design-Build) and Operator's Equipment (Operations), including spare parts, shall remain with the Operator or its Sub-contractors.

(5) The Owner may, in its sole discretion, purchase as of the End Date any of the Operator’s Equipment (Operations), including spare parts, at the fair market value of such Operator’s Equipment (Operations) as determined by an independent valuator and the Operator shall transfer Ownership and possession of such Operator’s Equipment (Operations) to the Owner as of the End Date.

(6) Notwithstanding the transfer of Ownership of the Plant and Equipment, the responsibility for care and custody of the Plant and Equipment, Operator's Equipment (Design-Build) and Operator's Equipment (Operations), together with the risk of loss or damage thereto, shall remain with the Operator pursuant to GC Section 9.4 until the End Date.

9.3.2. (Existing Equipment and Materials) Deleted

9.4. Care of the Site and Project Facility

(1) Except as provided in GC Sections 9.9 and 9.4(2), the Operator shall be responsible for the care and custody of the Site and Project Facility or any part thereof until the End Date and shall make good at its own cost any loss or damage that may occur to the Site or Project Facility from any cause whatsoever during such period. The Operator shall also be responsible for any loss or damage to the Site or Project Facility caused by the Operator or its Sub-contractors in the course of any work carried out, pursuant to GC Section 9.1.

(2) If any loss or damage occurs to the Site or Project Facility or any part thereof by reason of,

(a) insofar as they relate to the Country, nuclear reaction, nuclear radiation, radioactive contamination, pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced Operator or operator could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance, including War Risks, taken out under GC Section 9.6;

(b) any use or occupation by the Owner or any Third Party, other than a Sub-contractor, authorized by the Owner of any part of the Site or Project Facility; or

(c) any use of or reliance upon any Design, data or specification provided or Designated by or on behalf of the Owner, or any such matter for which the Operator has disclaimed responsibility herein,

the Owner shall pay to the Operator all sums payable in respect of the Site executed, notwithstanding that the same be lost, destroyed or damaged. If the Owner requests the Operator in writing to make good any loss or damage to the Plant thereby occasioned, the Operator shall make good the same at the cost of the Owner in accordance with GC Section 10.1.If the Owner does not request the Operator in writing to make good any loss or damage to the Project Facility thereby occasioned, the Owner shall either request a change in accordance with GC Section 10.1, excluding the performance of that part of the Project Facility thereby lost, destroyed or damaged, or, where the loss or damage affects a substantial part of the Project Facility, the Owner shall terminate the Contract pursuant to GC Section 11.2.1.

(3) The Operator shall be liable for any loss of or damage to any Operator's Equipment (Design-Build), Operator's Equipment (Operations) or any other property of the Operator used or intended to be used for purposes of the Site or the Project Facility, except where such loss or damage arises by reason of any of the matters specified in GC Sections 9.4(2)(b) and 9.9.

(4) With respect to any loss or damage caused to the Project Facility or any part thereof, the Operator's Equipment (Design-Build) or the Operator's Equipment (Operations) by reason of any of the matters specified in GC Section 9.9(1), the provisions of GC Section 9.9(3) shall apply.

9.5. Indemnification

(1) Subject to GC Section 9.5(5), the Operator shall indemnify and hold harmless the Owner and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property, arising in connection with the Operator's performance of the Services and by reason of the negligence of the Operator or its Sub-contractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Owner, its Operators, employees, officers or agents.

(2) If any proceedings are brought or any claim is made against the Owner that might subject the Operator to liability under GC Section 9.5(1), the Owner shall promptly give the Operator a notice thereof and the Operator may at its own expense and in the Owner's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

(3) If the Operator fails to notify the Owner prior to the expiration of 30 days after receipt of a notice given pursuant to GC Section 9.5(2) that it intends to conduct any such proceedings or claim, then the Owner shall be free to conduct the same on its own behalf. Unless the Operator has so failed to notify the Owner within the 30 day period, the Owner shall make no admission that may be prejudicial to the defence of any such proceedings or claim.

(4) The Owner shall, at the Operator's request, provide all available assistance to the Operator in conducting such proceedings or claim, and shall be reimbursed by the Operator for all reasonable expenses incurred in so doing.

(5) The Owner shall indemnify and hold harmless the Operator and its employees, officers and Sub-contractors from any liability for loss of or damage to property of the Owner that is caused by fire, explosion or any other perils, in excess of the amount recoverable from insurances procured under GC Section 9.6, provided that such fire, explosion or other perils were not caused by any act or omission of the Operator.

(6) The Party entitled to the benefit of an indemnity under this GC Section 9.5 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the Party fails to take such measures, the other Party's liabilities shall be correspondingly reduced.

9.6. Insurance

The Insurance to be provided by the operator during his entire duration of Contract Term has been specified in SCC.

9.7. Unforeseeable Physical Conditions

(1) In this GC Section 9.7, "physical conditions" means natural physical conditions and man-made and other physical obstructions and pollutants, which the Operator encounters at the Site when performing of the Design-Build Services, including sub-surface and hydrological conditions but excluding climatic conditions.

(2) If the Operator encounters adverse physical conditions which it considers to have been Unforeseeable, the Operator shall give notice to the Design-Build-Operations Engineer as soon as practicable.

(3) The Operator's Notice pursuant to GC Section 9.7(2) shall describe the physical conditions, so that they can be inspected by the Design-Build-Operations Engineer, and shall set out the reasons why the Operator considers them to be Unforeseeable. The Operator shall continue performing the Design-Build Services, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Design-Build-Operations Engineer may give. If an instruction constitutes a Change GC Section 10.1.3 shall apply.

(4) If and to the extent that the Operator encounters physical conditions which are Unforeseeable, gives the notice required by GC Section 9.7(2), and suffers delay or incurs Cost due to these conditions, the Operator shall be entitled subject to GC Section 1.9 to,

   (a) an extension of time for any such delay, if completion is or will be delayed, under GC Section 2.3.4; and

   (b) payment of any such Cost, which shall be included in the Contract Price.

(5) After receiving such notice and inspecting or investigating these physical conditions, the Design-Build-Operations Engineer shall proceed in accordance with GC Section 7.2.6 to agree or determine,

   (a) whether and to what extent these physical conditions were Unforeseeable; and

   (b) the amount of delay or Cost, if any, pursuant to GC Section 9.7(4).

(6) Before additional Cost is finally agreed or determined under GC Section 9.7(5), the Design-Build-Operations Engineer, pursuant to GC Section 7.2.6, may also review whether other physical conditions were more favourable than could reasonably have been foreseen when the Operator submitted the Bid. If and to the extent that these more favourable conditions were encountered, the Design-Build-Operations Engineer may proceed in accordance with GC Section 7.2.6 to agree or determine the reductions in Cost which were due to these conditions, which may be included, as deductions, in the Contract Price. The net effect of all adjustments under GC Section 9.7(4)(b) and all these reductions, for all the physical conditions encountered on the Site, shall not result in a net reduction in the Contract Price.

(7) The Design-Build-Operations Engineer may take account of any evidence of the physical conditions foreseen by the Operator when submitting the Bid, which may be made available by the Operator, but shall not be bound by any such evidence.

9.8. Force Majeure

(1) "Force Majeure" shall mean any event,

(a) beyond the reasonable control of the Owner or of the Operator, as the case may be; and

(b) which is unavoidable notwithstanding the reasonable care of the Party affected.

(2) Force Majeure shall include the events listed below in this GC Section 9.8(2) if the conditions set out in GC Section 9.8(1)(a) and (b) are satisfied:

(a) war, hostilities or warlike operations, whether a state of war be declared or not, invasion, act of foreign enemy and civil war;

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts;

(c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority;

(d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague;

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster; and

(f) shortage of labour, materials or utilities where caused by circumstances that are themselves Force Majeure.

(3) If the Parties are prevented, hindered or delayed from or in performing any of their obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 14 days after the occurrence of such event.

(4) The Party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such Party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GC Section 2.3.4(1) for events of Force Majeure during the Design-Build Period. If the Time for Completion is extended in accordance with GC Section 2.3.4(1), the End Date shall be extended for a period of time equal to the period of time during which the relevant event of Force Majeure continued.

(5) The Party or Parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfil its or their obligations under the Contract, but without prejudice to either Party's right to terminate the Contract under GC Sections 9.8(7) and 9.9(6).

(6) No delay or non-performance by either Party hereto caused by the occurrence of any event of Force Majeure shall,

(a) constitute a default or breach of the Contract; or

(b) subject to GC Sections 9.4(2), 9.9(3) and 9.9(5), give rise to any claim for damages or additional Cost occasioned thereby,

if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

(7) If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than 60 days or an aggregate period of more than 120 days on account of one or more events of Force Majeure during the term of the Contract, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other, but without prejudice to either Party's right to terminate the Contract under GC Section 9.9(6).

(8) In the event of termination pursuant to GC Section 9.8(7), the rights and obligations of the Owner and the Operator shall be as specified in GC Sections 11.2.1(2) and 11.2.2(1).

(9) Notwithstanding GC Section 9.8(6), Force Majeure shall not apply to any obligation of the Owner to make payments to the Operator herein.

9.9. War Risks

(1) "War Risks" shall mean any event specified in GC Section 9.8(2)(a) and (b) and any explosion or impact of any mine, bomb, shell, grenade or other Projectile, missile, munitions or explosive of war, occurring or existing in or near the Country.

(2) Notwithstanding anything contained in the Contract, the Operator shall have no liability whatsoever for or with respect to,

(a) destruction of or damage to the Site and Plant and Equipment or any part thereof;

(b) destruction of or damage to property of the Owner or any Third Party; or

(c) injury or loss of life,

if such destruction, damage, injury or loss of life is caused by any War Risks, and the Owner shall indemnify and hold the Operator harmless from and against any and all claims, liabilities, actions, lawsuits, damages, costs, charges or expenses arising in consequence of or in connection with the same.

(3) If the Site, Project Facility or any Plant and Equipment, Operator's Equipment (Design-Build), Operator's Equipment (Operations) or any other property of the Operator used or intended to be used for the purposes of the Services sustains destruction or damage by reason of any War Risks, the Owner shall pay the Operator for,

(a) any part of the Project Facility or the Plant and Equipment so destroyed or damaged, to the extent not already paid for by the Owner;

(b) replacing or making good any Operator's Equipment (Design-Build), Operator's Equipment (Operations) or other property of the Operator so destroyed or damaged; and

(c) so far as may be required by the Owner, and as may be necessary for completion of the Services, replacing or making good any such destruction or damage to the Site, Project Facility or the Plant and Equipment or any part thereof.

(4) If the Owner does not require the Operator to replace or make good any such destruction or damage to the Site or Project Facility, the Owner shall either request a Change in accordance with GC Section 10.1 excluding the performance of that part of the Project Facility thereby destroyed or damaged or, where the loss, destruction or damage affects a substantial part of the Site or Project Facility, shall terminate the Contract, pursuant to GC Section 11.2.1.

(5) Notwithstanding anything contained in the Contract, the Owner shall pay the Operator for any increased Costs that are in any way attributable to, consequent on, resulting from, or in any way connected with any War Risks, if the Operator notifies the Owner in writing of any such increased Cost as soon as practicable.

(6) If, during the term of the Contract, any War Risks occur that financially or otherwise materially affect the execution of the Contract by the Operator, the Operator shall use its reasonable efforts to execute the Contract with due and proper consideration given to the safety of its and its Sub-contractors' personnel engaged in the work on the Services. If the execution of the Services becomes impossible or is substantially prevented for a single period of more than 60 days or an aggregate period of more than 120 days on account of any War Risks, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other.

(7) In the event of termination pursuant to GC Section 9.9(4) or 9.9(6), the rights and obligations of the Owner and the Operator shall be as specified in GC Section 11.2.1(2) and 11.2.2(1).

9.10. Change in Laws and Regulations

If, after a date which is 30 days prior to the Submission Deadline in the Bidding Documents, in the Country, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed, which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Operator or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, or the Time for Completion shall be reasonably adjusted to the extent that the Operator has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the Contract Price adjustment provisions where applicable, in accordance with the SCC if so provided.

9.11. Patent Indemnity

9.11.1. Indemnity by Operator

The Operator shall indemnify and hold harmless the Owner and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Owner may suffer as a result of any infringement or alleged infringement by the Operator, Sub-contractors, or their employees, agents, or representatives, of any patent, utility model, registered Design,

trademark, copyright or other intellectual property right registered or otherwise existing.

9.11.2. Notice of Claim

(1) If any proceedings are brought or any claim is made against the Owner arising out of the matters referred to in GC Section 9.11.1, the Owner shall promptly give the Operator a notice thereof, and the Operator may at its own expense and in the Owner's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

(2) If the Operator fails to notify the Owner no later than 30 days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Owner shall be free to conduct the same on its own behalf. Unless the Operator has so failed to notify the Owner no later than the 30 day period, the Owner shall make no admission that may be prejudicial to the defence of any such proceedings or claim.

(3) The Owner shall, at the Operator's request, give all available assistance to the Operator in conducting such proceedings or claim, and shall be reimbursed by the Operator for all reasonable expenses incurred in so doing.

9.11.3. Indemnity by Owner

The Owner shall indemnify and hold harmless the Operator and its employees, officers and Sub-contractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Operator may suffer as a result of any infringement or alleged infringement by the Owner of any patent, utility model, registered Design, trademark, copyright or other intellectual property right registered or otherwise existing at the Effective Date arising out of or in connection with any Design, data, drawing, specification, or other documents or materials provided or Designed by or on behalf of the Owner.

9.12. Functional Guarantees

(1) The Operator guarantees that during the Tests and Inspection set out in DBSS Article 5, the Project Facility and all parts thereof shall attain the Functional Guarantees as required.

(2) If, for reasons attributable to the Operator, the minimum level of the Functional Guarantees are not met either in whole or in part, the Operator shall at its cost and expense make any such changes, modifications or additions to the Project Facility or any part thereof as may be necessary to meet at least the minimum level of the Functional Guarantees. The Operator shall notify the Owner upon completion of the necessary changes, modifications or additions, and shall request the Owner to repeat the applicable Tests and Inspection until the minimum level of the Functional Guarantees has been met. If the Operator eventually fails to meet the minimum level of Functional Guarantees, the Owner may consider termination of the Contract, pursuant to GC Section 11.2.3.

(3) If, for any reasons attributable to the Operator, the Functional Guarantees are not attained either in whole or in part, but the minimum level of the Functional Guarantees is met, the Operator shall, at the Operator's option, either

(a) make such changes, modifications or additions to the Project Facility or any part thereof that are necessary to attain the Functional Guarantees at its cost and expense, and shall request the Owner to repeat the Tests and Inspection; or

(b) pay liquidated damages to the Owner in respect of the failure to meet the Functional Guarantees in accordance with the provisions of the Liquidated Damages.

The payment of liquidated damages under GC Section 9.12(3) up to the limitation of liability specified in the SCC, shall completely satisfy the Operator's guarantees under GC Section 9.12(3), and the Operator shall have no further liability whatsoever to the Owner in respect thereof.

ARTICLE 10. CHANGE IN CONTRACT ELEMENTS

10.1. Change to the Design-Build Services

10.1.1. Introducing a Change

(1) Subject to GC Sections 10.1.2(6) and 10.1.2(10), the Owner shall have the right to propose, and subsequently require, that the Design-Build-Operations Engineer order the Operator from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the Design-Build Services (the "Change"), provided that such Change falls within the general scope of the Design-Build Services and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Design-Build Services and the technical compatibility of the Change envisaged with the nature of the Design-Build Services as specified in the Contract and any changes suggested by the statutory pollution control authority while giving consent to establish or operate the STP..

(2) The Operator may from time to time during its performance of the Contract propose to the Owner, with a copy to the Design-Build-Operations Engineer, any Change that the Operator considers necessary or desirable to improve the quality, efficiency or safety of the Design-Build Services. The Owner may at its discretion approve or reject any Change proposed by the Operator.

(3) Notwithstanding GC Section 10.1.1(1) and 10.1.1(2), no change made necessary because of any default of the Operator in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

(4) The procedure on how to proceed with and execute Changes is specified in GC Section 10.1.2 and 10.1.3, and the Design-Build-Operations Engineer shall provide Operator with further details and sample forms on the Change procedures prior to the Design-Build Starting Date.

10.1.2. Changes Originating from Owner

(1) If the Owner proposes a Change pursuant to GC Section 10.1.1(1), it shall send to the Operator a "Request for Change Proposal," requiring the Operator to prepare and furnish to the Design-Build-Operations Engineer as soon as reasonably practicable a "Change Proposal," which shall include the following:

(a) brief description of the Change;

(b) effect on the Time for Completion;

(c) estimated cost of the Change; and

(d) effect on any other provisions of the Contract.

(2) Prior to preparing and submitting the Change Proposal, the Operator shall submit to the Design-Build-Operations Engineer an "Estimate for Change Proposal," which shall be an estimate of the cost of preparing and submitting the Change Proposal.

(3) Upon receipt of the Operator's Estimate for Change Proposal, the Owner shall,

(a) accept the Operator's estimate with instructions to the Operator to proceed with the preparation of the Change Proposal;

(b) advise the Operator of any part of its Estimate for Change Proposal that is unacceptable and request the Operator to review its estimate; or

(c) advise the Operator that the Owner does not intend to proceed with the Change.

(4) Upon receipt of the Owner's instruction to proceed under GC Section 10.1.2(3)(a) (the "Change Order"), the Operator shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GC Section 10.1.2(1).

(5) The pricing of any Change shall, as far as practicable, be calculated in accordance with the prices included in the Contract. If such prices are inequitable, the Parties thereto shall agree on specific rates for the valuation of the Change.

(6) If, before or during the preparation of the Change Proposal, it becomes apparent that the aggregate effect of compliance therewith and with all other Change Orders that have already become binding upon the Operator under this GC Section 10.1 would be to increase or decrease the Contract Price by more than 15 per cent, the Operator may give a written notice of objection thereto prior to furnishing the Change Proposal. If the Owner accepts the Operator's objection, the Owner shall withdraw the proposed Change and shall notify the Operator in writing thereof.

(7) The Operator's failure to object pursuant to GC Section 10.1.2(6) shall neither affect its right to object to any subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Operator represents.

(8) Upon receipt of the Change Proposal, the Owner and the Operator shall mutually agree upon all matters therein contained. No later than 14 days after such agreement, the Owner shall, if it intends to proceed with the Change, issue the Operator with a Change Order.

(9) If the Owner decides not to proceed with the Change for whatever reason, it shall notify the Operator prior to the expiration of 14 days after the agreement on the Change. Under such circumstances, the Operator shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Operator in its Estimate for Change Proposal submitted in accordance with GC Section 10.1.2(2).

(10) If the Owner and the Operator cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters identified in the Change Proposal, the Owner may nevertheless instruct the Operator to proceed with the Change by issue of a "Pending Agreement Change Order."

(11) Upon receipt of a Pending Agreement Change Order, the Operator shall immediately proceed with effecting the Changes covered by such Order. The parties shall thereafter attempt to reach agreement on the outstanding issues under the Change Proposal.

(12) If the Parties cannot reach agreement prior to the expiration of 60 days after the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Adjudicator in accordance with the provisions of GC Section 1.6.1.

10.1.3. Changes Originating from Operator

(1) If the Operator proposes a Change pursuant to GC Section 10.1.1(2), the Operator shall submit to the Design-Build-Operations Engineer a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GC Section 10.1.2(1).

(2) Upon receipt of the Application for Change Proposal, the Parties shall follow the procedures outlined in GC Sections 10.1.2(8) and 10.1.2(10). If the Owner chooses not to proceed, the Operator shall not be entitled to recover the costs of preparing the Application for Change Proposal.

10.1.4. Payment in Applicable Currencies

If the Contract provides for payment of the Contract Price in more than one currency, then whenever a Change is agreed, approved or determined pursuant to GC Section 10.1.2 or 10.1.3, the amount payable in each of the applicable currencies shall be specified. For this purpose, reference shall be made to the actual or expected currency proportions of the Cost of the Change, and to the proportions of various currencies specified for payment of the Contract Price.

10.1.5. Design-Build Period

GC Sections 10.1.1 to 10.1.4 shall apply during only the Design-Build Period.

10.2. Change to the Operations Services

(1) Except as specifically provided in GC Section 10.2(2) or elsewhere in the Contract, the Operator shall make no claim whatsoever for any adjustment to the Contract Price during the Operations Period.

(2) The Operator or the Owner may request an adjustment to the Monthly O & M Payment if the quantity of sewage delivered to the Site changes in accordance with the SCC. In the event of such a change to the volume of sewage, the Operator or the Owner, as applicable, shall be entitled to receive an increase or decrease equal to the actual increase or decrease in Cost demonstrated by the Operator.

(3) The Operator or the Owner may request an adjustment to the Monthly O & M Payment if the total sewer length to be maintained exceeds by more than 2% of the total sewer length included originally in accordance with the Contract.

ARTICLE 11. SUSPENSION AND TERMINATION

11.1. Suspension

11.1.1. Suspension by the Owner

(1) The Owner may request the Design-Build-Operations Engineer, as applicable, by notice to the Operator, to order the Operator to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefore. The Operator shall thereupon suspend performance of such obligation, except those obligations necessary for the care or preservation of the Site or Project Facility, until ordered in writing to resume such performance by the Design-Build-Operations Engineer as applicable.

(2) If, by virtue of a suspension order given by the Design-Build-Operations Engineer, as applicable, other than by reason of the Operator's default or breach of the Contract, the Operator's performance of any of its obligations is suspended for an aggregate period of more than 90 days, then at any time thereafter and provided that at that time such performance is still suspended, the Operator may give a notice to the Design-Build-Operations Engineer as applicable, requiring that the Owner shall, no later than 30 days after the Owner's receipt of the notice, order the resumption of such performance or request and subsequently order a Change in accordance with GC Section 10.1, excluding the performance of the suspended obligations from the Contract.

(3) If the Owner fails to order the resumption of performance in accordance with GC Section 11.1.1(2), the Operator may, by a further notice to the Design-Build-Operations Engineer, elect to treat the suspension, where it affects a part only of the Services, as a deletion of such part in accordance with GC Section 10.1 or, where it affects the whole of the Services, as termination of the Contract pursuant to GC Section 11.2.1.

11.1.2. Suspension by the Operator

(1) If, the Owner has,

(a) failed to pay the Operator any sum due under the Contract within the period specified in the Contract;

(b) failed to approve any invoice or supporting documents without just cause under the Contract; or

(c) has committed a substantial breach of the Contract,

the Operator may give a notice to the Owner that requires payment of such sum, with interest thereon as stipulated in GC Section 5.2(3) requires

approval of an invoice or supporting documents, or specifies a breach & requires the Owner to remedy the same, as the case may be.

(2) If the Owner fails to pay the sums required by the Operator in accordance with GC Section 11.1.2(1) or fails to remedy the breach or take steps to remedy the breach no later than 14 days after receipt of the Operator's notice, then the Operator may, upon giving 14 days' notice to the Owner, suspend performance of all or any of its obligations under the Contract, or, in the case of the Design-Build Services, reduce the Operator's rate of progress.

(3) If the Operator is unable to carry out any of its obligations under the Contract for any reason attributable to the Owner, including the Owner's failure to provide possession of or access to the Site or other areas in accordance with GC Section 4.2, then the Operator may, upon giving 14 days' notice to the Owner, suspend performance of all or any of its obligations under the Contract, or, in the case of the Design-Build Services, reduce the Operator's rate of progress.

(4) If the Operator's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GC Section 11.1.2, then the Time for Completion shall be extended in accordance with GC Section 2.3.4, and additional Costs incurred by the Operator as a result of such suspension or reduction shall be paid by the Owner to the Operator in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Operator's default or breach of the Contract.

(5) During the period of suspension, the Operator shall not remove from the Site or Project Facility any Plant and Equipment, Operator's Equipment (Design-Build), Operator's Equipment (Operations), or any part of the Project Facility, without the prior written consent of the Owner.

11.2. Termination

11.2.1. Termination for Owner's Convenience

(1) The Owner may at any time terminate the Contract for any reason by giving the Operator a notice of termination that refers to this GC Section 11.2.1(1).

(2) Upon receipt of the notice of termination under GC Section 11.2.1(1),

(a) the Operator shall, either immediately or upon the date specified in the notice of termination,

(i) cease all further work, except for such work as the Owner may specify in the notice of termination for the sole purpose of protecting that part of the Facility already

executed, or any work required to leave the Site in a clean and safe condition;

(ii) terminate all Subcontracts; and

(iii) remove all Operator's Equipment (Design-Build) and, except if the Owner asserts its rights pursuant to GC Section 9.3.1(5), Operator's Equipment (Operations) from the Site, repatriate the Operator's Personnel and its Sub-contractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition; and

(b) the Operator, subject to the payment specified in GC Section 11.2.2, shall,

(i) deliver to the Owner the parts of the Project Facility executed by the Operator and all materials which have been paid for by the owner up to the date of termination; and

(ii) deliver to the Owner all the Contract Records, including the Design-Build Documents, prepared by the Operator or its Sub-contractors as at the date of termination.

11.2.2. Payment upon Termination by the Owner for Convenience

(1) Upon termination of this Contract pursuant to GC Section 11.2.1, the Owner shall make only the following payments to the Operator,

(a) any portion of the Contract Price payable to the Operator for Services satisfactorily performed prior to the date of termination and calculated as set out in GC Section 5.2;

(b) the Costs reasonably incurred by the Operator in the removal of the Operator's Equipment (Design-Build) and, except if the Owner asserts its rights pursuant to GC Section 9.3.1(5), Operator's Equipment (Operations) from the Site and in the repatriation of the Operator's Personnel and its Sub-contractors' personnel;

(c) any amounts required to be paid by the Operator to its Sub-contractors in connection with the termination of any Subcontracts, including any reasonable cancellation charges;

(d) the reasonable Costs incurred by the Operator in protecting the Site, Existing Facility and Project Facility and leaving the Site in a clean and safe condition pursuant to GC Section 11.2.1(2)(a)(i); and

(e) the reasonable Cost of satisfying all other obligations, commitments and claims that the Operator may in good faith have undertaken with Third Parties in connection with the Contract and that are not covered by GC Section 11.2.2(1).

(2) The Operator acknowledges that the only payments to be made to the Operator on termination by the Owner are set out in this GC Section 11.2.2. The Operator shall not make a claim for lost or foregone profits, revenues, consequential damages or any other costs, damages, expenses or losses of any kind as a result of or in connection with the termination of this Contract.

11.2.3. Termination for Operator's Default

(1) The Owner, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances, by giving a notice of termination and its reasons therefore to the Operator, referring to this GC Section 11.2.3(1):

(a) If the Operator becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Operator is a corporation, a resolution is passed or order is made for its winding up, other than a voluntary liquidation for the purposes of amalgamation or reconstruction, a receiver is appointed over any part of its undertaking or assets, or if the Operator takes or suffers any other analogous action in consequence of debt;

(b) If the Operator assigns or transfers the Contract or any right or interest therein in violation of the provision of GC Section 1.7; or

(2) If the Operator,

(a) has abandoned or repudiated the Contract;

(b) has without valid reason failed to commence work on the Site or Project Facility promptly or has suspended, other than pursuant to GC Section 11.1.1(2), the progress of Contract performance for more than 30 days after receiving a written instruction from the Owner to proceed;

(c) persistently fails to carry out the Services in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause; or

(d) refuses or is unable to provide sufficient materials, services, labour or personnel to perform the Services,

then the Owner may, without prejudice to any other rights it may possess under the Contract, give a notice to the Operator stating the nature of the default and requiring the Operator to remedy the same. If the Operator fails to remedy or to take steps to remedy the same within 14 days after its receipt of such notice, then the Owner may terminate the Contract forthwith by giving a notice of termination to the Operator that refers to this GC Section 11.2.3(2).

(3) Upon receipt of the notice of termination under GC Sections 11.2.3(1) or 11.2.3(2) the Operator shall, either immediately or upon such date as is specified in the notice of termination,

(a) cease all further work, except for such work as the Owner may specify in the notice of termination for the sole purpose of protecting that part of the Site and Project Facility already executed, or any work required to leave the Site and Project Facility in a clean and safe condition;

(b) terminate all Subcontracts;

(c) deliver to the Owner the parts of the Project Facility executed by the Operator up to the date of termination; and

(d) deliver to the Owner all Contract Records, including the Design-Build Documents, prepared by the Operator or its Sub-contractors as of the date of termination.

(4) The Owner may enter the Project Facility and upon the Site, expel the Operator, and, if the Project Facility is not completed, the Owner may complete the Facility itself or by employing any Third Party. The Owner may, to the exclusion of any right of the Operator over the same, take over and use with the payment of a fair rental rate to the Operator, with all the maintenance costs to the account of the Owner and with an indemnification by the Owner for all liability including damage or injury to persons arising out of the Owner's use of such equipment, any Operator's Equipment (Design-Build) and Operator's Equipment (Operations) owned by the Operator and on the Site in connection with the Project Facility for such reasonable period as the Owner considers expedient for the completion of the Project Facility. Upon completion of the Project Facility or at such earlier date as the Owner thinks appropriate, the Owner shall give notice to the Operator that such Operator's Equipment (Design-Build) and, except if the Owner asserts its rights pursuant to GC Section 9.3.1(5), Operator's Equipment (Operations) will be returned to the Operator at or near the Site and shall return such Operator's Equipment (Design-Build) and Operator's Equipment (Operations) to the Operator in accordance with such notice. The Operator shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

11.2.3.1. Corrupt or Fraudulent Practices

If the Owner determines, based on reasonable evidence, that the Operator has engaged in corrupt, fraudulent, collusive or coercive practices, in competing for or in executing the Contract, then the Owner may, after giving 14 days' notice to the Operator, terminate the Contract and expel him from the Site, and the provisions of Section 11.2 shall apply as if such termination had been made under Section 11.2.3 [Termination for Operator's Default].

Should any employee of the Operator be determined, based on reasonable evidence, to have engaged in corrupt, fraudulent or coercive practice during the execution of the work, then that employee shall be removed in accordance with Section 8.4 [Replacement of Operator's Personnel].

For the purposes of this Sub-Clause:

(i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party[69];

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;[70]

(iii) "collusive practice" is an arrangement between two or more parties Designed to achieve an improper purpose, including to influence improperly the actions of another party;[71]

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;[72]

(v) "obstructive practice" is

(i) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede an Owner's investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(ii) acts intended to materially impede the exercise of the Owner's inspection and audit rights provided for under Section 1.8.5 [Inspections and Audits].

[69] "Another party" refers to a public official acting in relation to the procurement process or contract execution]. In this context, "public official" includes employees of all organizations taking or reviewing procurement decisions.

[70] "Party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

[71] "Parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

[72] "Party" refers to a participant in the procurement process or contract execution.

(vi) **"**restrictive practice" means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating full and fair competition in the Bid Process.

11.2.4. Payment upon Termination for Operator's Default

(1) If the Contract is terminated pursuant to GC Section 11.2.3 and, subject to GC Section 11.2.4(2), the Operator shall be entitled to be paid,

(a) any portion of the Contract Price payable to the Operator for Services satisfactorily performed prior to the date of termination;

(b) the value of any unused or partially used Plant and Equipment on the Site, except to the extent that such Plant and Equipment have already been paid for by the Owner; and

(c) the Costs, if any, incurred by the Operator in protecting the Site and Project Facility and in leaving the Site in a clean and safe condition pursuant to GC Section 11.2.3(3)(a).

Any sums due the Owner from the Operator accruing prior to the date of termination shall be deducted from the amount to be paid to the Operator under this Contract.

(2) If the Owner completes the Project Facility pursuant to GC Section 11.2.3(4), the cost of completing the Project Facility by the Owner shall be determined, and, if the sum that the Operator is entitled to be paid, pursuant to GC Section 11.2.4(1), plus the reasonable costs incurred by the Owner in completing the Project Facility, exceeds the Contract Price, the Operator shall be liable for such excess as follows;

(a) if such excess is greater than the sums due the Operator under GC Section 11.2.4(1), the Operator shall pay the balance to the Owner; or

(b) if such excess is less than the sums due the Operator under GC Section 11.2.4(1), the Owner shall pay the balance to the Operator.

(3) The Parties shall agree in writing on the computation described in GC Section 11.2.4(2) and the manner in which any sums shall be paid.

11.2.5. Termination by Operator

(1) If,

(a) the Owner has,

(i) failed to pay the Operator any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the corresponding Terms and Procedures of Payment Schedule, or commits a substantial breach of the Contract, the Operator may give a notice to the Owner that requires payment of such sum, with interest thereon as stipulated in GC Section 5.2(3), requires approval of such invoice or supporting documents, or specifies the breach and requires the Owner to remedy the same, as the case may be; and

(ii) failed to pay such sum together with such interest, failed to approve such invoice or supporting documents or give its reasons for withholding such approval, failed to remedy the breach or take steps to remedy the breach no later than 14 days after receipt of the Operator's notice; or

(b) the Operator is unable to carry out any of its obligations under the Contract for any reason attributable to the Owner, including the Owner's failure to provide possession of or access to the Site or other areas,

then the Operator may give a notice to the Owner thereof, and if the Owner has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach no later than 30 days after receipt of such notice, or if the Operator is still unable to carry out any of its obligations under the Contract for any reason attributable to the Owner no later than 30 days after receipt of the notice, the Operator may, by a further notice to the Owner referring to this GC Section 11.2.5(1), forthwith terminate the Contract.

(2) The Operator may terminate the Contract forthwith by giving a notice to the Owner to that effect, referring to this GC Section 11.2.5(2),

(a) if the Owner becomes bankrupt or insolvent;

(b) has a receiving order issued against it, or compounds with its creditors;

(c) being a corporation, if a resolution is passed or order is made for its winding up, other than a voluntary liquidation for the purposes of amalgamation or reconstruction; or

(d) a receiver is appointed over any part of its undertaking or assets, or if the Owner takes or suffers any other analogous action in consequence of debt.

(3) If the Contract is terminated under GC Section 11.2.5(1) or 11.2.5(2), then,

(a) the Operator shall immediately,

(i) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the Site and Project Facility already executed, or any work required to leave the Site in a clean and safe condition; and

(ii) terminate all Subcontracts; and

(b) the Operator, subject to the payment specified in GC Section 11.2.6, shall

(i) deliver to the Owner the parts of the Project Facility executed by the Operator up to the date of termination; and

(ii) deliver to the Owner all Contract Records, including the Design-Build Documents, in existence as of the date of termination.

(4) Termination by the Operator pursuant to this GC Section 11.2.5 is without prejudice to any other rights or remedies of the Operator that may be exercised in lieu of or in addition to rights conferred by this GC Section 11.2.5.

11.2.6. Payment upon Termination by Operator

If the Contract is terminated under GC Sections 11.2.5(1) or 11.2.5(2), the Owner shall pay to the Operator all payments specified in GC Section 11.2.2(1), and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Operator arising out of, in connection with or in consequence of such termination.

11.2.7. General Provisions - Termination

(1) In this GC Section 11.2, the expression "Project Facility executed" shall include all work executed, Services provided, and all Plant and Equipment acquired, or subject to a legally binding obligation to purchase by the Operator and used or intended to be used for the purpose of the performing the Services, up to and including the date of termination.

(2) In this GC Section 11.2, in calculating any monies due from the Owner to the Operator, account shall be taken of,

(a) any sum previously paid by the Owner to the Operator under the Contract, including any advance payment paid pursuant to the Terms and Procedures of Payment Schedule;

(b) any sum owing by the Operator to the Owner under the Contract, including Liquidated Damages – Delay or liquidated damages calculated pursuant to GC Section 5.4.

Schedule 1
Special Conditions of Contract

FOR A CONTRACT

TO (I) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (II) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. NO. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (III) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION & DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN …….

SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract (SCC) shall supplement the General Conditions. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract (GCC). The corresponding article and section numbers of the General Conditions are indicated in parentheses.

Article 1: Contract and interpretation

1. **Definitions (GC Section 1.1)** No change

2. **Clause 1.3.1 – Language**

The language shall be "**English"**

3. **Clause 1.3.14 – Survival of Obligations**

Upon termination or expiration of the Contract, the following rights and obligations of the Parties survive:

(a) Such rights and obligations as may have accrued or to which the Parties may be entitled on the date of termination, and any rights which a Party may have under Applicable Law;

(b) On termination or expiration of the contract, the rights and obligations of the parties towards settlement of disputes through arbitration in the form of an arbitration clause / agreement.

(c) The Operator's obligations with respect to Contract Records, accounting and auditing set out in GC Section 1.8;

(d) The Operator's obligations with respect to Transition Assistance set out in GC Section 2.4.2;

(e) The Parties' rights and obligations with respect to copyright set out in GC Section 6.1;

(f) The Operator's obligations of confidentiality as set out in GC Section **Error! Reference source not found.**;

(g) The Parties' rights and obligations with respect to defect liability set out in GC Section **Error! Reference source not found.**; and

(h) The Parties' rights and obligations with respect to indemnification set out in GC Section **Error! Reference source not found.**5.

4. **Clause 1.4 – Notice**

All notices to the relevant party shall be sent to the following address:

a. Operator

_____

_____

b. Owner

_____

_____

5. Clause 1.5– Governing Law

The Applicable Law will be the Laws of India as well as the laws prevailing in the State of _____.

6. Clause 1.6.1 (4) - Adjudicator

The Adjudicator is: *[To be added at the time of signing of Contract]*

[Name, address, telephone and facsimile numbers]

The adjudicator shall be paid a fee @ Rs. _____/- per day of effective hearing plus actual expenditure towards travel, transportation, lodging, and boarding. The fees and expenditure shall be shared equally by the operator and the Owner.

7. Clause 1.6.1 (5) - Adjudicator

The authority to appoint new adjudicator shall be with _____[73].

8. Clause 1.6.2 – Arbitration

All disputes arising in connection with this contract shall be finally settled under the arbitration rules of the United Nations Commission on International Trade Law (UNICITRAL) by one or more arbitrators appointed in accordance with the rules. However, if the contract is with the domestic Operator arbitration shall be conducted in accordance with the Arbitration & Conciliation Act 1996.

The place of arbitration shall be (i) the location from where the Contract has been issued if the contract is with a domestic Operator, or (ii) a neutral location if the contract is with a foreign Operator. The arbitration shall be conducted in the language for communications defined in GC Clause 1.3.1 [Language].

Article 2: Contract Term, Timing and Completion

9. Clause 2.1.2 (1) – Expiration of Contract

The Contract shall terminate 15 years after Operations Starting Date.

10. Clause 2.3.2 and Clause 2.3.6 (1) Time for Completion

The Time for completion of the Design – Build Services shall be .....months from the Effective Date.

11. Clause 2.3.6 (2) – Maximum Liquidated Damages – Delay

The Maximum Liquidated Damages – Delay shall be 10 % of the Design-Build price of the Contract.

[73] *Specify an independent officer such as Chairman, Institution of Engineers of the State Chapter.*

12. Clause 2.3.6 (2) Delay in Completion - Liquidated Damages

The Operator shall be liable to pay Liquidated Damages to the Owner in accordance with GCC clause 2.3.6 (2) if the Operator fails to achieve various activities/milestones as tabulated below.

S.N	Activity/Milestone	Target Completion Time	Liquidated damages per day for delay in completion of activity/Milestone
(1)	(2)	(3)	(4)
1	Completion of works of 10% of Contract value of Design Build Services stipulated in the signed contract	…….. months *[Insert period equivalent to 15% of specified Completion Time]*	INR …… *[Insert amount equivalent to 0.05% of 10% of estimated value of Design-Build Services - rounded off to thousands of INR]*
2	Completion of works of 20% (cumulative) of Contract value of Design Build Services stipulated in the signed contract	…….. months [Insert period equivalent to 30% of specified Completion Time]	INR …… *[Insert amount equivalent to 0.05% of 10% of estimated value of Design-Build Services - rounded off to thousands of INR]*
3	Completion of works of 40% (cumulative) of Contract value of Design Build Services stipulated in the signed contract	…….. months *[Insert period equivalent to 50% of specified Completion Time]*	INR …… *[Insert amount equivalent to 0.05% of 20% of estimated value of Design-Build Services - rounded off to thousands of INR or hundreds of US dollar]*
4	Completion of works of 60% (cumulative) of Contract value of Design Build Services stipulated in the signed contract	…….. months *[Insert period equivalent to two thirds of specified Completion Time]*	INR …… *[Insert amount equivalent to 0.05% of 20% of estimated value of Design-Build Services - rounded off to thousands of INR]*
5	Completion of works of 75% (cumulative) of Contract value of Design Build Services stipulated in the signed contract	…….. months *[Insert period equivalent to 85% of specified Completion Time]*	INR …… *[Insert amount equivalent to 0.05% of 15% of estimated value of Design-Build Services - rounded off to thousands of INR]*
6	Completion of works of contracted Design-Build Services in all respects	…….. months *[Insert specified Completion Time]*	0.05 % (Zero point zero five Percent) of the Value of the Design Build Services stipulated in the signed contract for each day of delay beyond the Completion Time.

Note

(1) The value of works stipulated in column 2 of the table above excludes the value of materials intended for the works but not used or incorporated in the works.

(2) The target time for completion stipulated in column 3 will be subject to revision, if justified, in the event of extension of time for completion agreed under GCC clause 2.3.4.

Liquidated Damages recovered on account of delay in completion of an activity/activities listed in serial number 1 to 5 of the table above, will qualify for refund to the Operator, if the contracted works of the design-build services part of the contract are completed in all respects within the stipulated period or the revised completion period if so agreed to by the parties in accordance GCC clause 2.3.4.

13. Clause 2.3.6 (5)

This sub-paragraph is deleted.

Article 4: Obligations of the Owner

14. Clause 4.2 – Access to the Site and Project Facility

Add the following

(1) The Owner shall be responsible for acquiring and providing legal and physical possession of land as per requirement indicated by the Operator in his bid (as incorporated in Schedule 5 of the Contract), subject to a ceiling of____[74] Sq. M approximately for setting up the STP facility and allied works at the site of proposed STP and shall provide access thereto and all other areas reasonably required for the proper execution of the contract including all rights of way.

(2) If the Operator requests for additional land for setting up the STP facility over the above the requirement indicated by him in his bid, he shall furnish a justification for the same.

The Owner will examine the request from feasibility angle as also the supporting justification. Based on the justification, if the Owner decides to allocate additional land, such allocation will be subject to the Operator bearing and depositing with the Owner, the cost of additional land worked out at twice the rate specified in the BDS ITB 3.3 (c), namely twice the rate of INR ..... per square metre *[EA should insert the same rate as given in the BDS]* or a higher rate at the option of the Owner, in case the Owner incurs higher cost for acquiring the additional land.

(3) The Owner shall be responsible for acquiring and providing legal and physical access to land at ____[75] located at a distance of ____ km from the STP site, for disposal of treated Sludge and providing legal and physical access to *[please indicate the name of the nullah/ river/ sea]* _____[76] located at a distance of ___ Km from the STP site for disposal of treated Wastewater.

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[74] *Specify the size of the land parcel to be made available to the Operator for development of the STP.*

[75] *Specify the location and size of the land parcel identified by the Owner for disposal of the treated Sludge.*

[76] *Specify the location and size of the land parcel identified by the Owner for disposal of the treated Sludge.*

(4) The Owner shall provide the operator free of charge full possession and access of the above mentioned sites and right of way for the Project Facility only during the Contract Term.

(5) The Owner shall be responsible for acquiring and providing legal and physical possession of approximately ____Sq. M for Sewage Pumping Station(s) and/or diversion works at the site(s) of proposed Sewage Pumping Station(s) and/or diversion works and shall provide access thereto and all other areas along the selected alignment for the Sewerage Network and/or interception sewers, reasonably required for the proper execution of the contract including all rights of way.

(6) The Owner shall provide the operator free of charge possession and access of the above mentioned sites and right of way for the Sewerage Network and/or interception sewers during the Contract Period, so as to ensure that the Operator shall achieve progress of work consistent with the milestones, if laid down in Para 12 above under SCC clause 2.3.6 (2).

(7) The Operator shall complete the work on the sites handed over to him from time to time within in the specified time, as and when so instructed by the Design-Build-Operations Engineer or advised by the Owner, so as to minimize the inconvenience to the households and the public over prolonged durations of time.

Article 5: Contract Price and Payment

15. Clause 5.1 (3)– Contract Price

(a) Price Adjustment for Design Build Price

The prices for the Design Build works and services *shall/shall not** be subject to price adjustment during the performance of the contract. If price adjustment is applicable, details stipulated in Schedule 8 shall apply.

**Delete the words that are not applicable.*

(b) Price Adjustment for O&M Price

Price adjustment for the O&M price payable during the O&M period will be determined in accordance with Schedule 8.

16. Clause 5.2 – Terms of Payment

Provisions in Clause 5.2 (1), (3) and (4) shall be replaced with the following clauses:

(1) The Contract Price shall be paid in accordance with the provisions in Schedule 5 – Operator's Price Schedule and Schedule 6 – Terms and procedures of Payment of the Contract.

(3) In the event that the Owner fails to make any payment by its respective due date or within the period of 60 days from the date of submission of monthly statement of claim submitted in accordance with Schedule 6, the Owner shall pay to the Operator interest on the amount of such delayed payment at the rate of 8 % annually, for the period of delay until payment has been made in full.

(4) The currency of payment shall be Indian Rupees Only.

17. Performance Incentive Compensation

This clause is deleted.

18. Clause 5.4 – Liquidated Damages - Operations

The Operator shall pay to the Owner liquidated damages for failure to meet Performance Standards as set out in the Liquidated Damages – Operations Schedule, i.e. Schedule 7 of the Contract.

19. Clause 5.5.1 (2) (a) – Performance Security

The Operator shall provide a Performance Security of 9% (Nine Percent) and ESHS Performance Security of 1% (One Percent) of the total Contract Price as defined in the sub-paragraphs below. Total Contract Price shall be determined as under on the basis of Operator's Bid Prices quoted in various Parts of the Price Schedule and incorporated in Schedule 5 of the Contract:

Total Contract Price

1) à Design Build Price for STP as per Part A + Total price of BOQ items for I&D Works as per Part D +(plus)

2) à Total O & M Price for STP for the … year period as per Parts B & C, assuming indicative sewage flow rate reaching the STP during respective years of the O&M period as indicated in Appendix to Bid (Indicative Flow) Total O & M Price for Sewerage Network and/or Interception and Diversion Works and SPSs for the … year period as per Part E. *(As per Scope, Years)*

5.5.1 (4)

Performance Securities can be submitted by the Operator separately:

(i) for the Contract Price of Design and Build part as per BOQ Prices for STP + BOQ Prices for New/Replace Outfall/Interceptor sewer Line & SPSs, and

(ii) for the Contract Price of O&M part for O&M for STP for … years + O&M for the Network and/or Interception and Diversion Works & SPSs for … year.

Performance Security for Design and Build Part shall cover the period for design and build plus the first 3 years of O&M after completion of construction work.

Performance Security for the O&M Part shall be in three years intervals to be extended/renewed up to the entire O&M period. Each O&M performance security shall be extended/renew within 120 days prior to the expiry of the previous performance security.

It shall be the responsibility of the Operator to furnish the renewed the Performance Securities within 120 days prior to the expiry of the original Performance Securities. In case the renewed Performance Securities are not received by the Owner within 120 days prior to the expiry date of the original Performance Securities, the Owner will be

entitled to take measures for enforcement/forfeiture of the Performance Securities in hand without any further notice to the Operator.

20. Clause 5.5.2 (2) – Advance Payment Security

Provisions in Clause 5.5.2 (2) shall be replaced with the following clause

(2) The Mobilization Advance paid to the Operator by the Owner shall be recovered commencing from the date on which the payment to the Operator has reached 20% of the value of Design, Build and Commissioning Services and shall be recovered at the rate of 15% from each bill submitted by the Operator for the payment. The entire amount of mobilization advance shall be recovered latest by the time 90% of the value of Design Build and Commissioning services has been claimed by the Operator.

Article 7: Contract administration and supervision during the Design-Build and Operations Periods

21. Clause 7.2 - Design-Build Supervision

Provisions in Clause 7.2 shall be replaced with the following clauses.

7.2.1 Supervision during the Design-Build Period

GC Section 7.2 shall apply during the Design-Build Period and Operations Period and immediately after the End date solely for the purpose of resolving transition issues and any outstanding issues arising during the Operations Period.

7.2.2 Design-Build-Operations Engineer's Duties and Authority (Design-Build and Operations Period)

(1) The Owner shall appoint the Design-Build-Operations Engineer who shall be responsible for day to day contract management and supervision during the Design-Build Period and the Operations Period. The Design-Build-Operations Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

(2) The Design-Build-Operations Engineer shall have no authority to amend the Contract.

(3) Except, as specifically provided otherwise in the Contract, the Design-Build-Operations Engineer may exercise the authority attributable to the Design-Build-Operations Engineer as specified in or necessarily to be implied from the Contract. The Owner undertakes not to impose further constraints on the Design-Build-Operations Engineer's authority, except as agreed with the Operator.

(4) The Design-Build-Operations Engineer is obligated to obtain the approval of the Owner for matters specified in the sub-clause 7.22 (5) (d) of the SCC. If the Design-Build-Operations Engineer exercises a specified authority for which the Owner's approval is required then, for the purposes of the Contract, the Owner shall be deemed to have given approval.

(5) Except as otherwise stated in the Contract,

(a) if the Design-Build-Operations Engineer carries out duties or exercises authority, specified in or implied by the Contract, the Design-Build-Operations Engineer shall be deemed to act for the Owner;

(b) the Design-Build-Operations Engineer has no authority to relieve any Party of any duties, obligations or responsibilities under the Contract; and

(c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test or similar act by the Design-Build-Operations Engineer, including absence of disapproval, shall not relieve the Operator from any responsibility it has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

(d) The Design Build **Operations** Engineer shall obtain the approval of the Owner before exercising its authority in the following circumstances:

(a) approving assignment of the Contract, or any part thereof;
(b) determining an extension of the Time for Completion;
(c) certifying additional costs determined under GCC 1.9(8)(b); and
(d) issuing a Change Order, except:
a. in an emergency situation, as reasonably determined by the Design-Build-Operations Engineer; or
b. if such Change Order would increase the Contract Price by less than 1%.

7.2.3 Delegation by the Design-Build-Operations Engineer

(1) The Design-Build-Operations Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, or independent inspectors appointed to inspect or test items of Plant or Equipment. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. Unless otherwise agreed by both Parties, the Design-Build-Operations Engineer shall not delegate the authority to determine any matter in accordance with GC Section 7.2.6.

(2) Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in GC Section 1.3.1.

(3) Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Operator to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Design-Build-Operations Engineer. However,

(a) any failure to disapprove any work or Plant and Equipment shall not constitute approval, and shall therefore not prejudice the right of the Design-Build-Operations Engineer to reject the work or the Plant and Equipment; and

(b) if the Operator questions any determination or instruction of an assistant, the Operator may refer the matter to the Design-Build-Operations Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

7.2.4 Instructions of the Design-Build-Operations Engineer

(1) The Design-Build-Operations Engineer may issue to the Operator, at any time during the Design-Build Period, instructions which may be necessary for the execution of the Design-Build Services and the remedying of any defects, all in accordance with the Contract. The Operator shall only take instructions from the Design-Build-Operations Engineer, or from an assistant to whom the appropriate authority has been delegated under GC Section 7.2.3. If an instruction constitutes a Change, GC Section 10.1 shall apply.

(2) The Operator shall comply with the instructions given by the Design-Build-Operations Engineer or delegated assistant, on any matter related to the Contract. These instructions shall be given in writing.

7.2.5 Replacement of the Design-Build-Operations Engineer

If the Owner intends to replace the Design-Build-Operations Engineer, the Owner shall, not less than 42 days before the intended date of replacement, give notice to the Operator of the name, address and relevant experience of the intended replacement Design-Build-Operations Engineer. The Owner shall not replace the Design-Build-Operations Engineer with a person against whom the Operator raises reasonable objection by notice to the Owner, with supporting particulars.

7.2.6 Determinations by the Design-Build-Operations Engineer

(1) Whenever the Contract provides that the Design-Build-Operations Engineer shall proceed in accordance with this GC Section 7.2.6 to agree or determine any matter, the Design-Build-Operations Engineer shall consult with each Party in an endeavour to reach agreement. If agreement is not achieved, the Design-Build-Operations Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

(2) The Design-Build-Operations Engineer shall give notice to the Parties of each agreement or determination, with supporting particulars. Each Party shall give effect to each agreement or determination unless and until revised under GC Section 1.9.

22. Clause 7.3 Operations Supervision

This clause stands deleted

Article 8: Representatives Staff and Sub-contracting

23. Clause 8.1.2 (1) Operator's Representative

The Operator's Representative is: _____

24. Clause 8.1 Existing Staff

The Operator is not obliged to retain staff employed by the Owner.

25. Clause 8.3 Operator's Personnel

The Operator's Key Staff employed during the design build services shall have the expertise and qualifications specified in the Table[77] below.

SN	Staff	No	Minimum Qualifications
1	Project Manager	1	A Graduate in Civil Engineer with not less than 10 years' experience in construction of Sewage Treatment Plants/ Sewerage Networks.
2	Civil Engineer	2	A Civil Engineer (Graduate Engineer) with not less than eight years' experience in construction of similar engineering works or Diploma in Civil Engineer with 10 years' experience
3	Electro Mechanical Engineer	1	A Electro /Mechanical Engineer (Graduate Engineer) with not less than 8 years' experience in construction of similar engineering works or Diploma in Electro/ Mechanical Engineering with 10 years' experience
4	Civil Supervisors	3	Diploma in Civil Engineering with minimum 2 years' experience in Construction of Civil Engineering

[77] EA should ensure that the requirements relating to the Key Staff given in the BDS under ITB 3.3 (h) 4 8are identical with the SCC 8.3.

			works
5	Environmental Engineer	1	Graduate Degree in civil Engineering / environmental Science / environmental planning with total 5 years' experience of which minimum 3 years' experience in environmental management works of urban infrastructure projects.
6	Health and Safety Engineer	1	Graduate in any field with specialised qualification in Occupational Health and safety (OHS) with total 5 years' of experience of which 3 years' in management of OHS works in infrastructure projects.
7	Social Expert	1	Degree in Social Science / Sociology / Social Work / Anthropology / Planning with total 5 years' experience of which 3 years in management of social safeguard activities in infrastructure projects.

26. Clause 8.6 (1) Maximum Percentage of Sub contracting

Sub-contracting shall not exceed 25% percent. However, the nominated Sub-contractor whose experience and qualification have been claimed for meeting the qualification criteria in accordance with stipulations in annexure A part h shall be excluded while applying the ceiling of 25 %.

Article 9: Liability and Risk Distribution

27. Clause 9.1 Defect Liability Period

Clause 9.1 is hereby deleted. The Operator shall be responsible for the repair and maintenance of the STP, Sewerage Network and/or Interception and Diversion Works, SPSs and other facilities at his own cost during the O&M period of 15 years as stipulated in Schedule 3 – Operation and Maintenance Services Schedule.

28. Clause 9.6 - Insurance

Delete the existing clause and replace it with the following clause:

In this Clause, "insuring Party" means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause. Wherever the Operator is the insuring Party, each insurance shall be affected with insurers and in terms approved by the Owner. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

Wherever the Owner is the insuring Party, each insurance shall be affected with insurers and in terms consistent with the details contained under this

contract. If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Operator shall act under the policy on behalf of these additional joint insured except that the Owner shall act for Owner's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

The relevant insuring Party shall, within 28 days from the Effective Date submit to the other Party:

a) evidence that the insurances described in this Clause have been effected, and

b) copies of the policies for the insurances described in Sub-Clause 9.6.2 (Insurance for works and Operator's Equipment) and Sub-Clause 9.6.3 (Insurance against Injury to Persons and Damage to Property).

When each premium is paid, the insuring Party shall submit evidence of payment to the other Party. Whenever evidence or policies are submitted, the insuring Party shall also give notice to the Design Build Operations Engineer.

Each Party shall comply with the conditions stipulated in each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Project and ensure that insurance is maintained in accordance with this Clause. Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or attempts to make) any alteration, the Party first notified by the insurer shall promptly give notice to the other Party.

If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provide satisfactory evidence and copies of policies in accordance with this Sub-Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

Nothing in this Clause limits the obligations, liabilities or responsibilities of the Operator or the Owner, under the other terms of the Contract or otherwise. Any amounts not insured or not recovered from the insurers shall be borne by the Operator and/or the Owner in accordance with these obligations, liabilities or responsibilities. However, if the insuring Party fails to effect and keep in force

an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

Payments by one Party to the other Party shall be subject to the provisions of GCC & SCC as contained in this contract as applicable. The Operator shall be entitled to place all insurance relating to the Contract (including, but not limited to the insurance referred to Clause 9.6) with insurers from any eligible source country.

9.6(2) Insurance for Works and Operator's Equipment

The insuring Party shall insure the Works, Plant, Materials and Operator's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 9.6.1 (General Requirements for Insurances), until the End Date.

The insuring Party shall maintain this insurance to provide cover until the End Date, for loss or damage for which the Operator is liable arising from a cause occurring prior to the End Date, and for loss or damage caused by the Operator in the course of any other operations.

The insuring Party shall insure the Operator's Equipment for not less than the full replacement value, including delivery to Site. For each item of Operator's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Operator's Equipment.

Unless otherwise stated in the Particular Conditions, insurances under this Sub-Clause:

a) shall be effected and maintained by the Operator as insuring Party,

b) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated between the Parties for the sole purpose of rectifying the loss or damage,

c) shall cover all loss and damage from any cause not listed in the GCC / SCC of this contract.

d) shall also cover loss or damage to a part of the Projects which is attributable to the use or occupation by the Owner of another part of the Works, and loss or damage from the Owner's risks listed in the GCC / SCC excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not

more than the amount stated in the Contract Data (if an amount is not so stated, this sub-paragraph (d) shall not apply), and

e) may however exclude loss of, damage to, and reinstatement of: (i) a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below), (ii) a part of the Works which is lost or damaged in order to reinstate any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or workmanship, (iii) a part of the Works which has been taken over by the Owner, except to the extent that the Operator is liable for the loss or damage, and (iv) Goods while they are not in the Country, subject to the provisions of GCC / SCC contained in this contract as applicable.

If, more than one year after the Base Date, the cover described in sub-paragraph (d) above ceases to be available at commercially reasonable terms, the Operator shall (as insuring Party) give notice to the Owner, with supporting particulars. The Owner shall then (i) be entitled subject to provisions of GCC / SCC contained in this contract as applicable. to payment of an amount equivalent to such commercially reasonable terms as the Operator should have expected to have paid for such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clause 9.6.1 [General Requirements for Insurances].

9.6.(3) Insurance[78] against Injury to Persons and Damage to Property

The insuring Party shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property {except things insured under Clause 9.6.(2) [Insurance for Works and Operator's Equipment]} or to any person {except persons insured under Sub-Clause 9.6.(2) [Insurance for Operator's Personnel]}, which may arise out of the Operator's performance of the Contract and occurring before the issue of the Performance Certificate.

The Insurance cover under this clause shall be as under and to be borne by the Operator:

1. Loss of human life – Rs. _____ million or equivalent amount in convertible currency and to be recouped as and when it is used.
2. Permanent Disability of human beings - Rs. _____ million or equivalent amount in convertible currency and to be recouped as and when it is used..

[78] *In case of NCB specify INR only*

3. Human Body Injury not resulting into permanent disability -Rs. _____ million or equivalent amount in convertible currency and to be recouped as and when it is used.

Unless otherwise stated in the Particular Conditions, the insurances specified in this Sub-Clause:

a) shall be effected and maintained by the Operator as insuring Party,

b) shall be in the joint names of the Parties,

c) shall be extended to cover liability for all loss and damage to the Owner's property (except things insured under Sub-Clause 18.2) arising out of the Operator's performance of the Contract, and

d) may however exclude liability to the extent that it arises from:

i. the Owner's right to have the Project executed on, over, under, in or through any land, and to occupy this land for the Project,

ii. damage which is an unavoidable result of the Operator's obligations to execute the Works and remedy any defects, and

iii. a cause listed as Owner's Risks as contained in GCC / SCC, except to the extent that cover is available at commercially reasonable terms.

9.6. (4) Insurance for Operator's Personnel

The Operator shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Operator or any other of the Operator's Personnel. The Owner and the Design Build Operate Engineer shall also be indemnified under the policy of insurance, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Owner or of the Owner's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For Sub-contractor's employees, the insurance may be affected by the Sub-contractors, but the Operator shall be responsible for compliance with this Clause

Article 10: Change in Contract Elements

29. Clause 10.2 - Change to Operations Services

(a) GCC sub-clause 10.2 (1) is amended to read as under:

"Except as specifically provided in Schedule 6 of the Contract (Terms and Procedure of Payment), Schedule 8 of the Contract – Price Adjustment or elsewhere in the Contract, the Operator shall make no claim whatsoever for any adjustment to the Contract Price during the Operations Period."

(b) GCC sub-clause 10.2 (2) and 10.2 (3) shall stand deleted.

Schedule 2

Design Build Services Schedule (DBSS)

TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.

ARTICLE 12. General

12.1. Description of Design-Build Services:

For STP

The Operator shall carry out and be responsible for the Design and construction of the STP and all allied appurtenant structures. The Operator's work and services as part of the "Design-Build Services" shall cover all necessary or desirable services / activities for the Design and construction of the STP and all allied works in accordance with and as contemplated by the Design-Build Documents and the Technical Standards including,

a. the Design services in respect of the STP and all allied works including treatment process, hydraulic, structural, electrical, instrumentation, mechanical and piping Design, and all civil, mechanical, electrical and piping drawing including architectural & construction drawings and environmental assessment with necessary mitigation measures, as set out in DBSS.

b. the building and construction work and services in respect of the STP and all allied works as set out in DBSS;

For Network

The Operator shall carry out and be responsible for the review of owner's design and redesign where necessary; and construction of the Sewerage Network including pipe network, Sewage pumping stations and all allied appurtenant structures and be responsible for its performance. The Operator's work and services as part of the "Design-Build Services" shall cover all necessary or desirable services / activities for the design and construction of the Sewerage Network and all allied works in accordance with and as contemplated by the Design-Build Documents and the Technical Standards including,

a) The redesign services in respect of Sewerage Network and allied appurtenant structures such as manholes, vent shafts etc., including design, alignment, layout, installation, all civil works, construction drawings and environmental and social assessments; social, safety and environmental safeguards; as set out in DBSS.

b) the design services in respect of the Sewage pumping stations and all allied works including operations process, hydraulic, electrical, instrumentation, mechanical and piping design, all civil, mechanical, electrical and piping drawing including architectural & construction drawings and environmental assessment with necessary mitigation measures, as set out in DBSS.

The Operator shall propose its own structural design and configuration for SPS and the design will be subject to approval of the owner. The electromechanical components for the SPS will be adopted as the BOQ in the contract unless otherwise mandated by redesign of network and approved by owner.

c) the building and construction work and services in respect of the Sewerage Network and all allied works such as Pump stations, road restoration etc. as set out in DBSS;

d) Refurbishment or replacement of existing sewerage network in compliance to the conditions as set out in the DBSS.

e) Supervising connections to household or any other connections to the network approved by the Owner to ensure such connections are technically complied with necessary requirements for operations and performance.

For Interception & Diversion Works

The Operator shall carry out and be responsible for the review of owner's design and redesign where necessary; and construction of the diversion structure across nallah/drain along with intercepting sewer laid for conveying the sewage from nallah/drains up to the Sewage Treatment Plant and including Sewage lifting and pumping stations and all appurtenant structures forming a part of both the New/Existing Sewerage Infrastructure and be responsible for its performance. The Operator's work and services as part of the "Design-Build Services" shall cover all necessary or desirable services / activities for the design and construction of the Interception & Diversion Works and all allied works in accordance with and as contemplated by the Design-Build Documents and the Technical Standards including,

a) a) The redesign services in respect of I&D works and allied appurtenant structures such as manholes, vent shafts etc., including design, alignment, layout, installation, all civil works, construction drawings and environmental and social assessments; social, safety and environmental safeguards; as set out in DBSSthe design services in respect of the Sewage pumping stations and all allied works including operations process, hydraulic, electrical, instrumentation, mechanical and piping design, all civil, mechanical, electrical and piping drawing including architectural & construction drawings and environmental assessment with necessary mitigation measures, as set out in DBSS.

The Operator shall propose its own structural design and configuration for SPS and the design will be subject to approval of the owner. The electromechanical components for the SPS will be adopted as the BOQ in the contract unless otherwise mandated by redesign of network and approved by owner.

b) the building and construction work and services in respect of the Sewerage Network and all allied works such as Pump stations, road restoration etc. as set out in DBSS;

12.2. Supplementing the General Conditions

The provisions contained in this Design-Build Services Schedule are to be read in conjunction with the General Conditions of Contract and Special Conditions of Contract as contained in this bid document for the purpose of providing greater specificity of the Design-Build Services that the Operator shall perform.

ARTICLE 13. DESIGN SERVICES

For STP

13.1. General

13.1.1. Design and Engineering

a. The Operator shall execute the basic and detailed Design of STP and allied structures and its execution in compliance with the technical specifications and requirements contained in the contract, codes of practices as published by the Bureau of Indian Standard (BIS) or its equivalent standard as well as the latest version of "Manual on Sewerage and Sewage Treatment" as published by the Central Public Health Engineering Organization (CPHEEO) of the Ministry of Urban Development, Government of India. Wherever, the codes, standards and manual do not provide for the Design and execution of some component i.e. required to be Designed and executed, the operator shall follow the standard engineering practices as approved by Design-Build-Operations Engineer.

13.1.2. Proposed treatment scheme

The treatment scheme shall include facilities (complete in all respects) for receiving sewage, screening, degritting, any proven treatment unit, flow measurement, disinfection and sludge management. Provision of exact components shall depend on the proposed technology. In addition, the following units shall be provided:

i. Electrical substation

ii. Adequate lighting to all the units.

iii. Fire-fighting equipment as per state Government department of Fire services

iv. Environmental, Social, Health and Safety Plan (ESHS) management Plan must be incorporated for the management of all staff and activities undertaken in construction and O&M of the STP. .

v. Provisions for power generation units (if power generation is found feasible), engine rooms with gas engines and accessories.

13.1.3. The following general rules shall be followed in arranging the Plant:

i. Minimum clear distance of 6 m shall be allowed between adjacent units of treatment or fixed structures to permit safe and convenient access for operation and maintenance;

ii. Open area with necessary pavement, adjacent to all mechanical Plant shall be provided as a maintenance lay down area;

iii. Fixed runways, lifting eyes or other means shall be provided to permit the removal of Plant equipment that may logically be required to be removed during the course of its normal operational life for maintenance or any other purpose;

iv. Areas where leakage is likely to occur whether in normal use or during maintenance, shall be provided with covered drainage channels which shall direct the spillage either to a suitable drain or to a sump from where it can be pumped;

v. Provided acoustic coverings where necessary to limit the noise produced during normal operation to the limits detailed in these documents;

vi. Plant shall be arranged and the building designed to permit convenient maintenance and removal of equipment whenever deemed necessary;

vii. Management of environmental impacts during construction and installation/erection works and O&M shall be carried out as per the Environmental Management Plan provided in *Appendix 1* of Schedule 2 (Design Build Services), recommendations of Environmental and Social Impact Assessment Report of the project (shared as part of the information to the bidders), ESHS implementation plan in line with the ESHS code of Practice submitted.

viii. Provide adequate supports and restraints for process piping, valves and appurtenances.

ix. Connect pipework to equipment with flexible connections or make other provisions to avoid transfer of pipe loads to devices.

x. All electro mechanical equipment, electronic instrumentation and Air conditioning facilities shall be designed to withstand the corrosive environment that will be prevailing in the STP.

xi. All sluice gates, valves, piping, Screens, degritting equipment, aerators and air piping, sludge handling equipment, etc., which will be submerged in or in contact with sewage or sludge and stairs or ladders and hand railings for access and platforms and walkways shall be designed with Corrosive resistant material.

xii. Chemical piping for supply and feed of chlorine and polymer shall be of corrosion resistant material and shall be secured to racks or trays to be fixed to duct walls or walls of tanks and buildings as necessary. The method of securing the pipes to the racks and / or trays shall be by clips or similar devices and shall be of corrosion – resistant material facilitating ease of

xiii. removal in such a way that individual runs can be changed without dismantling adjacent pipes.

xiv. All chemical piping shall be colour banded and suitably labeled to enable individual lines to be identified throughout their run.

xv. Particular attention shall be paid to the layout of the chemical piping, which shall be functional and neat in appearance. Generally, where pipework is installed in ducts, it shall be supported not less than 150 mm clear of the floor.

xvi. Where materials subject to UV degradation are employed, they shall be shielded from direct sunlight.

xvii. Provide necessary platforms and walkways at all levels for operation of valves, gates and

xviii. mechanical equipment with stairs or ladders and hand railings for access.

xix. Human contact with the sewage or sludge during O&M of STP shall be strictly avoided

13.1.4. Provision of Modular Construction for Sewage Treatment Plants

All the treatment units shall be designed and constructed for their respective flows / capacities mentioned in these technical specifications and shall be constructed in suitable modular or treatment train capacities. The minimum number of modules or treatment trains and the minimum number of each unit process component required shall be provided to facilitate O&M. Wherever no modular approach and stand by equipment is being proposed, the Operator will provide proper justification and certify that the proposed system will fulfill effluent design standards and other safeguards in all possible flow fluctuations.

13.1.5. Receiving of Sewage

Raw Sewage will be delivered through …. mm dia with invert level of xx m at the ground level of …. m. into a Receiving Chamber to be constructed in this contract and from where it will be taken into downstream screens. Receiving Chamber shall be of adequate size to meet the working space requirements. The flow from the receiving chamber will lead to further units such as screening/ grit chamber/ secondary treatment unit etc. based on the technology and process flow being proposed by the bidder.

13.1.6. Flow Measurement:

Flow meters with transmitters shall be provided on all the common header of the raw sewage pumps.

13.1.7. Disinfection:

The Treated Sewage from the Secondary treatment units will be disinfected using suitable cost effective process/ technology. The treated and disinfected sewage is to be disposed into the water stream by suitable outfall arrangements.

13.1.8. Sludge Handing System – meet the relevant disposal standards:

Efforts shall be made to reduce the sludge volume to the extent possible in a cost-effective manner. Sludge should be stabilised before disposal. Human contact with sludge shall be avoided.

13.1.9. Design criteria:

a. The Tenderers are to adopt the same nomenclature as mentioned in the bid document (to the extent possible) used for various treatment units in their design report. Wherever new/ proprietary terms are being used, they shall be explained in sufficient detail.

b. The STP shall be designed for __ mld capacity. The land provided is for augmenting the capacity to the ultimate flow of ….. mld. The General Arrangement Drawing (GAD) supported by hydraulic sizing calculation for ultimate flow of __ mld shall be provided. However the detailed design shall be furnished for only __ mld.

c. To the extent possible, the plant must be designed in modules so as to augment the capacity as and when the plant reaches its designed capacity. It is also informed that the expected sewage flows cannot be generated immediately after construction and that the sewage flows are likely to increase gradually and that the STP should be able to perform at the designed levels even with these low flows.

d. The process design of various units shall be done as per the norms prescribed in the CPHEEO Sewerage Manual (Latest Edition). If no guidelines are mandated by CPHEEO for a certain component, the bidder shall demonstrate that the guidelines being adopted are based on past successful experiences in similar situtations and conform to best engineering practices.

e. The Designs and drawings as formulated by the operator shall be subject to approval by the owner or its authorized representative.

f. The Operator shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents, desired output / performance of the STP, whether specifications, drawings and other documents have been approved by the Owner or its representative or not, provided that such discrepancies, errors or omissions are not because of inaccurate

information furnished in writing to the Operator by or on behalf of the Owner.

13.1.10. Codes and Standards

Wherever references are made in the Contract to codes and standards, in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards 30 days prior to the Submission Deadline shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied after approval by the Owner/Owner's Representative and shall be treated in accordance with GC Section 10.1.

13.1.11. Design Responsibilities

a. The Operator's Design and Design-related services shall include, but not limited to the following:

1. Site investigation and data collection including geotechnical assessment and soil analysis for the Design and construction of the structures required for the STP and allied works;

2. Selection, adoption and detailed engineering Designs for the most appropriate techno economically feasible cost effective treatment process technology for the treatment of the sewage ensuring that the treated sewage meets with the stringent of the disposal standards prescribed by the MOEF / CPCB and in the contract as may be applicable. These standards are prescribed below:

S. No	Parameters	Parameters Limit (Standards)	Location
1	pH	6.5 – 9.0	Anywhere in the Country
2	BOD (mg/l)	Not more than 20	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, and Union Territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli, Daman & Diu and Lakshadweep
	BOD (mg/l)	Not more than 30	Areas/regions other than mentioned above

3	TSS (mg/l)	Not more than 50	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, and Union Territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli, Daman & Diu and Lakshadweep
	TSS (mg/l)	Not more than 100	Areas/regions other than mentioned above
4	Fecal Coliform (MPN/100ml)	Less than 1000	Anywhere in the country

*Metro cities are Delhi, Mumbai, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune

3. the acquisition of all data and information necessary to prepare the Design and that are required to demonstrate that the __ MLD STP meets or exceeds the Technical Standards;

4. Preparation of Design development documents, based on the approved HFD /schematic Design documents accepted by the Owner, consisting of drawings and other documents appropriate to the size of the __ MLD STP to describe the units and character of the entire proposed plant including architectural, mechanical, civil works, and electrical systems, materials, operations, landscaping, and such other elements as may be appropriate;

5. the preparation of Design-Build Documents setting forth in detail the requirements for construction based on the Design development documents accepted by the Owner;

6. obtaining all approvals, permits, including building permits, and licenses for the Design-Build Services, necessary compliances with environmental management plan and ESHS Management requirements as specified in Appendix 1 of the Schedule 2 (Design Build services) except for those approvals, permits or licenses that the Owner is explicitly required to obtain itself under the Applicable Law in which case the Operator shall prepare all documentation and provide assistance to the Owner in obtaining such approval, permits or licenses;

7. the conducting of general reviews of the progress of the Design process, to the extent necessary, in order to determine to the Operator's satisfaction that the Design services are performed in compliance with the requirements of the Contract and Applicable Laws.

13.1.12. Design-Build Documents

a. The Operator shall prepare all the Design-Build Documents. The Design Build Documents shall include the plans, Designs, drawings, as-built documents, operations manuals, specifications, schematic Design documents, Design development documents, and all modifications thereto required in order to properly and fully test for, analyses for, plan, Design and build the STP and all allied works as contemplated in the Technical Standards and the remaining provisions of the Contract.

b. The Operator shall prepare any other document, as may be requested by the Design-Build-Operations Engineer, that the Owner considers necessary to monitor the progress of the Design-Build Services and assess the Operator's compliance with the Contract.

c. The Operator shall provide the Owner with three sets of all of the Design-Build Documents in reproducible form and shall modify them to keep them up-to-date as requested by the Owner acting in a professionally reasonable manner. The Design-Build Documents, with the exception of the as-built documents, shall be subject to the review and approval of the Owner prior to performing any of the services set out in DBSS in respect of any Design-Build Document.

d. When the Operator notifies the Owner in accordance with DBSS, the Operator shall provide to the Owner one copy of the "as built Designs, Drawings/Documents" in reproducible form showing the exact as built locations, sizes and details of the STP. The STP shall not be considered to have reached Completion for the purposes of DBSS until such Design-Build Documents have been provided. The Operator shall update the as built Designs, Build Drawings/Documents as necessary for the correction of defects or deficiencies contemplated by DBSS.

13.1.13. Design Considerations

In preparing the Design for the STP and allied works and the Design-Build Documents, the Operator shall,

a. Protect public health and safety, including by the means set out in DBSS

b. maximize the protection of the environment and minimize any adverse environmental impacts caused by the construction of STP throughout the Service Area and Country, including as may be required, recommended or advisable pursuant to any technical standard or environmental assessments conducted on, at or near the STP site and by the means set out in DBSS;

c. Consider the existing infrastructure and the Sewage Treatment Plant to be connected with the Trunk infrastructure.

d. Ensure the STP and allied works has the capacity to accommodate the anticipated sewage based upon the verifications prepared by the Operator pursuant to DBSS;

13.2. Design Responsibilities – On Site Issues

In preparing the Design for the STP and the Design-Build Documents, the Operator shall ensure that the Design,

a. makes adequate preparation and plans to ensure traffic movement and safety during the laying of the network.

b. makes adequate preparation and plans and takes adequate measures for controlling access to the STP site by animals and humans and vehicular traffic at the perimeter of the site, including plans for plantings and vegetation, fencing, lockable gates at vehicular access points, and the creation of an internal (perimeter access corridor inside or, with appropriate local and other approvals, surrounding the Site;

c. provides for allied works like control valves chambers, anchor /thrust /pedestal blocks, internal access roads within the site and proposed units within the STP site;

d. provides for ancillary works like new approach road that lead to or will be used to access the Plant, culverts, compound wall with gates, fencing etc.;

e. provides for all utility services required for all of the Services

f. provides utilities services at the STP site such as electricity, telephone, potable water, non- potable water and sewage collection and disposal.

13.3. Sewage Treatment Plant Layout and operation sequence

a. The Operator shall be responsible for the planning and Designing of the area of the Site for __ MLD STP, including,

b. Design and Construction of ___ MLD STP and all allied /ancillary works with an approach road to enter the facility and then carry out STP Operation & Maintenance for 15 years by way of other services. Operator shall verify these details as per site condition.

c. The STP shall comprise treatment process, as may be techno economically feasible and cost effective, leading to stringent of the effluent quality as prescribed by MoEF / CPCB/ NRCD/ contract as may be applicable.

d. The Operator shall have responsibility to dispose the treated sewage at the designated location under the Contract. The Operator shall have no

right over the use of treated wastewater and sludge except for generation of power (if found feasible) from sludge for use in the STP.

e. On completion of the 15 years O & M period, the operator shall have to handover the STP to the Owner in full working condition, with necessary replacements of the components towards the end of their economic life as suggested by the manufacturers / operations manuals etc.

f. Landscaping of plant area, internal roads with access to all units, illumination of the entire STP site, pathways, storm water drainage, compound wall all around & gates, administrative building including store house for tools and spares, laboratory with water supply and waste water disposal arrangements, access road of 7 m carriageway, O&M manual and as-built drawings for all civil, electrical & mechanical works. All units shall be provided with draining arrangements with suitable valves/gates with chambers.

g. Supply and providing safety equipment namely gas mask, breathing apparatus, Air hose respirator, portable lighting equipment, non-sparking lighting equipment, portable air blowers, safety belts, inhalators and diver suit at the commencement of O & M.

h. The operator shall train the Owner's selected staff for on job training during the specified 6 months of O & M period. A Maximum of Fifteen (15) staff of Owner will be trained for a total period of 45 days during the last year of the Operations Period.

i. Handing over of the Plant in good working condition with all relevant documents such as as-built drawings, physical & operational condition of the assets, rights on proprietary technologies, software, systems, O&M manual, periodical reports along with soft copy to Owner.

j. Design shall be such that the plant requires minimum land foot print within the total land made available under this contract and also lesser energy and less manpower requirement with full automation for its sustainable and efficient operation & maintenance.

k. Proposed STP shall include but not be limited to the following criteria:

    i. The disinfected effluent shall be discharged in to the receiving water body through a suitable outlet channel and should be designed for the appropriate peak flow from the STP (. A suitable flow meter preferably ultrasonic electromagnetic shall be provided for measuring the flow through the outlet channel

    ii. Sludge Handing and disposal System shall form an integral part of the treatment system. This should include stabilization of sludge before disposal and reuse for beneficial purposes including

gas recovery and power generation to run the STP, agriculture manure, making stabilized clay bricks, etc.

iii. Characteristics and properties of the stabilized sludge before disposal shall be in conformance with the applicable environmental norms and CPHEEO guidelines.

iv. For the disposal of Grit and screening materials, solid waste etc., the same shall be disposed of by the operator at his own cost at the site Designated by the Owner

13.4. Designation of ____MLD STP on Site Areas for Other Uses

a. In preparing the Design and layout for the STP, the Operator shall Designate areas of the STP site for use in,

i. Sewage Treatment Units including receiving well/ equalisation chamber, pumping arrangement and other elctro-mechanical units/ equipment;;

ii. Sludge handling facilities;

iii. Ancillary works;

iv. Site administration and Lab building;

v. Perimeter buffer zones;

vi. Staff quarters etc.

13.5. Surface and Ground Water Management

In preparing the Design for the STP and all allied works and the Design-Build Documents, the Operator shall,

a. plan and Design the surface drainage at the Site of STP with adequate water drainage channels, pipes, sewers, structures and appurtenances, , adequate to manage the highest seasonal levels and volumes of storm water; and

b. plan and Design the STP site with adequate protection from flooding whether from rain, groundwater, high rivers, storms or any other source.

13.6. Site Administrative Facility

a. The Operator shall be responsible for the administration of the STP and all allied works during the Design-Build Period and the Operator shall Design,

b. temporary office facilities for use by the Operator and its Sub Operators in the administration and execution of the Design-Build Services;

c. Project Facility for use in the administration of the Operations Services to accommodate personnel, furniture, utility services, a lunch room, washrooms and public toilets adequate or the Operations staff;

d. appropriate signage for the Site and the STP , including signs that,

   i. identify the STP and its units;

   ii. provide warning and hazard notification in Designated areas where warranted; and

   iii. identify areas of the STP that are restricted to visitors and are accessible to only Designated employees of the Operator;

e. the landscaping for the Facility as per the Design-Build Documents;

For Network and/or I&D Works

2.1 General

2.1.1 Design and Engineering

a) The Operator shall execute the basic and detailed design of Sewerage Network and/or I&D Works and allied structures and its execution in compliance with the technical specifications and requirements contained in the contract, codes of practices as published by the Bureau of Indian Standard (BIS) or its equivalent standard as well as the latest version of "Manual on Sewerage and Sewage Treatment" as published by the Central Public Health Engineering Organization (CPHEEO) of the Ministry of Urban Development, Government of India, New Delhi (draft or approved but whichever is latest). Wherever, the codes, standards and manual do not provide for the design and execution of some component i.e. required to be designed and executed, the operator shall follow the standard engineering practices as approved by Design Build Operations Engineer.

b) Where the Owner provides detailed designs. The Operator shall review owner's designs and come up with its own designs for the Sewerage Network and/or I&D Works based on the alignment suggested/allowed by the Owner under Schedule 13 (Allowed alignments/locations). The changes in the suggested that include technical; allowed alignments etc shall be considered only due to compelling site conditions or unforeseen technical reasons, subject to the approval of the Owner or its authorised representative.

c) The designs and drawings as formulated by the operator shall be subject to approval by the Owner or its authorized representative.

d) The Operator shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents, desired output / performance of the Sewerage Network and/or I&D Works, whether specifications, drawings and other documents have been approved by the Owner or its representative or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Operator by or on behalf of the Owner. Normally it is expected that Operator will not deviate from the specifications prescribed by the Owner unless the proposed changes will result in better performance and cost effectiveness.

2.1.2 Codes and Standards

Wherever references are made in the Contract to codes and standards, in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards 30 days prior to the Submission Deadline shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied after approval by the Owner/Owner's Representative and shall be treated in accordance with GC Section 10.1.

2.1.3 Design Responsibilities

a) The Operator's design and design-related services shall include, but not limited to the following:

i. A confirmatory topographical study covering the proposed sites and the network alignment. Survey drawings are to be submitted in hard and soft copy to the owner;

ii. [Investigation and assessment of the design requirements taking into cognizance of the indicative results of the Asset Condition Assessment Study]

iii. Site investigation and data collection including geotechnical assessment and soil analysis for the design and construction of the structures required for the Sewerage Network and/or I&D Works;

iv. Operator uses the population data/ projections for future supplied; and per capita wastewater production assumptions by the Owner. Selection, adoption and detailed engineering designs for the most appropriate techno economically feasible cost effective pumping configuration, network alignment and network installation process ensuring that the sewerage system meets with the standards prescribed by the MOEF / CPHEEO / CPCB as may be applicable. The hydraulic designs use computer based approved/ proven software.

v. Selection, adoption and detailed engineering design for the sections of the Existing Sewerage Network and/or I&D Works, wherever required, to integrate with the new network system and/or I&D Works. Usefulness of existing network will be conducted through a conditional assessment where Design-Build engineer's team will also participate. Decision regarding the condition assessment shall be communicated by owner within 15 days after submitting complete condition assessment report by the contractor.

vi. the preparation of Hydraulic Flow Diagram (HFD)/schematic/preliminary design documents to illustrate the scale and character of the Design-Build Services and how the units of the process-adopted functionally relate to each other;

vii. Preparation of design development documents, based on the approved HFD /schematic design documents accepted by the Owner, consisting of drawings and other documents appropriate to the size of the Pumping Stations to describe the units and character of the entire proposed plant including architectural, mechanical, civil works, and electrical systems, materials, operations, landscaping, and such other elements as may be appropriate;

viii. the preparation of Design-Build Documents setting forth in detail the requirements for construction based on the design development documents accepted by the Owner;

ix. obtaining all approvals, permits, including building permits, and licenses for the Design-Build Services, necessary compliances with occupational health and safety requirements, except for those approvals, permits or licenses that the Owner is explicitly required to obtain itself under the Applicable Law in which case the Operator shall prepare all documentation and provide assistance to the Owner in obtaining such approval, permits or licenses;

x. the coordination required to integrate all parts of the Design-Build Services; such other Design-Build Services that may be required from time to time that are agreed to by the Operator and the Owner in writing; and

xi. the conducting of general reviews of the progress of the design process, to the extent necessary, in order to determine to the Operator's satisfaction that the design services are performed in compliance with the requirements of the Contract and Applicable Laws.

2.1.4 Design-Build Documents

a) The Operator shall prepare all the Design-Build Documents. The Design Build Documents shall include the plans, designs, drawings, as-built documents, operations manuals, specifications, schematic design documents, design development documents, and all modifications thereto required in order to properly and fully test for, analyses for, plan, design and build the Sewerage Network and/or I&D Works and all allied works as contemplated in the Technical Standards and the remaining provisions of the Contract.

b) The Operator shall prepare all the Refurbishment / Replacement drawings including sections and plans of the Sewerage Network and/or I&D Works to be replaced / refurbished including schematic/ detailed drawings, engineering drawings, construction drawings, design basis documents, construction methodology and technical standards adopted. The network and other systems built will be placed on a GI based system at the end of construction and handed over to the owner before operations commences. It also includes hydraulic design system to help monitor and for future upgrades.

c) The Operator shall prepare any other document, as may be requested by the Design-Build Engineer, that the Owner considers necessary to monitor the progress of the Design-Build Services and assess the Operator's compliance with the Contract.

d) The Operator shall provide the Owner with three sets of all of the Design-Build Documents in reproducible form and shall modify them to keep them up-to-date as requested by the owner acting in a professionally reasonable manner. The Design-Build Documents, with the exception of the as-built documents, shall be subject to the review and approval of the owner prior to performing any of the services set out in DBSS in respect of any Design-Build Document.

e) When the Operator notifies the Owner in accordance with DBSS, the Operator shall provide to the owner one copy of the "as built Designs, Drawings/Documents" in reproducible form showing the exact as built locations, sizes and details of the Sewerage Network and/or I&D Works and the Design-Build Services as executed. The Sewerage Network and/or I&D Works shall not be considered to have reached Completion for the purposes of DBSS until such Design-Build Documents have been provided. The Operator shall update the as built Designs, Build Drawings/Documents as necessary for the correction of defects or deficiencies contemplated by DBSS.

2.1.5 Design Considerations

In preparing the design for the Sewerage System and all allied works and the Design-Build Documents, the Operator shall,

i. Protect public health and safety, including by the means set out in DBSS

ii. Consider the existing infrastructure and the Sewerage Network to be connected with the Trunk infrastructure.

iii. Consider the existing structures and Pumping facility at the proposed SPS site (if any).

iv. Ensure the Sewerage Network and/or I&D Works and all allied works has the capacity to accommodate the anticipated sewage based upon the verifications prepared by the Operator pursuant to DBSS;

2.2 Implementation Responsibilities – On Site Issues

In preparing the design for the Sewerage Network and/or I&D Works and the Design-Build Documents, the Operator shall ensure that the design,

i. makes adequate preparation and plans to ensure traffic movement and safety during the laying of the network, connecting service connections and construction of pump stations.

ii. makes adequate preparation and plans and takes adequate measures for controlling access to the Sewage Pumping Station(SPS) site by animals and humans and vehicular traffic at the perimeter of the SPS site, including plans for plantings and vegetation, fencing, lockable gates at vehicular access points, and the creation of an internal (perimeter access corridor inside or, with appropriate local and other approvals, surrounding the Site;

iii. allied works like control valves chambers, anchor /thrust /pedestal blocks, internal access roads within the site and proposed units within the SPS site;

iv. provides utilities services at the SPS site such as electricity, telephone, potable water, non- potable water and sewage collection and disposal.

2.3 Sewerage Network and/or I&D Works Layout and operation sequence

The Operator shall be responsible for the planning and designing of the area along the Sewerage Network and/or I&D Works and the Sewage Pumping Stations (SPS), including,

a) Design and Construction of …..No. SPSs and specified allied works and redesign and construction of___ Km long Sewerage Network and/or I&D Works, and all allied /ancillary works and then carry out

Operation & Maintenance of the Sewerage Network and/or I&D Works, Sewage Pumping Stations and all allied / ancillary works for 15 years by way of other services. Operator shall verify these details as per site condition.

b) Selection, adoption and detailed engineering designs for the most appropriate techno economically feasible cost effective pumping configuration, network alignment and network installation process ensuring that the sewerage system meets with the standards prescribed by the MOEF / CPHEEO / CPCB as may be applicable.

c) On completion of the 15 years O & M period, the operator shall have to handover the facilities to the Owner in full working condition, as it was on the date of commissioning of the Sewerage Network and/or I&D Works.

d) Design and construction including getting necessary approvals from the concerned public authorities for installation of sewerage network on road crossings, railway line crossings etc.; the Owner shall assist in facilitating such approvals as and when so requested by the Operator.

e) Plans for disposal of excavated earth in a safe and environmentally compliant manner.

f) Relocation of services within the network layout and restoration of roads, including approvals for relocation of the services from respective Authorities,

g) Plans for rehabilitation of excavated area / roads to its original condition,

h) Plans for the traffic diversion, clearing and excavation of land, disposal of excavated soil, dewatering, debris and other material at the SPS area; Site clearance, site surveys, topographical surveys, soil investigation, submission of process design and hydraulic design calculations, network alignment and SPS lay outs, hydraulic flow diagram (Process & Instrumentation diagram), preparation and submission of specific detailed Environmental Management Plan for the contract (C-ESMP) that complies to the requirements of Environmental Management Plan provided in Appendix 1of Schedule 2 (Design Build Services), recommendations of Environmental and Social Impact Assessment Report of the project (shared as part of the information to the bidders) and ESHS implementation plan in line with the ESHS code of Practice submitted, preparation & submission of civil, architectural, General arrangement drawings & structural design of all civil works, electrical & mechanical equipment drawings including equipment installation drawings, supporting calculations & technical information, instrumentation & control system, construction and laying of Sewerage Network and/or I&D Works and all allied /ancillary works of required capacity

as per approved designs, testing, commissioning, performance testing of process units & trial run.

i) landscaping of SPS area, internal roads with access to all units, illumination of the entire SPS site, pathways, storm water drainage, compound wall all around & gates, administrative building including store house for tools and spares.

j) Preparation of BOQ in accordance with Schedule 6 of this Contract to the satisfaction of the Owner.

k) O&M manual and as-built drawings for all civil, electrical & mechanical works.

l) Supply and providing safety equipment namely gas mask, breathing apparatus, Air hose respirator, portable lighting equipment, non-sparking lighting equipment, portable air blowers, safety belts, inhalators and diver suit at the commencement of O & M.

m) Mobilising necessary sewer cleaning equipment and maintaining such equipment for timely maintenance of sewer network

n) The operator shall train the Owner's selected staff for on job training during the specified 6 months of O & M period. A Maximum of Fifteen (15) staff of Owner will be trained for a total period of 45 days.

o) Handing over of the Plant in good working condition with all relevant documents such as as-built drawings, physical & operational condition of the assets, rights on proprietary technologies, software, systems, O&M manual, periodical reports along with soft copy to Owner.

For Both STP and Network and/or Interception and Diversion Works

13.7. Other Design Responsibilities

[EA to include specific requirements if any advised by NMCG in its Administrative Approval and Expenditure Sanction (AA&ES).]

The Operator shall carry out the following Design or Design-related responsibilities:

a. the Operator shall prepare plans and Designs for all temporary works as required by the Operator's Design and as required by the Contract

b. the Operators shall prepare plans and Designs for landscaping of the site;

c. the Operator shall prepare plans and Designs for the acquisition of all data and information necessary to prepare the Design, including, but not limited to, any intrusive site investigations, off-site surveys and

environmental baseline monitoring required or contemplated under the Contract; and

d. the Operator shall prepare detailed plans and methodologies for the testing and inspection of the Plant and Equipment.

ARTICLE 14. BUILDING AND CONSTRUCTION SERVICES

14.1. General

a. The Operator shall carry out all building, refurbishment and construction of STP and Sewerage Network and/or I&D Works pursuant to Articles of DBSS

b. The Operator shall provide all of the demolition, excavation, building, co-ordination, repair, warranty, review, inspection, testing, quality assurance and control, monitoring, scheduling, clean-up etc. for connecting incoming sewage network, construction of the STP and the Sewerage Network and/or I&D Works and all appurtenant structures and allied works as contemplated by Design-Build Documents.

c. The Operator shall effectively direct and supervise these services so as to ensure conformity with the Design-Build Documents.

d. The Operator shall be solely responsible for installation methodology, construction means, methods, techniques, sequences, and procedures and for co-ordinating the various parts of the Design-Build Services under the Contract.

e. Unless agreed with Owner, the operator has to establish casting RCC pipes; preferably using vertical casting method within the vicinity of the site of construction. Generally, procurement of RCC sewer lines from outside manufacturers is discouraged. Owner will only consider request for procurement from outside only on cases where quantity required is not viable for setting up a plant.

14.2. Procurement and Transportation

a. Subject to GC Section 3.4, the Operator shall procure and transport all the equipment in an expeditious and orderly manner to the Site.

b. The Operators shall at its own risk and expense for transport all equipment, to the site.

c. The Operator shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of Equipment, to the Site. The Operator shall indemnify and hold harmless the Owner from and against any claim for damage to roads, bridges or any other traffic facilities that may be caused by the transport of the to the Site.

d. The Operator shall, at its own expense, handle all imported Equipment, at the point(s) of import and shall handle any formalities for customs clearance. If the Applicable Law requires any application or act to be

made by or in the name of the Owner, the Owner shall take all necessary steps to comply with such Applicable Law. In the event of delays in customs clearance that are not the fault of the Operator, the Operator shall be entitled to an extension in the Time for Completion, pursuant to GC Section 2.3.4.

14.2.1. Temporary Supports, Structures and Utility Services

a. The Operator shall have the sole responsibility for the Design, erection, operation, maintenance, and removal of temporary supports, structures and utility services and the Design and execution of construction methods required in their use.

b. The Operator shall engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform those functions referred to in DBSS where required by law or by the Design- Build Documents and in all cases where such temporary supports, structures and utility services and their Designs and method of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results

14.2.2. Document Review

The Operator shall review the Design-Build Documents and shall report promptly to the Owner any error, inconsistency or omission the Operator may discover. If the Operator does discover any error, inconsistency or omission in the Design-Build Documents, the Operator shall not proceed with the work affected until the Operator has corrected any such errors or inconsistency or supplied any missing information and these corrections have been approved in writing by the Owner.

14.2.3. Plant and Equipment

a. The Operator shall provide and pay for labor, Plant and Equipment, tools, construction and maintenance machinery and equipment, materials and supplies, water, heat, light, power, transportation, and all other facilities and services necessary for the performance of the Design-Build Services in accordance with the Design-Build Documents.

b. The Operator shall ensure that all Plant and Equipment provided are new. Plant and Equipment which are not specified shall be of a quality consistent with those specified and their use shall be acceptable to the Owner.

14.2.4. Documents at the Site

The Operator shall keep one copy of the Design-Build Documents as up-dated, submittals, reports and records of meetings at the Site, in good order

and shall make them available to the Owner upon request and at any reasonable time.

14.2.5. For STP

Use of the ____ MLD STP site

a. The Operator shall confine construction machinery and equipment, storage of Plant and Equipment, Operator's Equipment (Design-Build) and Operator's Equipment (Operations), and operations of Operator's Personnel to limits indicated by laws, ordinances, permits or the Design-Build Documents and shall not unreasonably encumber the Site with Plant and Equipment, Operator's Equipment (Design-Build) or Operator's Equipment (Operations). .

b. The Operator shall not store Plant and Equipment, Operator's Equipment (Design-Build) or Operator's Equipment (Operations) at the Site which are not necessary for the construction of the STP.

For Network and/or I&D Works

Alignment and Setting Out

a) The Operator shall be responsible for the true and appropriate alignment of the network and setting-out of the Site and the Sewage pumping Station in relation to benchmarks, reference marks, existing Infrastructure and lines specified in the Design-Build Documents.

b) If, at any time during the construction of the Sewerage Network and/or I&D Works / pumping stations etc., any error shall appear in the position, level or alignment of the network or any of its components, the Operator shall forthwith notify the Owner of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Owner.

14.2.6. Quality Assurance

a. The Operator shall institute a quality assurance system to ensure compliance with the requirements of the DBSS. Compliance with the quality assurance system shall not relieve the Operator of its duties, obligations or responsibilities.

b. The Operator shall submit for approval details of all quality assurance procedures and documents relating to Operator's compliance with the quality assurance system to the Owner before each stage of the Design-Build Services is commenced as set out in the Time Schedule. When any document is issued to the Owner, it shall be accompanied by the signed quality statements for such document, if any. The Owner may

audit any aspect of the quality assurance system and the Operator shall take any corrective action as the Owner may deem appropriate.

14.2.7. Operator's Access Routes and Rights of Way during the Design-Build Period

a. The Operator shall satisfy itself as to the suitability and availability of the access routes it chooses to use during the Design-Build Period for access to and from the Site. He shall, as between the Parties, be responsible for the maintenance of access routes during the Design-Build Period. The Owner will not be responsible for any claims which may arise from the use or otherwise of any access route. The Owner does not guarantee the suitability or availability of any particular access route, and will not entertain any claim for any non-suitability or non-availability for continuous use, during the Design-Build Period, of any such route.

b. The Operator shall bear all costs and charges for special or temporary rights-of- way required by it for access to the Site. The Operator shall also provide, at its own cost, any additional facilities outside the Site if required by it for the purposes of the Design-Build Services.

14.2.8. Site Regulations and Safety

a. The Operator shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. He shall prepare and submit to the Owner, proposed Site regulations for the Owner's approval, which approval shall not be unreasonably withheld. Such Site regulations shall include rules in respect of security, safety of Plant, gate control, sanitation, medical care, emergency preparedness, emergency response, on-site safety training of employees and fire prevention.

b. The Operator shall comply with all applicable safety regulations in providing the Design-Build Services and in occupying any part of the Site, Unless otherwise stated in the Design-Build Documents, the Operator shall, during the Design- Build Period, provide secure fencing, lighting, guarding and watching; provide temporary roadways, footways, guards and fences which may be necessary for the accommodation and protection of its employees, Site visitors, Owners and occupiers of adjacent land, the public and others; carry out safety briefings of applicable site regulations to all employees, Sub-contractors, agents, representatives and visitors to the Site prior to permitting first access of the applicable person to the and at regular intervals thereafter.

c. During the Design-Build Period, the Operator shall develop and implement a comprehensive occupational health and safety program for the protection of the Operator's Personnel and all other persons who may attend at the site. The program shall include a description of how the Operator will,

i. carry out all occupational health and safety responsibilities in respect of construction of STP and the laying of sewerage network and/or I&D Works as required under the Applicable Law;

ii. develop and manage all required occupational health and safety reporting procedures; and

iii. manage all occupational health and safety claims.

14.2.9. Operator's Equipment (Design-Build) and Site Clearance

a. All Operator's Equipment (Design-Build) brought by the Operator onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Operator shall not remove the same from the Site without the Owner's consent that such Operator's Equipment (Design-Build) is no longer required for the execution of the Contract.

b. The Operator shall maintain the site of construction and installation in a tidy condition and free from the accumulation of waste products and debris. The Operator shall remove waste products and debris resulting from the construction / laying and shall leave the Facility clean and suitable for occupancy and performance of the Operations Services before attainment of Substantial Completion. The Operator shall remove products, tools, construction machinery, and equipment, including the Operator's Equipment (Design-Build), not required for the performance of the remaining Design-Build Services.

c. Prior to notifying the Owner pursuant to DBSS 6.2(1), the Operator shall remove products, tools, construction machinery and equipment, and waste products and debris, including the Operator's Equipment (Design-Build).

d. Upon the issue of any Completion Certificate, the Operator shall clear away and remove, from the site, all Operators' Equipment (Design-Build), surplus material, wreckage, rubbish and temporary work or structures. The Operator shall ensure that the site is in a clean and safe condition to the satisfaction of the Owner.

e. If the Operator fails to remove, no later than 30 days after the issue of the Completion Certificate, any remaining Operator's Equipment

(Design-Build), surplus material, wreckage, rubbish and temporary work or structures, the Owner may sell or otherwise dispose of such items. The Owner shall be entitled to retain, from the proceeds of such sale, a sum sufficient to meet the costs incurred in connection with the sale or disposal, and in restoring the area around the STP, Sewerage Network and/or I&D Works and SPS sites. Any balance of the proceeds shall be paid to the Operator. If the proceeds of the sale are insufficient to meet the Owner's costs, the outstanding balance shall be recoverable from the Operator by the Owner.

f. The Owner will, if requested, use reasonable efforts to assist the Operator in obtaining any local, state or national government permission required by the Operator for the export of the Operator's Equipment (Design-Build) imported by the Operator solely for use in the execution of the Contract that is no longer required for the execution of the Contract.

14.2.10. Protection of the Environment

a. The Operator shall take all reasonable steps to protect the environment, both on and off the Site, and to limit damage and nuisance to people and property resulting from pollution, noise, dust and other results of its Services, including,

1. adopting working practices that prevent or minimize the transfer of any pollutant off-site; maintaining the access roads in good repair;
2. using appropriate dust suppressant methods;
3. restricting trucking and loud machinery and equipment use to daylight hours;
4. using mufflers, silencers and other appropriate methods to minimize the noise of the construction;
5. Maintaining clean STP and SPS sites, that are free of garbage.

b. The Operator shall, at all times during building and construction, ensure that the Environmental Management Plan specified in Appendix 1of Schedule 2 (Design Build Services) is fully complied and measures recommended in Environmental and Social Impact Assessment Study for the project (shared with the bidders as part of the information to the bidders) and ESHS implementation plans are implemented as per the ESHS code of practice.

c. The Operator shall monitor water quality upstream and downstream of the ___ MLD STP site, prior to and throughout the process of construction.

14.2.11. Emergency Work

a. If, by reason of an emergency arising in connection with and during the execution of the Design-Build Services, any protective or remedial work is necessary as a matter of urgency to prevent damage to the STP and Sewerage Network and/or I&D Works infrastructure, the Operator shall immediately carry out such work.

b. If the Operator is unable or unwilling to do such work immediately, the Owner may do or cause such work to be done as the Owner may determine is necessary in order to prevent damage to the Sewerage Infrastructure. In such event the Owner shall, as soon as practicable after the occurrence of any such emergency, notify the Operator in writing of such emergency, the work done and the reasons therefore. If the work done or caused to be done by the Owner is work that the Operator was liable to do at its own expense under the Contract, the reasonable costs incurred by the Owner in connection therewith shall be paid by the Operator to the Owner. Otherwise, the cost of such remedial work shall be borne by the Owner.

ARTICLE 15. TEST AND INSPECTION

15.1. Tests and Inspection

a. The Operator shall at its own expense carry out at the place of manufacture or on the Site all such tests and inspections of the Plant & Equipment. The Operator shall, in addition to those tests and inspections set out in the Contract, develop a plan for all testing and inspection of the equipment that is required in order to complete the STP and Sewerage Network and/or I&D Works in accordance with the Technical Standards Schedule and implement such quality assurance plan.

b. The Operator shall undertake such tests towards the Sewerage Network and/or Interception Sewer (sewers, man-holes etc.) so as to ascertain the attainment of self-cleansing velocity, leakage and completeness of the Sewerage Network and/or Interception Sewer.

c. The Owner or their Designated representatives shall be entitled to attend any test or inspection, provided that the Operator shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

d. Whenever the Operator is ready to carry out any test or inspection, the Operator shall give a reasonable advance notice of such test or inspection and of the place and time thereof to the Owner. The Operator shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Owner or their Designated representatives to attend the test or inspection.

e. The Operator shall provide the Owner with a certified report of the results of any test or inspection. The Operator will also maintain photographic records with coordinates of all construction activities and use it in support of quality of construction and to support payments – more importantly shoring, bedding, bailing of water etc have to be supported by photographic evidence with proper referencing.

f. If the Owner, or their Designated representatives, fails to attend the test or inspection, or if it is agreed between the Parties that such persons shall not do so, then the Operator may proceed with the test or inspection in the absence of such persons, and shall provide the Owner with a certified report of the results thereof.

g. The Owner may require the Operator to carry out any test or inspection not required by the Contract, provided that the Operator's reasonable costs and expenses incurred in the carrying out of such test or inspection shall be added to the Contract Price. Further, if such test or

inspection impedes the progress of work on the STP and Sewerage Network and/or I&D Works or the Operator's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

h. If any Plant and Equipment or any part of the STP and Sewerage Network and/or I&D Works fails to pass any test or inspection, the Operator shall either rectify or replace such Plant and Equipment or part of the STP and Sewerage Network and/or I&D Works and shall repeat the test or inspection upon giving a notice under DBSS Section 5.1(3).

i. If any dispute or difference of opinion arises between the Parties in connection with or arising out of the test or inspection of the Plant and Equipment or part of the STP and Sewerage Network and/or I&D Works that cannot be settled between the parties within a reasonable period of time, it may be referred to an Adjudicator for determination in accordance with GC Section 1.6.1(1).

j. The Operator shall give the Owner, at the Owner's expense, access at any reasonable time to any part of the STP and Sewerage Network and/or I&D Works or any place where the Plant and Equipment are being manufactured or installed in the STP and Sewerage Network and/or I&D Works, in order to inspect the progress of the work and the manner of manufacture or installation, provided that the Owner shall give the Operator a reasonable prior notice.

k. The Operator agrees that neither the execution of a test or inspection of Plant and Equipment or any part of the Site, STP and Sewerage Network and/or I&D Works, nor the attendance by the Owner, nor the issue of any test certificate pursuant to DBSS, shall release the Operator from any other responsibilities under the Contract.

l. No part of the STP, Sewerage Network and/or I&D Works and Pumping Stations and foundations shall be covered up on the Site without the Operator carrying out any test or inspection required under the Contract. The Operator shall give a reasonable notice to the Owner whenever any such part of the plant or foundations is ready or about to be ready for test or inspection; such test or inspection and notice thereof shall be subject to the requirements of the Contract.

ARTICLE 16. COMPLETION OF THE STP AND SEWERAGE NETWORK AND/OR I&D WORKS

16.1. Monthly Progress Notice

a. The Operator shall submit to the Owner after the end of each month six copies, each signed by the Operator's Representative named in accordance with GC Section 8.1.2, a notice (the "Monthly Progress Notice") in such form as the Owner may from time to time prescribe, showing the percentage of completion that the Operator considers it has effected in the preceding month, in respect of the Design-Build Services.

b. The Owner shall, no later than 30 days after receipt of the Monthly Progress Notice, deliver to the Owner a statement (the "Design-Build-Operations Engineer's Statement") indicating, separately, the percentage of completion of the Design-Build Services with documentary evidence such as photographs etc. that the Owner considers the Operator has effected in the applicable month.

c. If the Owner notifies the Operator of any defects or deficiencies, or both, in any of the Design-Build Services, the Operator shall then correct the defects or deficiencies, and shall repeat the procedure described in DBSS Section 5.1(a).

16.2. Completion

a) As soon as the Design-Build Services have, in the opinion of the Operator, been completed in accordance with the Technical Standards Schedule (including restoration of services and roads cut to lay sewer lines), excluding minor items not materially affecting the operation or safety of the STP and Sewerage Network and/or I&D Works, has satisfactorily passed all Tests on Completion as set out in DBSS and Technical Standards Schedule, the Operator shall so notify the Owner in writing (the "Notice of Completion") and provide the as-built Design-Build Documents referred to in DBSS. It may be true that at times, parts of the networks are commissioned and hence such completion should be notified to Owner. However, final completion has to cover all such part commissioned networks. Operation of such commissioned sub-networks shall be the responsibility of the Operator.

b) The Owner shall, no later than 30 days after receipt of the Operator's notice under DBSS Section 5.2(a) either issue a Completion Certificate stating that the STP and Sewerage Network and/or I&D Works has reached Completion as of the date of the Operator's notice under

DBSS Section 5.2(a), or notify the Operator in writing of any defects or deficiencies or both.

c) If the Owner is not satisfied that the Design-Build Services are complete, the Owner shall notify the Operator in writing of any defects or deficiencies no later than 14 days after receipt of the Notice of Completion.

d) If the Owner notifies the Operator of any defects or deficiencies or both, the Operator shall then correct such defects or deficiencies, and shall repeat the procedure described in DBSS Section 5.2(a).

e) If the Owner is satisfied that the Design-Build Services have reached Completion, the Owner shall, no later than 7 days after receipt of the Operator's repeated Notice of Completion, issue a Completion Certificate stating that the Design-Build Services have reached Completion as of the date of the Operator's repeated Notice of Completion.

f) If the Owner fails to issue the Completion Certificate and fails to inform the Operator of any defects or deficiencies 14 days after receipt of the Notice of Completion or 7 days after receipt of the Operator's repeated Notice of Completion, then the Design- Build Services shall be deemed to have reached Completion as of the date of the Notice of Completion or repeated Notice of Completion as the case may be.

g) As soon as possible after Completion, the Operator shall complete all outstanding minor items so that the STP and Sewerage Network and/or I&D Works are fully in accordance with the requirements of the Contract, failing which the Owner will undertake such completion and deduct the costs thereof from any monies owing to the Operator.

ARTICLE 17. COMMISSIONING AND OPERATIONAL ACCEPTANCE

17.1. Commissioning

Commissioning of the STP and Sewerage Network and/or I&D Works shall be commenced by the Operator immediately after issue of the Completion Certificate by the Design-Build-Operations Engineer, pursuant to DBSS Section5.2 (b) or immediately after issue of the deemed Completion, under DBSS Section 5.2 (f).

17.2. Tests on Commissioning

a. The Tests on Commissioning as set out the Technical Standards Schedule, and repeats thereof, shall be conducted by the Operator during Commissioning of the STP and Sewerage Network and/or I&D Works and all allied works to ascertain whether the STP and Sewerage Network and/or I&D Works or the relevant part can attain the technical standards as required in the contract. The Operator's and Design-Build-Operations Engineer's advisory personnel shall attend the Tests on Commissioning, and shall advise and assist the Owner. The Owner shall promptly provide the Operator with such information as the Operator may reasonably require in relation to the conduct and results of the Tests on Commissioning, and any repeats thereof.

b. If for reasons not attributable to the Operator, the Tests on Commissioning of the STP and Sewerage Network and/or I&D Works cannot be successfully completed within 21 days after the period from the date of Completion specified in the SCC or any other period agreed upon by the Owner and the Operator, the Operator shall be deemed to have fulfilled its obligations with respect to the Tests on Commissioning.

17.3. Operational Acceptance

a. Operational Acceptance shall occur in respect of the STP and Sewerage Network and/or I&D Works when the Tests on Commissioning have been successfully completed.

b. The operator shall be responsible to obtain consent to operate in compliance to consent to establish from UPPCB / CPCB.

c. At any time after the successful completion of the Tests on Commissioning, the Operator may give a notice to the Owner requesting the issue of an Operational Acceptance Certificate in respect of the STP and Sewerage Network and/or I&D Works.

d. The Owner shall, after consultation with the Owner, and no later than 7 days after receipt of the Operator's notice, issue an Operational Acceptance Certificate.

e. If within 7 days after receipt of the Operator's notice, the Owner fails to issue the Operational Acceptance Certificate or fails to inform the Operator in writing of the justifiable reasons why the Owner has not issued the Operational Acceptance Certificate, the STP and Sewerage Network and/or I&D Works shall be deemed to have been accepted as of the date of the Operator's said notice.

ARTICLE 18. REPORTING DURING THE DESIGN-BUILD PERIOD

18.1. Design-Build Progress Reports

a. The Operator shall prepare monthly progress reports of the Design-Build Services during the Design-Build Period and submit six copies of the reports to the Design-Build-Operations Engineer. The first report shall cover the period up to the end of the calendar month after that in which the Design-Build Starting Date occurred and reports shall be submitted monthly thereafter, each no later than 14 days after the last day of the month to which it applies.

b. The Design-Build Services monthly reports shall include the following information:

1. photographs and detailed descriptions of progress, including each stage of design, procurement, manufacture, delivery to the STP and Sewerage Network and/or I&D Works site, construction, laying, erection, testing and commissioning;

2. charts showing the status of Design-Build Documents, purchase orders, manufacture and construction;

3. for the manufacture of each main item, equipment, machinery, floor or component of the STP and Sewerage Network and/or I&D Works, the name of manufacturer, manufacture location, percentage progress, and the actual or expected dates of commencement of manufacture, Operator's inspections, tests and delivery relating thereto;

4. detailed records of the Operator's Personnel and Operator's Equipment (Design- Build) on the STP site, Sewerage Network and/or I&D Works and the actual usage of the Operator's Equipment (Design- Build) during the reporting period and the tasks performed by the Operator's Personnel;

5. copies of quality assurance documents, test results and certificates of the Plant and Equipment;

6. all monitoring results;

7. the Environmental, Social, Health and Safety (ESHS) metrics set out in Appendix 1 of Schedule 2 (Design Build Services) Part 3";

8. percentage completion achieved compared with the planned percentage completion for each activity; and

9. Where any activity is behind in the scheduled completion, comments and likely consequences and a description of the corrective action being taken.

"The Contractor shall provide immediate notification to the Engineer of incidents in the following categories. Full details of such incidents shall be provided to the Engineer within the timeframe agreed with the Engineer.

(a) confirmed or likely violation of any law or international agreement;

(b) any fatality or serious (lost time) injury;

(c) significant adverse effects or damage to private property (e.g. vehicle accident, damage from fly rock, working beyond the boundary)

(d) major pollution of drinking water aquifer or damage or destruction of rare or endangered habitat (including protected areas) or species; or

(e) any allegation of sexual harassment or sexual misbehavior, child abuse, defilement, or other violations involving children.

18.2. Replacement of Key Staff to be deployed by the Operator during the Design build period.

If replacement of any Key Staff during design & build services period becomes necessary, the Operator shall submit a proposal for Owner's approval, advising therein the name of the replacement staff of equivalent or higher qualifications duly supported by his CV.

The overlap period of the new key staff and the staff to be replaced shall be minimum of one month.

Appendix 1

Environmental Management Plan (EMP) and Environmental, Social, Health and Safety Management Implementation Plan (ESHS-MSIP)

Part 1: Environmental Management Plan

Please include EMP chapter of ESMP Report (without cost details of the EMP) here

Part 2: Environmental, Social, Health and Safety Management Implementation Plan (ESHS-MSIP)

The operator shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key Environmental, Social, Health and Safety (ESHS) risks, specific to the detailed design of the contract.

The plan should integrate environmental protection, occupational and community health and safety, gender, equality, child protection, vulnerable people (including those with disabilities), gender-based violence (GBV), HIV/AIDS awareness and prevention and specific to the activities involved in the execution of the Works. The plan should also include mechanisms for monitoring, continuously improving processes and activities and for reporting on the compliance with the policy.

As a minimum, the plan should, include:

1. *traffic management plan to ensure safety of local communities from construction traffic];*
2. *water resource protection plan to prevent contamination of drinking water];*
3. *boundary marking and protection strategy for mobilization and construction to prevent offsite adverse impacts];*
4. *strategy for obtaining Consents/Permits prior to the start of relevant works such as opening a quarry or borrow pit].*
5. *apply good international industry practice to protect and conserve the natural environment and to minimize unavoidable impacts;*
6. *provide and maintain a healthy and safe work environment and safe systems of work;*
7. *protect the health and safety of local communities and users, with particular concern for those who are disabled, elderly, or otherwise vulnerable;*
8. *ensure that terms of employment and working conditions of all workers engaged in the Works meet the requirements of the ILO labour conventions to which the host country is a signatory;*
9. *be intolerant of, and enforce disciplinary measures for illegal activities. To be intolerant of, and enforce disciplinary measures for GBV, child sacrifice, child defilement, and sexual harassment;*
10. *incorporate a gender perspective and provide an enabling environment where women and men have equal opportunity to participate in, and benefit from, planning and development of the*

Works;

11. *work co-operatively, including with end users of the Works, relevant authorities, contractors and local communities;*
12. *engage with and listen to affected persons and organizations and be responsive to their concerns, with special regard for vulnerable, disabled, and elderly people;*
13. *provide an environment that fosters the exchange of information, views, and ideas that is free of any fear of retaliation;*
14. *minimize the risk of HIV transmission and to mitigate the effects of HIV/AIDS associated with the execution of the Works;*

Part 3: **Environmental, Social, Health and Safety (ESHS) - Content of Progress Report**

Contents for regular reporting:

a. environmental incidents or non-compliances with contract requirements, including contamination, pollution or damage to ground or water supplies;

b. health and safety incidents, accidents, injuries and all fatalities that require treatment;

c. interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);

d. status of all permits and agreements:

   i. work permits: number required, number received, actions taken for those not received;

   ii. status of permits and consents:

   - list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);
   - list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);
   - identify major activities undertaken in each area this month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);
   - for quarries: status of relocation and compensation (completed, or details of monthly activities and current status).

e. health and safety supervision:

   i. safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;

   ii. number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);

f. worker accommodations:

   iii. number of expats housed in accommodations, number of locals;

   iv. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;

   v. actions taken to recommend/require improved conditions, or to improve conditions.

g. HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);

h. gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);

i. training:

   vi. number of new workers, number receiving induction training, dates of induction training;

   vii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;

   viii. number and dates of HIV/AIDS sensitization training, no. workers receiving training (this month and in the past); same questions for gender sensitization, flaglady/flagman training.

j. environmental and social supervision:

   ix. environmentalist: days worked, areas inspected and numbers of inspections of each (road section, work camp, accommodations, quarries, borrow areas, spoil areas, swamps, forest crossings, etc.), highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;

   x. sociologist: days worked, number of partial and full site inspections (by area: road section, work camp, accommodations, quarries, borrow areas, spoil areas, clinic, HIV/AIDS center, community centers, etc.), highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and

   xi. community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.

k. Grievances: list this month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up(Cross-reference other sections as needed):

   xii. Worker grievances;

   xiii. Community grievances

l. Traffic and vehicles/equipment:

   xiv. traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;

xv. accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;

xvi. overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).

m. Environmental mitigations and issues (what has been done):

xvii. dust: number of working bowsers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/muram/spoil lorries with covers, actions taken for uncovered vehicles;

xviii. erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;

xix. quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken this month at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;

xx. blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);

xxi. spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination;

xxii. waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;

xxiii. details of tree plantings and other mitigations required undertaken this month;

xxiv. details of water and swamp protection mitigations required undertaken this month.

n. compliance:

xxv. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;

xxvi. compliance status of ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance

xxvii. other unresolved issues from previous months related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.

Schedule 3

Operation and Maintenance Services Schedule

TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.

ARTICLE 1. Introduction

The Operator shall ensure the Operation and Maintenance of the STP, Sewerage Network and/or I&D Works, Pumping Stations and other allied works in compliance to the guidelines contained in the Manual on "Sewerage & Sewage Treatment", latest edition as published by the Central Public Health Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India, New Delhi and the prescription laid down hereunder.

ARTICLE 2. Scope of Work

For STP

2.1. Operate the STP, for a period of 15 years as specified below:

2.1.1. General Scope

a. The Operator shall operate and maintain the STP under the Contract complete including the road works, landscaping, civil/structural, mechanical components, instrumentation system, Electrical System, all utility and ancillary buildings for the period of ten (10) years from the date of successful completion of "Tests after Completion of the Works".

b. The Operator shall make his own arrangements at his own cost for Works operation personnel, lubricants, diesel, spares, tools and tackles, routine maintenance, screenings collection, desilted material collection, transportation and disposal, co-ordination with respective pollution control board, agency supplying power to the STP, and any other activity required for the operation and maintenance of the constructed Works in full compliance with all applicable rules, regulations, laws, codes, effluent quality requirements and any other limitations.

c. Carrying out continuous flow measurements and recording of treated & untreated sewage at outlet and inlet of STP, regular calibration, cleaning, maintenance and replacement when required of measuring devices;

d. Collecting samples of influent and effluent and analyzing & testing them on a daily basis (inhouse) and getting tests done at weekly basis from *[The EA should specify here the independent laboratory like the one under the control of State PCB, etc.]* to determine the quality of sewage and performance of the treatment plant. Minimum 3 grab samples representative of different flow conditions (quantum and quality wise) in the day of the treated effluent shall be drawn every week jointly by the Owner and the Operator and the results of the test report shall be binding on both the parties.;

e. Take all necessary measures to minimize the power consumption in carrying out its operations.

f. operate electrical equipment during power failures by making appropriate alternative arrangements,

g. Store or dispose: (i) the Residual Matter obtained after the processing and treatment of the Sewage such as sludge, grit, waste screens etc.; and (ii) the Residual Treated Water obtained from treatment of Sewage in a manner which is compliant to all applicable environmental laws and rules;

h. The Operator shall submit a weekly report to the Owner detailing the Operation and Maintenance indicating the labour hours expended, Electrical Power Consumed and other Consumables consumed and also problems faced and rectified.

i. The Operator shall submit detailed schedule/manual of all O& M activities with references of equipment manufacturers' maintenance schedules/manuals to the Owner for review and approval.

j. The Operator shall submit Guidelines and Instructions manual for the maintenance staff of all levels for all the tools, plants and equipment and Operating STP to maintain the service levels within the standards prescribed within the contract;

k. The Operator shall carry out all O&M activities as per the approved Operation and Maintenance Manuals.

l. During the Operation and Maintenance period, the Operator shall ensure that the sewage detention time in wet well not exceeds 30 min. and there is no backflow of sewage.

m. The Operator's responsibility shall also include the safety and security of the Works during the course of Operation and Maintenance.

n. Acquire and maintain sufficient stock of consumables such as chemicals, algal nutrients, safety gear, grit screens etc. and procure necessary electrical and mechanical equipment required for operations and maintenance of STP to ensure continuous operations.

o. Establish a Project office to manage the Project. The Project office can be located at the sewage treatment plant campus or at any other appropriate location where land is made available by the Owner.

p. All Project sites shall be well secured and kept in a clean and hygienic condition with sufficient measures for safety and security of man-power, built structures, equipment and other system components.

q. During Operation and Maintenance period, the Operator shall appoint an Operator and Electrical/Mechanical Technician. In addition, the Operator shall appoint suitable

number of operators, drivers, cleaners, fitters, electricians, helpers, gardeners, office peons, security guards, labourers as required for the operation and maintenance of complete proposed STP for three shifts and adequate other staff / supporting personnel during general Shift. Security of man-power, built structures, equipment and other system components

2.1.2. General Scope

a. To Operate and maintain the sewage treatment plant, all instruments and mechanical, electrical equipment in accordance with the aim and purpose of treatment. The plant & equipment covered under the above contract will be totally attended to, by the Operator including any "Troubleshooting" to ensure smooth and trouble free operation.

b. The Operator will monitor the performance of the sewage treatment plant; conduct the analysis of the inlet sewage and water quality after treatment. Operator shall initiate and take adequate actions to ensure smooth and satisfactory performance / running of the plants on a 24 hours / round the clock basis.

c. The Operator shall prepare and implement an effective plant maintenance programme in consultation with the Owner. It is an absolutely operator's responsibility to look after all sorts of maintenance whether preventive, Minor, Major, or break-down

d. The Operator will determine operating parameters, select settling (Chemical doses etc.) and generally optimize the process, and working of the treatment plant. Excessive chemical dozing i.e. dose more than normal should be avoided otherwise penalty shall be levied and recovered from the Operator.

e. The Operator should plan & procure all spares, Polyelectrolyte and all consumables including chemicals, grease, lubricating oil, cleaning agents, laboratory reagents etc. Further the Operator will plan about the requirement well in advance (At least 4 months) and procure the material from the market.

f. The Operator will be responsible for keeping up-to-date record of documents including History Card for equipment and maintaining every day log book relating to various analysis performed.

g. The Operator shall maintain and update logbook, in which details of operational parameters are recorded in every shift and at regular interval say hourly or as decided mutually.

h. The Operator will prepare and submit a daily report of plant performance and will assist the Owner in preparing the necessary documents for their purpose and records.

i. The Operator will be responsible to carry out day to day periodic maintenance, necessary to ensure to smooth and efficient performance / running of all equipment / instruments comprising the sewage treatment plant and maintaining the record of the same.

j. The Operator shall have to issue identity cards with photographs to all the staff employed for Operation and Maintenance. The list of the same shall be submitted to the Owner mentioning qualification & experience.

k. The Operator will also be responsible to carry out day to day Maintenance of the rising main inside the STP premises.

l. The Operator will employ minimum staff for operation and maintenance of the Plant as per the list mentioned in the detailed scope of work.

m. The above staff shall be distributed in three shifts as per mutual agreement between Operator and Owner As per agreement the number of staff in each shift should always remain present otherwise penalty towards absence of any staff shall be recovered from the Operator as per Volume-I GCC . The Operator shall make the arrangement of reliever for weekly off/holiday etc. Absence on any ground like weekly off or holiday shall not be considered. The presence of staff in each shift should be marked in muster to be maintained at office of shift in charge at Sewage Treatment Plant that shall be considered as final. The Operator's staff must mark their presence in this muster. The Operator may maintain a separate register for his own purpose.

n. The staff of Operator will always remain in contact with the Junior Engineer, Assistance Engineer/Electrical Supervisor, in charge of the Plant deployed by the Owner and follow their instruction.

o. Unsatisfactory and inefficient running of the plant and unnecessary and excessive usage of spare, consumable, etc. supported by the reasons which are under control of Operator will be highly objected. In such cases Engineer-in-charge's decision will be final and binding to the Operator.

p. It is required that at least once in every one month a technical expert other than the Monthly Staff of the Operator will visit the plant and will suggest if required, to improve the efficiency and working of the plant etc. No separate payment will be made for such visits. The visit must be recorded and outcome of the visit/minutes of the meeting should be got signed by Owner authorities without which the visit shall not be considered.

q. Operator will comply with all safety rules and regulations as followed by the Owner.

r. The Owner will not be responsible for any accident /injury to the staff of the Operator. Further the Owner will not provide any insurance or medical facility to the staff of Operator. The responsibility lies with the Operator.

s. All Central/State Government / Semi-Government / Local Body's Rules and Regulations pertaining to this contract shall be followed and observed by the Operator without any extra cost to the Owner.

t. No accommodation / guesthouse / transportation facility will be provided by the to the Operator. Operation & maintenance staff will not be allowed any accommodation facility inside the plant premises.

u. The duration of the O&M shall be 120 months from the date of successful commissioning of the STP. The same can be extended for the further period if the Owner so desires. The Operator should employ all the staff within two days of successful commissioning. The Operator will provide the necessary tools and tackles required for day-to-day maintenance.

v. The scope of work also includes cleaning of complete plant area including floor, toilet block railing, door, windows, light fixtures and ceiling etc. The entire premises of the plant area shall also be cleaned and maintain by the Operator regularly.

w. This work is inclusive of but not limited to operation, maintenance, housekeeping, cleaning, removing sludge by its own carrier arrangement & disposes it off as per Owner's instructions. Preparing data recording, correspondence work to Owner and Government Departments, etc. All this work should be done as per standard practices and by following labour, factory, electrical, STATE PCB, and all other latest updated regulations, Indian standards etc. as applied of Local, State and Central Government of India.

x. The Operator will not employ persons who are , pronounced guilty or charged with indiscipline.

y. Right is reserved by Owner of suspension, dismiss ion, termination of any officer / staff employed by Operator. He shall have taken prior permission to employ or to terminate his personals.

z. No watch and ward, safety insurance, security, storage, housing accommodation etc. will be provided by Owner. This will be responsibility of Operator.

aa. Consumable items like rubber bush, graphite packing, rubber sheet, nut-bolts, material required for cleaning and housekeeping etc. are to be brought by the Operator.

bb. Monitoring should be done as per guideline given by Engineer-in-charge. Operator has to maintain all the parameter of effluent within stipulated limit or he will be penalized for not maintaining the parameters given by STATE PCB and Owner. All expenditure incurred for the same like, suite fee, court fee, case fee, or

the penalty as decided by Engineer of Owner and penalty charged by STATE PCB will be charged to Operator and deducted from his bills, S.D etc.

cc. Operator shall have to test the effluent / influent at his own cost at the plant lab on daily basis. The same be verified by and checked by Owner whenever required. The Operator shall also have to test the effluent / influent at STATE PCB lab for different parameter on weekly basis at his own cost.

dd. No equipment shall remain ideal or un-attended or damaged for the period of 3 days..

ee. The payment of O & M charges will be made as per the tender conditions. The other terms and condition described in these complete tender documents, wherever applicable shall remain unchanged. In case of any discrepancy the decision of Engineer-In-Charge will remain final & binding on the Operator.

ff. During Operation & Maintenance period, Operator has to supply all the spares, at his cost during preventive, major-minor breakdown, replacement and maintenance work. No extra payment will be made for such maintenance on any ground. The payment for the same will be made strictly as per tender document irrespective of the number of break down / minor, major repairs replacements. During the O & M Operator will have to enter annual maintenance agreement with Manufacturers of all major Mechanical Equipments like Centrifuge, Air Blowers, Screens, Decanters etc.

gg. Operator will have to maintain required Power Factor as per STATE EB rules and regulations. In case penalty is levied by STATE EB for not maintaining the Power Factor the same will be recovered from the. Operator

hh. Maintenance of Garden, Lawns, Plants, Bushes, Plantation of new Plants, Lawns etc. and feeding, gardening, cleaning etc. is in the scope of the Operator. No separate payment will be made for the same.

ii. The Operator during his O&M period will have to follow all the guidelines set by STATE PCB for Operation & Maintenance of STP.

jj. Operation and maintenance of all General facilities and utility services including all other components of work done under this contract.

kk. Operation and maintenance of PLC based automation system and all instruments installed in the STP including all repairs, replacements towards the entire instrumentation works during the O & M period shall be in the scope of Operator.

ll. Any other services required for smooth running of the scheme.

mm. The Operator shall also dispose off the sludge, screenings, grit and any other material, as per specifications and to the satisfaction of the Engineer-in-Charge. It

is to be noted that all costs during the O&M period, excluding the cost of power and chlorine are to be borne by the Operator. The Operator is to ensure that the following guarantees are maintained during the operation & maintenance period:

i. for quality of treated effluent

ii. for consumption of chemicals

iii. for automation

nn. The Operator shall provide on job training to the Local body staff as per specifications.

oo. At the end of every 2(1/2) year of operation & maintenance period, an assessment of the condition of the plant has to be done by the Owner through third party inspection at Owner's cost and based on that assessment the Operator shall, at no extra cost to the Owner, repair and re-condition all the mechanical equipment in the concluding year of the O&M contract to a condition so that they are in running condition with regular preventive and recommended maintenance as per manufacturer's recommendations or as per CPHEEO manual.

pp. Variability of through output: If the quantity of treated sewage from the Facility can be increased in the existing system without impacting the annual fixed costs to the Operator, the Operator shall comply with such requirements. For a sustained requirement of higher throughout from the Facility, the Operator may be required to frame and submit a proposal that shall be implemented if mutually acceptable.

2.1.3. Treated Sludge Disposal

The Operator shall operate the Sewage Treatment Plant such that the sludge produced is of a spreadable consistency and the volume of sludge produced after necessary process is minimum. The sludge generated from the STP shall be disposed of through proper approved means of transport to the Compost yard site as designated by the Owner

2.1.4. Chemical Requirements

All chemicals consumed to operate the Sewage Treatment Plant and other facilities under this contract will be borne by the Operator.

2.2. Adverse Operating Condition

During which the raw sewage quality deteriorates ~~beyond the Specifications in Volume I~~, the following provisions will be applicable

a. If the raw sewage can still be treated to meet the Output Standards, the Operator shall comply with such specifications.

b. In the event it is not possible to meet the Output Standards, the Operator shall immediately inform the Owner.

c. In the event it is possible to meet the Output Standards, but an increase in fixed and variable costs is unavoidable, the Operator shall, as soon as practically possible, inform the Owner.

2.2.1. Alternate Output Standards;

The treated effluent output BOD, shall be maximum 7% of the influent BOD, the maximum period of adverse condition is 30 days.

2.3. Output and Operational Guarantees

The Operator is fully responsible for treating all the Sewage reaching the Receiving chamber. The performance of the Operator shall be treated as unsatisfactory if he fails to treat the complete sewage or does not maintain the guarantees listed in this clause excepting in force majeure condition or fails to fulfill other conditions of the contract.

2.4. Treated Effluent Quality

The Operator shall operate the Sewage Treatment Plant in such a way that the treated effluent quality attains the following parameters:-

S. No	Parameters	Parameters Limit (Standards)	Location
1	pH	6.5 – 9.0	Anywhere in the Country
2	BOD (mg/l)	Not more than 20	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, and Union Territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli, Daman & Diu and Lakshadweep
	BOD (mg/l)	Not more than 30	Areas/regions other than mentioned above
3	TSS (mg/l)	Not more than 50	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, and Union Territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli, Daman & Diu and Lakshadweep

	TSS (mg/l)	Not more than 100	Areas/regions other than mentioned above
4	Fecal Coliform (MPN/100ml)	Less than 1000	Anywhere in the country

*Metro cities are Delhi, Mumbai, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune

2.4.1 Treated Sludge Disposal

The Operator shall operate the Sewage Treatment Plant such that the sludge produced is of a spreadable consistency and the volume of sludge produced after necessary process, is minimum. The sludge generated from the STP shall be disposed off through proper approved means of transport to the place / yard site as Designated by the Owner

2.4.2 Undertaking capacity building measures:

Conduct a training and handholding assistance programme for six months in aspects of Operation and Maintenance of the Sewage Treatment Plant for maximum fifteen employees of the ULB.

2.5 Tests to be undertaken during the operations period:

The Operator should get analyzed / checked the untreated as well as treated sewage samples every week from respective pollution control authority/ Laboratory specified by Owner for parameters mentioned in Section 2.4. The necessary testing charges are to be borne by the Operator.

The parameters shall also be tested daily inhouse by the operator.

2.6. Staff:

The qualification and experience of the personnel required for O & M are specified below. However, the Operator shall mention the personnel proposed for O&M in his bid.

S. No.	Key Staff	Nos. Required	Minimum Qualifications
1.	Manager	1	Degree in Civil Engineering / Mechanical Engineering with minimum 5 years' experience in Operating &

S. No.	Key Staff	Nos. Required	Minimum Qualifications
			Maintaining a sewage treatment plant
2.	Shift Engineer	1	B. Tech in Civil / Mechanical Engineering with 2 years' experience or Diploma in Civil/Mechanical Engineering with 5 years' experience in managing STPs
3.	STP Operators	2	Diploma in Civil / Mechanical. Engineering with 2 years' experience in Operating STPs
4.	Electro – mechanical engineer	1	(Degree in Mechanical /Electrical Engineering with minimum 1 years' experience in Operating /Maintaining STP)
5.	Plumbers / fitters	1	Experience in laying / maintaining and operating TP and related electromechanical works for afor a minimum of 1 year.
6.			
7.			
8.			
9.	Helpers	2	-
10.	Security and Housekeeping	3	-

The work shall be carried out on a 24 hr. basis, without intermission and the staff deployed by the Operator shall be in accordance with this contract.

a. The Operator shall give or provide all necessary superintendence during the O&M and as long thereafter as the Owner may consider necessary. Such superintendence shall be given by a competent person having adequate knowledge of the operation and Maintenance to be carried out (including the methods and techniques required),

the hazards likely to be encountered and methods of preventing accident) as may be required for the satisfactory working of the entire plant.

b. No labor below the age to 18 years shall be employed on the work. List of staff is to be given by the agency to the Owner and advance intimation to be given before deputing/removing any staff from site during the period of contract. Not more than one of the Operator's key staff shall be absent from the Project site at any given time. In case it is necessary for more than one of the key personnel to be absent at a given time, the Operator shall provide replacement of equivalent or better qualifications. The CVs of such key staff replacements shall be got approved from Owner in advance.

c. Owner shall be authorized to direct the contracting agency to remove any or all staff employed on O&M of the STP if in his opinion continued presence of such staff is detrimental to safety or proper O&M of the STP. The Operator shall comply with such directions & post suitable substitute(s) thereof. Whenever the Engineer has to inform the Operator in writing that any person on the work is in his opinion unsatisfactory or/incompetent or unfaithful or dishonest, untruthful or disorderly or to be otherwise unsuitable/such person shall be discharged by the Operator from the work and shall not be employed again on it.

2.7. Reporting and Record Keeping:

a. Maintain a periodical reporting system to provide access and retrieval of Sewage Treatment Plant operating data including all such information which is necessary to verify costs and expenses incurred and otherwise to confirm that the Operator is in compliance with its obligations under the terms and conditions of this Contract;

b. The Operator will prepare daily and monthly reports (in Owner format) of pumping/treatment and project performance and submit to the Engineer-in-Charge and will assist the department in preparing the necessary documents for their purpose and record as per proforma given from time to time. The reports shall contain, inter-alia, the following:

c. Raw Sewage quantity and quality and effluent quality as per the on-line monitoring programme and other tests as specified in Clause 3.0 of this section and print outs of online monitoring shall be submitted to Engineer-in charge.

d. A description of the maintenance work carried out in the reporting period.

e. A report on major failures, if any, their causes and remedial actions taken.

f. Sludge quality and quantity (daily basis) in the reporting period.

g. Power and chemicals consumed in the reporting period.

h. An inventory of the chemicals and spare parts available at the end of the reporting period.

i. O&M staff deployed by the Operator during the reporting period. Any major repair works, if any.

a. Operator shall maintain separate register/computerized records at all sites of following information:

1. Pumping register
2. Quantity of sewage treatment and performance register D
3. Working hours register
4. Electric break down register
5. Maintenance register
6. Staff attendance register
7. Equipment breakdown, repair record and extent of repair
8. Chlorination equipment and chlorine toner operating and using register

b. The Operator shall maintain a record for the entire Term of the following:

1. status or progress report of the operation and maintenance of each of the Sewage Treatment Plant components;
2. record of all consumables, tools, equipment's manhole covers, etc. used / replaced towards operations and maintenance of the STP;
3. report certifying that the quality and quantity of the Residual Treated Water at the Discharge Point;
4. daily readings of the meters at the Receipt Point;
5. daily readings of the meters at the Discharge Point;
6. methods of disposal used for Residual Matter; and
7. Nature and scope of any ancillary activities being carried out in accordance with the terms and conditions of this Contract.
8. Provide reports on accidents in respect of the Sewage Treatment Plant, if any
9. Daily readings of the meters at the inlet of the STP;
10. Nature and scope of any ancillary activities being carried out in accordance with the terms and conditions of this Contract; and
11. Provide reports on accidents in respect of the Sewage Treatment Plant, if any.

c. The Operator shall provide an accurate, complete and up-to-date record, report or document in relation to any aspect of modernization, expansion, operation, maintenance and management of the Sewage Treatment Plant to Owner as and when a request is made as soon as reasonably practicable and in any event within any time limit prescribed by Owner for the production of such record, report or other document.

d. Provide a copy to Owner of its annual audited accounts of expenditure by the Operator in the implementation of the Project as at the end of and for that accounting period.

e. Report to Owner regarding any litigation or material claims, disputes or actions, threatened or filed, concerning the Sewage Treatment Plant or the obligations to be performed by the Operator under this Contract;

f. Report to Owner any refusal or threatened refusal to grant, renew or extend or any action pending or threatened that might affect the granting, renewal or extension of any Applicable Approval;

g. Report to Owner any material information concerning new or significant aspects of the operations, maintenance and management of the Sewage Treatment Plant, any material complaint about the Sewage Treatment Plant from any person or any other information received by the Operator which is material to the Operation and Maintenance of the Sewage Treatment Plant

h. Hourly record of Flow as measured / recorded through the Notch / Weir / Flow meter:

Date/ Time	**Head Over The Notch / Weir / Meter**	**Rate Of Flow**	**Average Rate Of Flow In Past Hour**	**Flow Quantity**

2.8. SAFETY/SECURITY

The Operator shall take all safety precautions under various Acts/Rules under central/State Govt. from time to time and he shall be responsible for safety of its staff and the consequences thereof. The Operator shall deploy round the clock security personnel

at entrance of plant's premises and in the compound for the safety of the plant and premises for the safety of the plant, equipment and personnel during this period.

2.8.1. Responsibility for damages

a. The care of the whole of the permanent works shall remain with the Operator who shall be responsible for all accidents or damages from whatever cause arising and chargeable for anything that may be stolen, removed destroyed or damaged to whomsoever belonging and also for making good all defects and damages to the said works or to any property adjoining or any cause whatever, whether such damage or defects were occasioned by the negligence of the Operator or not or may be or might have been discovered during the progress to be known after the completion whereof or whether payment may wholly or partially have been made or the works approved as supposed to have been properly done and no certificate of approval of any works by any officers or members of the Board shall affect or prejudice the right of the STATE PCB against the Operator or be considered or held as at all conclusive as to the sufficiency of any work materials.

b. Adequate safety precautions against fire, flooding, lightening, electrical shocks, accident due to moving/non-moving heavy/light equipments shall be strictly observed by the Operator at his own cost. Suitable safety measures like gumboots, gloves, safety belts, ladders, safety lamps, gas masks, Oxygen apparatus, insulated tools, alarms etc. shall be provided by the Operator. Necessary medical first aid kit shall be made available all the time. In absence of observance of above safety precautions, the Operator shall be responsible for any unforeseen loss of the equipments or persons dealing with it. Special care shall be taken by the Operator while carrying out the work in sewage gas zone. Any incidence of human life or accident will be totally Operator's responsibility.

c. The Operator shall ensure that the staff employed takes all necessary precautions while carrying out the work either in shift duties or any general shift as per Indian Electricity Rules/Factory Act/CPHEEO Manual, or manufacturer's special instruction for safety / gas handling. The staff should use Gas masks, Oxygen apparatus, Gum Boots, Safety Belts and Safety Lamps, etc. while carrying out the work in Bar Screens, sumps etc.

d. The Operator will make arrangement for all necessary safety equipments for persons working at STP as per Factory Act/Safety Rules. In the event of any accident on or off site, in which the Operator or his personnel are involved, in which an injury occurs to any person whether directly concerned with the project or a third party, the Operator shall inform Owner within 24 hrs. of the occurrence of the event. The plant

will be open to local/state/central agencies for verification of safety/emission/acts compliance.

e. During night hours, the main gate should be locked. However, shift duty staff should be alert and open the gate during surprise checking of Owner staff or any other Government Authorities or his nominee without any wait. Only bona-fide persons be allowed in the plant premises being a prohibited area. Smoking and drinking are prohibited in the plant. The staff engaged shall wear common uniform with name plate indicating name and designation during duty hours.

2.9. Operation and maintenance manual

a. The Operator shall prepare a detailed program (referred to as O&M Manual) covering the operation and maintenance of the treatment plants as a whole. This program shall include the work and activities described in this Chapter, as relevant to the specific items and technology.

b. The Operator shall provide 6 copies of draft O&M Manual to the Owner, at the time of the commissioning of the Project and on approval of draft, 10 copies of operation &maintenance manual shall be supplied by the Operator.

c. The O&M Manual shall include the daily, weekly, monthly, quarterly, half yearly and annual checks and remedies if necessary to be performed for effective operation of the plant, elaborate detail, all operating and maintenance procedures and policies which are required, advisable and / or necessary for the Facility to achieve full compliance with the operational guarantees and to achieve maintenance and repair standard for the Facility which will ensure compliance with the maintenance specifications. The O&M manual shall include interalia full explanation of all plant procedures and processes.

d. Without limiting the generality of the foregoing the O&M Manual shall include descriptions, procedures and shall comply with the requirements, set forth in the provisions of the Bid Documents.

e. The draft of the O&M Manual shall be subject to the review and approval of Owner, which shall have the right to make any changes and revisions to the O&M Manual as it may deem appropriate. The Operator shall revise such draft O&M Manual prior to the commencement of the O&M period.

f. At the end of the construction period, the Operator shall revise the draft O&M Manual to reflect any updates, changes or revisions it deems appropriate, inter-alia based on its experience and as necessary to reflect any modifications or adjustments to the plant. Without limiting the above, the Operator shall annually fully review, revise, update and modify the draft O&M Manual as may be necessary or

appropriate. Any revision to the draft O&M Manual shall be subject to the review and approval of Owner.

g. Owner shall have the right to require revisions to the draft O&M Manual as it may deem appropriate. The Operator shall prepare and submit to Owner, for its review and approval, 30 days prior to the proposed date of commencement of O&M, a revised draft O&M Manual which reflects all changes, revisions and modifications. The Operator shall prepare the O&M Manual, as approved by the Owner, prior to the start of O&M.

h. During the term of this Agreement, the Operator shall promptly notify Owner of any revisions, additions or modifications which he, in his professional opinion, believes should be made to the O&M Manual, whether as a result of additional experience in operating and maintaining the Facility, changes in influent quality or volume, changes or modifications to any equipment part, component or structure incorporated in the Facility.

i. Such notification shall set forth the reason for the proposed revision. Any proposed revision shall be subject to the approval of the Owner. In addition, during the term of this Agreement, Owner shall have the right to require relevant changes, revisions, or additions to the O&M Manual as it, shall deem appropriate to ensure full compliance with the O&M Standards.

j. The Operator shall submit 10 copies of the final O & M manual along with a soft copy in Microsoft Word Format.

2.10. Technical Audit

a. The Owner has the right to conduct a technical audit of the Facility and to perform any analysis or inspection he deems necessary. The Operator shall at his cost provide all assistance the Owner required to complete these inspections. Such audits may cover all or any of the obligations of the Operator, including without limitation,

a. Verification of the system capacity and save for normal wear and tear during the O&M Period

b. Verification of the performance standards and useful life of the individual assets of the Facility, save for normal wear and tear during the O&M Period

c. Verification of the capacity of the Facility to meet Output Standards during the residual life of the Facility and save for normal deterioration expected during such residual life

d. Sampling, testing and verification of the Output Standards for treated sewage, sewage losses

2.11. Facility Visits

a. At any time or at the end of each twelve month period, or at the initiative of the STATE PCB, a visit shall be organized so that both parties can check the condition of the installations at the facility.

b. A report shall be drawn up to record the opinions of the both parties. The STATE PCB reserves the right to call the equipment manufacturers or specialized technicians for these visits. All expenses are to be borne by the Operator for the purpose.

2.12. Maintenance schedules

a. The Operator shall prepare and follow a Maintenance plan, detailing the maintenance activities scheduled for each of the component of the STP on a periodic approved by Design-Build-Operations Engineer and / or the Owner.

b. Every part of the works and all the materials to be used therein shall be subjected to such tests from time to time during the execution of the work as the Owner may direct and the whole of such tests shall in all cases be made at the Operator's sole expense.

c. The work shall be carried on and completed under the exclusive control direction and supervision and to the satisfaction of the Owner. The Owner shall likewise have full power to reject or condemn any work or material that he may deem unsuitable. In case of any work or material being rejected by the Engineer in-charge, the Operator shall immediately remove and replace the same to the satisfaction of the Owner or the Owner shall have full powers to get the same removed and replaced and deduct the expenditure incurred in the process from any amount due or that may become due to the Operator.

d. The Operator shall use only the original and genuine spares of the original equipment as per recommendations given in the maintenance booklet of the manufactures/as per directions of the Owner. Adequate stock of such spares is to be maintained by the Operator. Test certificate of manufacturer is required for bearings along with supplies. Test certificate of all major equipment will be submitted from the manufacturer.

e. The Operator shall also be responsible to maintain cleanliness in around the plant including machineries, disposal of floating removed from the Bar Screens/reactors, etc. Grit and other unwanted material.

f. If any material brought to the site of works, be in the judgment of the Engineer, found inferior or improper & not as per described standards, the said materials or workmanship shall where required by the Owner shall be removed or amended by

the Operator forthwith or within such period for every breach by the Operator in this clause.

g. All leakages should be attended promptly to avoid any nuisance etc. Chokages should be removed at once. All the valves/gates which are not used regularly should be operated at least once a week and make sure that they are properly lubricated /greased.

h. All safety valves should be checked daily and ensure that they are working properly. In case of any fault the same should be attended immediately without any wait. The maintenance of the plant shall be as per maintenance manuals of the manufacturer for all equipment. Operator shall keep all the safety devices in working order.

i. All the steel structures and machines installed in open areas should be painted after every monsoon period after cleaning the surface as per the instructions of the Engineer- in-charge. Entire plant including all civil structures, mechanical equipment, HT panel and Transformers etc. shall be repainted after every 2(1/2) years as per original painting specifications.

j. All safety valves should be checked daily and ensure that they are working properly. In case of any fault the same should be attended immediately without any wait. The maintenance of the plant shall be as per maintenance manuals of the manufacturer for all equipment. Operator shall keep all the safety devices in working order.

k. The Operator should make sure that no unwanted material should float/grow in and around different units. In case it is found the same shall be removed /cleaned immediately. He shall also be responsible for cleaning/sweeping the plant buildings inside and outside, roads, foot path etc.

l. Launders/Weirs etc. of reactors etc. to be maintained clean round the clock. During preventive/ breakdown maintenance, the Operator has to visit the unit/units as and when needed. The pumping units or other machineries required if any shall have to be arranged by the Operator at his own costs for completing the work. In case of battery operated auto system panels and also system alarm etc., batteries are required to be maintained and replaced as and when needed by the Operator.

m. Consumables such as POL (petrol/Diesel Oil & Lubricants) etc. has to be arranged by the Operator as and when needed as per manufactures recommendations for periodical maintenance of entire Network. The Owner shall not provide such items.

n. In case of major repair due to normal wear and tear/break down, the Operator should bring the same to the notice of the Owner immediately and necessary measures for its repair should be taken simultaneously. Breakdown, all repairs of any kind are to be attended by the Operator. Any unit/equipment being irreparable in the opinion of the Owner will be replaced by the Operator at no cost to Owner.

o. The Operator shall give his telephone no., contact addresses, etc. to the Owner as well as shift duty shift to contact him during emergency/odd hours etc.

p. The Operator will be responsible to carry day to day as well as periodic maintenance, necessary to ensure smooth and efficient performance/running of all equipment instruments installed at the STP. He shall be responsible for maintenance/replacement of street light poles and light etc. also. All the plant, building land, Sewage treated/untreated/sludge, etc. shall remain the property of Owner.

2.12.1. Oil & Grease Schedule

a. Routine & preventive maintenance of electrical /Mechanical/ hydraulic/ machines & equipments is to be carried out as per the operation & maintenance manual. Minimum oil & grease requirement for one year Operation & maintenance of the Plant to be procured by the Operator well in advance

2.13. Routine, Preventive, Minor & Major maintenance of all Civil, Electrical, Mechanical, hydraulic machines & Equipment of the plant

a. The Operator should prepare schedule of daily maintenance & preventive maintenance of all the equipment & machineries operated & run by him in the premises of the plant. The schedule should be as per the guidelines mentioned in the tender &as per the O& M manual. The scope covers Routine, Preventive, Minor & Major maintenance of all major minor equipment and machines in the Plant like Submersible pumps, Coarse &Fine screens Grit Removal Mechanism, Channel gates, Decanters, Sludge pumps, Centrifuge feed pumps, Centrifuges, All dosing systems including Chlorine Dosing equipment, etc.

b. The scope also covers Routine, Preventive, Minor & Major maintenance of all the instrumentation system installed like PLC, Actuators, Flow meters level indicators etc. The Operator should also carry out Routine, Preventive, Minor & Major maintenance of all major minor electrical equipment like Electrical Panels, Switch Gears, Power Cables, Control cables, Changeover switches DG set etc. so as to ensure uninterrupted round the clock operation of the Plant.

c. The Operator should maintain all civil structures including Administrative building, Store room, Storm Drains, fencing etc. in a neat manner. He should maintain all civil structures of the plant sturdy to complete the natural/Designed lifetime.

d. The Operator should carry out the safety audit of the plant & necessary certificate from the competent authorities. This item includes all types of Routine, Preventive, Minor & Major maintenance of all Civil, Electrical, Mechanical, hydraulic machines & equipment of the plant covering supply erection test &trial run of the part/machine to be repaired/ replaced with material &labor expenses, necessary

hardware's, sundry materials, lubricant oils, power oils, grease other materials plus machining charges etc.

e. The Operator should procure all the spares required for all types of maintenances in advance. The part/equipment/machine to be repaired /replaced should be as per the Owner approved list & as per the O& M manual or as per the existing manufacturer's brand.

f. The Operator, after first notifying the UPCB shall be responsible for fulfilling all requirements associated with any release of any substance into the environment (form the facility or the site) as required by Applicable law or by any Legal Entitlement including but not limit to the notification or reporting of releases /

g. Hazardous substances or Hazardous Waste. The Operator shall prepare a memorandum evidence such notification or reporting and provide copies thereof to the Owner, along with any documents provided to the relevant regulatory agency regarding such release.

h. The Operator shall process and obtain the clearance of all such agencies as required for the purpose, including all clearances during O&M period. He shall be fully responsible to comply with all requirements of Laws including hazardous substances, emission standards for air, discharge standards for effluent oil, sub-soil pollution. The contracting agency shall not release any hazardous/toxic materials inside the premises.

2.14. Site Order Book

Site order Book shall be kept by the Engineer -in-charge at the plant site. Orders entered in this Book by the Engineer-in-Charge or his authorised representative shall be held to have been formally communicated to the Operator. The Engineer-in-Charge or his authorised representative shall sign each order as it is entered and will hand over the duplicate to the Operator or his agent, who shall sign the original in acknowledgment of having received the order

FOR SEWERAGE NETWORK AND/OR I&D WORKS AND SPS

2.15. Operate the Sewerage System, for a period of 15 years from the date of commissioning as specified below:

1. The Operator shall operate and maintain the Sewage Pumping Station (SPS), Lift Stations and Sewer networks under the Contract complete including the road

works (liability of restored portions of roads is limited to 3 years only, however the operator will not be held responsible for road restoration required on account of damage done by other agencies/ utilities), landscaping, civil/structural, mechanical components, instrumentation system, Electrical System, all utility and ancillary buildings, SPS premises area, lift station, for the period of Fifteen (15) years from the date of successful completion of "Tests after Completion of the Works".

2. The Operator shall make his own arrangements at his own cost for staff required for operation and maintenance of networks and other assets, lubricants, diesel, spares, tools and tackles, sewer cleaning vehicles and other equipment maintenance of all types such as routine, breakdown, periodic and repair maintenance, replacement of demaged/ unserviceable sewers, maintenance of house service connections after building lanes, screenings collection; desilted material collection, transportation and disposal; co-ordination with State Pollution Control Board (SPCB), State Power Supply Utilities[79] authorities and any other activity required for the operation and maintenance of the constructed Works in full compliance with all applicable rules, regulations, laws, codes, effluent quality requirements and any other limitations. The operator will also maintain a Customer grievance redressal centre and ensure that O&M services meet the standards of services/ service levels maintained as follows:

Charter of Services

SN	**Nature of complaints**	Time for rectification (in days)	
		Minimum	Maximum
1	Sewerage overflow on the road		
2	Choking at household premises		
3	Replacement of missing manhole cover		

[The EA shall fill in the details in the Table above keeping in view the Performance Standards specified in Schedule 7, default from which will attract Liquidated Damages - Operation.]

3. The operator ensures that there is a steady and uninterrupted flow of waste water/sewage to STPs.

4. Identify and inform the Owner about the illegal connections on the Sewerage Network within seven days of its being detected.

[79] *Modify for appropriate SPCBs and Power Supply Utilities*

5. The Operator shall submit a weekly report to the Owner detailing the Operation and Maintenance indicating the labour hours expended, Electrical Power Consumed and other Consumables consumed and also problems faced and rectified.
6. The Operator shall submit detailed schedule/manual of all O& M activities with references of equipment manufacturers' maintenance schedules/manuals to the Owner for review and approval.
7. The Operator shall submit Guidelines and Instructions manual for the maintenance staff of all levels for all the tools, plants and equipment and Operating Sewerage Network and/or I&D Works to maintain the service levels within the standards prescribed within the contract;
8. The Operator shall carry out all O&M activities as per the approved Operation and Maintenance Manuals.
9. If any consumer connection needs extension of sewer line during O&M period, from an existing line, the same will be designed and estimated by the operator using prevailing schedule of rates and market rates. Such costs will also include 15% towards supervision charges. The owner will collect the same and pays to the Operator for executing the same after the connection is formally approved. However, Owner will retain connection fee/ charges.
10. During the Operation and Maintenance period, the Operator shall ensure that the sewage detention time in wet well not exceeds 30 min. and there is no backflow of sewage. The operator is responsible for maintaining back up power arrangements at his cost to ensure that the O&M services are not affected due to failure of power supply from the Public Utility Company.
11. The Operator's responsibility shall also include the safety and security of the Works during the course of Operation and Maintenance.
12. During Operation and Maintenance period, the Operator shall appoint an Operator and Electrical/Mechanical Technician. In addition, the Operator shall appoint suitable number of operators, drivers, cleaners, fitters, electricians, helpers, gardeners, office peons, security guards, laborers as required for the operation and maintenance of complete proposed sewerage system for three shifts and adequate other staff / supporting personnel during general Shift. Security of man-power, built structures, equipment and other system components.

a. Undertaking capacity building measures:

Conduct a training and handholding assistance programme for six months in aspects of Operation and Maintenance of the Project Facilities for maximum fifteen employees of the ULB.

b. Staff

1. The minimum personnel required for O & M is as given below. However, the Operator shall mention the personnel required for O&M in his bid. The work shall be carried out on a 24 hour basis without intermission and the staff deployed by the Operator shall be in accordance with this contract.

[The staff requirement shown in the Table below is only indicative. The EA should review and modify the same according to the size of the network to be maintained.]

S. N.	Key Staff	Nos. Required	Minimum Qualifications
1	Manager	1	Degree in Environmental / Civil Engineering / Post Graduate in Water Supply & Sewerage Engineering Mechanical Engineering with minimum 10 years' experience in Operating & Maintaining a Sewerage Network)
2	Engineer		Degree in Environmental / Civil Engineering / Post Graduate in Water Supply & Sewerage Engineering Mechanical Engineering with minimum 5 years' experience in Operating & Maintaining a Sewerage Network)
3	Shift In charge		Diploma / B.Tech. in Civil / Mechanical. Electrical Engineering with 3 years' experience in managing Sewerage Network
4	SPS and Lift station Operators		Diploma / B.Tech. in Civil / Mechanical. Electrical Engineering with 2 years' experience in Operating SPS and Lift Stations.
5	Electro – mechanical engineer		(Degree in Mechanical /Electrical Engineering with minimum 1 years' experience in Operating /Maintaining any Sewerage Network and SPS)
6	Plumbers / fitters		Experience in laying / maintaining and operating Sewerage Networks and SPS for a minimum of 1 year.
7	Sewer cleaning works and other support staff		-
8	Security and Housekeeping	2	-

2. The Operator shall give or provide all necessary superintendence during the O&M and as long thereafter as the Owner may consider necessary. Such superintendence shall be given by a competent person having adequate knowledge of the operation and Maintenance to be carried out (including the methods and techniques required), the hazards likely to be encountered and methods of preventing accident) as may be required for the satisfactory working of the entire plant.

3. No labor below the age to 18 years shall be employed on the work. List of staff is to be given by the agency to the Owner and advance intimation to be given before deputing/removing any staff from site during the period of contract. Not more than one of the Operator's key staff shall be absent from the project site at any given time. In case it is necessary for more than one of the key personnel to be absent at a given time, the Operator shall provide replacement of equivalent or better qualifications. The CVs of such key staff replacements shall be got approved from Owner in advance.
4. Owner shall be authorized to direct the contracting agency to remove any or all staff employed on O&M of the sewerage network and/or I&D Works if in his opinion continued presence of such staff is detrimental to safety or proper O&M of the sewerage network and/or I&D Works. The Operator shall comply with such directions & post suitable substitute(s) thereof. Whenever the Engineer has to inform the Operator in writing that any person on the work is in his opinion unsatisfactory or/incompetent or unfaithful or dishonest, untruthful or disorderly or to be otherwise unsuitable/such person shall be discharged by the Operator from the work and shall not be employed again on it.

c. Reporting and Record Keeping:

1. Maintain a periodical reporting system to provide access and retrieval of Project Facilities operating data including all such information which is necessary to verify costs and expenses incurred and otherwise to confirm that the Operator is in compliance with its obligations under the terms and conditions of this Contract;
2. The Operator shall maintain a record for the entire Term of the following:
    a. status or progress report of the operation and maintenance of each of the Project Facilities;
    b. record of all consumables, tools, equipment's manhole covers, etc. used / replaced towards operations and maintenance of the Sewerage Network and/or I&D Works;
    c. Daily readings of the meters at the Sewage pumping stations;
    d. identification and reporting of illegal connections on the sewerage network;
    e. Nature and scope of any ancillary activities being carried out in accordance with the terms and conditions of this Contract; and
    f. Provide reports on accidents in respect of the Project Facilities, if any.
3. The Operator shall provide an accurate, complete and up-to-date record, report or document in relation to any aspect of modernization, expansion, operation, maintenance and management of the Project Facilities to Owner as and when a request is made as soon as reasonably practicable and in any event within any time

limit prescribed by Owner for the production of such record, report or other document.

4. Provide a copy to Owner of its annual audited accounts of expenditure by the Operator in the implementation of the Project as at the end of and for that accounting period.
5. Report to Owner regarding any litigation or material claims, disputes or actions, threatened or filed, concerning the Project Facilities or the obligations to be performed by the Operator under this Contract;
6. Report to Owner any refusal or threatened refusal to grant, renew or extend or any action pending or threatened that might affect the granting, renewal or extension of any Applicable Approval;
7. Report to Owner any material information concerning new or significant aspects of the operations, maintenance and management of the Project Facilities, any material complaint about the Project Facilities from any person or any other information received by the Operator which is material to the Operation and Maintenance of the Project Facilities

a. Operation and maintenance manual

1. The Operator shall prepare a detailed program (referred to as O&M Manual) covering the operation and maintenance of the Sewerage Network and/or I&D Works as a whole. This program shall include the work and activities described in this Chapter, as relevant to the specific items and technology.
2. The Operator shall provide 6 copies of draft O&M Manual to the Owner, at the time of the commissioning of the project and on approval of draft, 10 copies of operation &maintenance manual shall be supplied by the Operator.
3. The O&M Manual shall include the daily, weekly, monthly, quarterly, half yearly and annual checks and remedies if necessary to be performed for effective operation of the plant, elaborate detail, all operating and maintenance procedures and policies which are required, advisable and / or necessary for the Facility to achieve full compliance with the operational guarantees and to achieve maintenance and repair standard for the Facility which will ensure compliance with the maintenance specifications. The O&M manual shall include interalia full explanation of all plant procedures and processes.
4. Without limiting the generality of the foregoing the O&M Manual shall include descriptions, procedures; schedule of maintenance, and shall comply with the requirements, set forth in the provisions of the Bid Documents.
5. The draft of the O&M Manual shall be subject to the review and approval of Owner, which shall have the right to make any changes and revisions to the O&M Manual as

it may deem appropriate. The Operator shall revise such draft O&M Manual prior to the commencement of the O&M period.

6. At the end of the construction period, the Operator shall revise the draft O&M Manual to reflect any updates, changes or revisions it deems appropriate, inter-alia based on its experience and as necessary to reflect any modifications or adjustments to the plant. Without limiting the above, the Operator shall annually fully review, revise, update and modify the draft O&M Manual as may be necessary or appropriate. Any revision to the draft O&M Manual shall be subject to the review and approval of Owner.
7. Owner shall have the right to require revisions to the draft O&M Manual as it may deem appropriate. The Operator shall prepare and submit to Owner, for its review and approval, 30 days prior to the proposed date of commencement of O&M, a revised draft O&M Manual which reflects all changes, revisions and modifications. The Operator shall prepare the O&M Manual, as approved by the Owner, prior to the start of O&M.
8. During the term of this Agreement, the Operator shall promptly notify Owner of any revisions, additions or modifications which he, in his professional opinion, believes should be made to the O&M Manual, whether as a result of additional experience in operating and maintaining the Facility, changes in influent quality or volume, changes or modifications to any equipment part, component or structure incorporated in the Facility.
9. Such notification shall set forth the reason for the proposed revision. Any proposed revision shall be subject to the approval of the Owner. In addition, during the term of this Agreement, Owner shall have the right to require relevant changes, revisions, or additions to the O&M Manual as it, shall deem appropriate to ensure full compliance with the O&M Standards.
10. The Operator shall submit 10 copies of the final O & M manual along with a soft copy in Microsoft Word Format.

b. Maintenance schedules

1. The Operator shall prepare and follow a Maintenance plan, detailing the maintenance activities scheduled for each of the component of the Sewerage Network and/or I&D Works on a periodic approved by Design Build Operations Engineer and / or the Owner.
2. Every part of the works and all the materials to be used therein shall be subjected to such tests from time to time during the execution of the work as the Owner may direct and the whole of such tests shall in all cases be made at the Operator's sole expense.

3. The work shall be carried on and completed under the exclusive control direction and supervision and to the satisfaction of the Owner. The Owner shall likewise have full power to reject or condemn any work or material that he may deem unsuitable. In case of any work or material being rejected by the Engineer in-charge, the Operator shall immediately remove and replace the same to the satisfaction of the Owner or the Owner shall have full powers to get the same removed and replaced and deduct the expenditure incurred in the process from any amount due or that may become due to the Operator.

4. The Operator shall use only the original and genuine spares of the original equipment as per recommendations given in the maintenance booklet of the manufactures/as per directions of the Owner. Adequate stock of such spares is to be maintained by the Operator. Test certificate of manufacturer is required for bearings along with supplies. Test certificate of all major equipment will be submitted from the manufacturer.

5. If any material brought to the site of works, be in the judgment of the Engineer, found inferior or improper & not as per described standards, the said materials or workmanship shall where required by the Owner shall be removed or amended by the Operator forthwith or within such period for every breach by the Operator in this clause.

6. All the steel structures and machines, if installed in open areas, should be painted after every monsoon period after cleaning the surface as per the instructions of the Engineer- in-charge. Entire plant including all civil structures, mechanical equipment, HT panel and Transformers etc. shall be repainted after every 2(1/2) years as per original painting specifications.

7. All leakages should be attended and all network blockages shall be removed within three days of them being identified and reported. All the valves/gates which are not used regularly should be operated at least once a week and make sure that they are properly lubricated /greased.

8. All safety valves should be checked daily and ensure that they are working properly. In case of any fault the same should be attended immediately without any wait. The maintenance of the plant shall be as per maintenance manuals of the manufacturer for all equipment. Operator shall keep all the safety devices in working order.

9. The Operator should make sure that no unwanted material should float/grow in and around different units. In case it is found the same shall be removed /cleaned immediately. He shall also be responsible for cleaning/sweeping the plant buildings inside and outside, roads, foot path etc.

10. Launders/Weirs etc. of reactors etc. to be maintained clean round the clock. During preventive/ breakdown maintenance, the Operator has to visit the unit/units as and when needed. The pumping units or other machineries required if any shall have to be arranged by the Operator at his own costs for completing the work. In case of battery

operated auto system panels and also system alarm etc., batteries are required to be maintained and replaced as and when needed by the Operator.

11. The Operator shall maintain the Supervision, Control and Data Acquisition System (SCADA) in working condition for the 10 years of O & M period. The Operator shall not remove/ shift any equipment/ machinery even temporarily without written permission of the Owner or authorized representative. Though the Operator has to operate and maintain all the equipment/machineries, lighting (plant area, boundary walls, gate lightening etc.) but the machine of the equipment under warranty should not be dismantled without prior permission of the Owner. The list of such equipment (Under warranty), if any, will be given by the Operator.
12. Consumables such as Manhole covers, POL (petrol/Diesel Oil & Lubricants) etc. has to be arranged by the Operator as and when needed as per manufactures recommendations for periodical maintenance of entire Network. The Owner shall not provide such items.
13. The Operator shall carry out biannual cleaning of network before and after the monsoon season including cleaning of all manhole chambers and collection network.
14. In case of major repair due to normal wear and tear/break down, the Operator should bring the same to the notice of the Owner immediately and necessary measures for its repair should be taken simultaneously. Breakdown, all repairs of any kind are to be attended by the Operator. Any unit/equipment being irreparable in the opinion of the Owner will be replaced by the Operator at no cost to Owner. However, if there is any unexpected population growth / high flows are observed due to urban growth, which warrants replacement of sewer with higher diameters, such cases will be brought to the attention of the owner. Upon owner's approval, at owner's cost, the same shall be executed and commissioned by the Operator. In these cases no supervision or design and estimation charges will be paid by the owner.
15. The Operator shall give his telephone no., contact addresses, etc. to the Owner as well as shift duty shift to contact him during emergency/odd hours etc.
16. The Operator will be responsible to carry day to day as well as periodic maintenance, necessary to ensure smooth and efficient performance/running of all equipment instruments installed at the Sewage Pumping Stations. He shall be responsible for maintenance/replacement of street light poles and light etc. also. All the plant, building, land, etc. shall remain the property of Owner.

ARTICLE 3. Taking Over

3.1. TRANSITION PLAN

(1) At least two years prior to the End Date, the Operator shall develop a plan to hand-over the STP, Sewerage Network and/or I&D Works and all appurtenant structures and allied works to the Subsequent Operator at the end of the term of the Contract (the "Transition Plan").

(2) The Transition Plan shall include,

(a) plans to transfer the STP and Sewerage Network and/or I&D Works to the Subsequent Operator;

(b) transition plans with respect to the Operator's Personnel including a plan for transition of the Operator's Personnel to a Subsequent Operator;

(c) a proposed process for the transfer of all Contract Records to the Owner;

(d) plans to transfer operations and maintenance functions to the Subsequent Operator; and

(e) a program to train staff of the Owner in all aspects of the operation and maintenance of the New Facility.

3.2. TAKING OVER

(a) The STP, Sewerage Network and/or I&D Works and all appurtenant structures and allied works will be taken over by Owner on satisfactory completion of the Operation & Maintenance of the plant provided that

i. The plant /equipment are in good, smooth running condition.

ii. The result of the treated wastewater quality for last three months of operation of the plant is within the limits specified.

iii. In case of major repairs /replacement of equipment, the performance guarantee is extended by six months from the date of putting back into satisfactory operation of such unit/equipment, in case such putting back is at the end of completion of operation & maintenance period.

iv. All records of operation & maintenance are handed over to Owner in proper condition.

v. The Third Party Inspection of the STP, Sewerage Network and/or I&D Works and all appurtenant structures and allied works viz: Civil units, Mechanical units/equipment, Electrical units/equipment, instruments, & all other Major & minor units/machines has to be carried out & the defects unsatisfactory working performances of the equipment/ machines are to be corrected by the Operator at his own cost. The necessary Third Party inspection Charges shall be borne by the Owner.

vi. The Operator should repaint the STP, SPSs and all appurtenant structures and allied works including all civil structures, mechanical, electrical equipment/ units /structures as per the tender specifications

(b) In case taking over is delayed on account of Operator's failure to meet the requirement specified in sub clause (a) above, the operation & maintenance period will be extended further till it meets the requirement without any additional cost to Owner.

Schedule 4

SITE AND SITE AREA[80]

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

[80] *Insert relevant details*

Schedule 5

OPERATOR'S PRICE SCHEDULE

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

Schedule 6

TERMS AND PROCEDURE OF PAYMENT

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWEROF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

ARTICLE 1. Terms And Procedure of Payment

1. 1 Mobilisation Advance:

Advance payment as an interest free loan for mobilisation and cash flow support for an amount equal to 10 % of the Design-Build Price as stipulated in the contract shall be paid to the Operator against 'Bank Guarantee for Advance Payment' for the same amount in two instalments as under subject to the provisions of this Contract.

(i) 5% within 30 days of effective date of contract; and
(ii) 5% on mobilization at the site including setting up of the Operator's office, deployment of manpower and machinery & equipments for construction.

Repayment of Mobilisation advance:

The Mobilization Advance paid to the Operator by the Owner shall be recovered commencing from the date on which the payment to the Operator has reached 20 % of the Value of Design, Build and Commissioning Services and shall be recovered at the rate of 15 % from each bill submitted by the Operator for payment. The entire amount of mobilization advance shall be recovered latest by the time payments up to 90 % of the Value of Design, Build and Commissioning Services have been claimed by the Operator.

1.2 Secured Advance:

Secured Advance for the following non-perishable materials[81] brought to site:

a. **Network and/or I&D Works** – pipes, transformers, motor, starters, and DG Set;

b. **STP** – DG Set, pumps, motors, and transformers subject to acceptance of the rate by the Design, Build Operations Engineer; and

c. **SPS** - DG Set, pumps, and motors subject to acceptance of the rate by the Design, Build Operations Engineer .

Secured advance will be limited to 75% of invoice value or market value whichever is lower and will be subject to following conditions:

a. The quantities of materials are not excessive and shall be used within a reasonable time (not exceeding 3 months) as determined by the Owner.

b. The materials are in accordance with the specifications.

c. The materials have been delivered to site and are properly stored and protected against damage or deterioration to the satisfaction of the Owner.

[81] The list of item is indicative and the EA may modify as appropriate

d. The Operator's records of the requirement, orders, receipt and use of materials are kept in a form approved by the Owner and such records shall be available for inspection by the Owner.

e. The Operator has submitted with his monthly statement, the estimated value of the materials on site together with such documents as may be required by the Owner, for the purpose of valuation of material and providing evidence of ownership and payment thereof.

f. Ownership of such materials shall be deemed to vest in the Owner for which the Operator has submitted an indemnity bond in an acceptable format.

Repayment of Secured advance:

The secured advance shall be repaid from each succeeding monthly payments to the extent the materials (for which advance was previously paid) have been incorporated into the works.

2. Payment of Design-Build Price (STP)

Subject to the provisions of this Contract Agreement and in consideration of the Operator undertaking the implementation of the Project, the Operator shall be paid as per the terms of payment contained hereunder:

Design-Build Price shall be paid in monthly amounts equal to the percentage of the Design-Build Services that the **Design-Build-Operations Engineer** indicates in the Design-Build Engineer's Statement were completed or supplied, as applicable, in the preceding month. The amount of payments for completion of each stage of works shall not exceed the amounts indicated below.

1.0	Mobilization Advance	10% as per Para 1 above
1A	**Civil works**	
	(a) Completion of Design and detailed engineering	5% of Contract Price as per SN 1A of Price Schedule Part A
	(b) After Completion of various stages of civil structures	
	Stage 1	20% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	Stage 2	30% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	Stage 3	20% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	Stage 4	10% of cost of itemised Contract Price as per SN 1A

		of Price Schedule Part A
	(c) Finishing testing & commissioning,	15% of Contract Price as per SN 1A of Price Schedule Part A
1B	Installation, testing and commissioning of Electro – mechanical and Instrumentation equipment and accessories. Power connection of .....kVA *[EA should insert the appropriate figure]* including construction of electrical substation. Supply & Installation of ..... kVA Diesel Generating set	
	Completion of Design and detailed engineering	5% of Contract Price as per SN 1B of Price Schedule Part A
	Supply & Installation of equipment including Completion of allied works for mechanical/electrical /instrumentation works	80% of cost of itemised Contract Price as per SN 1B of Price Schedule Part A
	Testing at site	5% of cost of itemised Contract Price as per SN 1B of Price Schedule Part A
	Commissioning & Trial run	10% of cost of itemised Contract Price as per SN 1B of Price Schedule Part A
1C	Ancillary works like approach roads, bridges, compound wall with gates, internal roads, area grading etc.	
	After Completion of each activity	90%
	After commissioning & trial run	10%

2a. Description of various stages of construction of civil structures

Sl. No.	Stages of works	Completion stage	Type of Civil Structures
1	Stage- 1	Completion of Excavation & construction of Foundation including bottom raft/ pile foundation with pile cap, columns etc.	All type of water storage tanks including all type of settling tanks/ basins, chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ effluent pumping stations, open channels etc.
		Completion up to Foundation & Columns/ beams/walls up to plinth level	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc

2	Stage 2	Completion of side walls up to 60% height	All type of water storage tanks including chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ effluent pumping stations, open channels etc.
		Completion of super structures including columns, beams, walls, lintels, roof slab etc.	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc
3	Stage 3	Completion of side walls up to 100% height	All type of water storage tanks including chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ effluent pumping stations, open channels etc.
		After completion of all required fittings, e.g. internal electrification, shutters, doors & windows & plastering etc.	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc
4	Stage 4	Completion of all type of ancillary structures including required interconnection with other units & any other required for completion of the structures.	All type of water storage tanks including chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ effluent pumping stations, open channels etc.
		Completion of ancillary structures roof treatment, plastering, flooring, cable trench, painting, varnishing, apron, drainage etc and any other work required for proper completion of the structure.	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc

2.1 The Operator shall submit his claim for the price adjustment, if applicable to this contract as per SCC 5.1(3), along with his claim for payment for the work done during the month, and price adjustment will be paid as per formulae stipulated in Schedule 8 of the Contract.

3. Payment of Design-Build Price (Network and/or I&D Works)

a. The Operator shall submit to the Design Build Operations Engineer monthly statements of the value of the work completed less the cumulative amount certified previously along with

details of measurement of the quantity of works executed in a tabulated form as approved by the Design Build Operations Engineer. The Design Build Engineer will follow respective State's Public Works Department procedures such as measurement, check measurements, approving deviations etc and certify such invoices for payment. Further, a third party QA Consultants will also review invoices, photographic evidence for all the works, more importantly for shuttering, bedding, manholes, depth of cutting etc. that are not visible for future verification; conduct tests where required and certify the invoices.

The Operator shall include in the Monthly Statements only such items of works which are described in the 'Payment Break-up Schedule' appended at the end of this Schedule 6, provided such items have been completed during the month.

b. The Design Build Operations Engineer shall check the details given in the Operator's monthly statement and within 14 days certify the amounts to be paid to the Operator after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amount and under conditions set forth in para 1.2 above, deductions for advance payments, secured advance, other recoveries, adjustment on account of Liquidated Damages - Operations, and other adjustments in terms of the contract and deduction of taxes at source, as applicable under the law.

c. The value of work executed shall be determined by the Design Build Operations Engineer after due check measurement of the quantities claimed as executed by the Operator, and only such items of works included in the Monthly Statement will qualify for verification/payment if these have been identified as such in the 'Payment Break-up Schedule' appended at the end of this Schedule 6. For items of works not covered in the said 'Break-up Schedule', payment as per rate quoted and quantity executed shall be verified for payment.

d. The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

e. The value of work executed shall include the valuation of Variations.

f. The Design Build Operations Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

g. The Operator shall submit his claim for the price adjustment, if applicable to this contract as per SCC 5.1(3) (a) and 5.1(3) (b) along with his claim for payment for the work done during the month, and price adjustment will be allowed as per formulae stipulated in Schedule 8 of the Contract.

4. Payment of Annual Operations and Maintenance Price for treatment of sewage up to the Threshold Sewage Flow (Part B of price schedule) (For STP):

a. Subject to deduction of Liquidated damages for Operation determined in accordance with SCC 5.4, and other provisions of this Contract Agreement and in consideration of the Operator undertaking the implementation of the Project, Owner shall pay, from the Operations Starting Date to the Operator, Annual O&M Price in equal monthly instalments, as determined in

accordance with the provisions of this Clause and other relevant provisions of this Contract Agreement. The O&M Prices in respect of Operation and Maintenance services shall be paid for a period of 15 years as monthly amounts. The monthly payments shall be taken as one twelfth of the Annual Operations and Maintenance Price payable by the Owner to the Operator.

b. In the event that the occurrence of the Operations Starting Date is delayed due to Owner or Force Majeure events, the Annual O&M Price shall be paid from the date of delayed Operations Start Date till the end of the Term (which shall be extended by the numbers of days of delay) so as to achieve total O&M period of 15 years.

5. Payment of Additional Operations and Maintenance Price per MLD (for STP):

a. Additional Operation and Maintenance Prices shall be paid only in the event the amount of sewage treated by the STP exceeds the specified Threshold Sewage Flow as per the provisions of this Contract.

b. Subject to the provisions of this Contract Agreement and in the event of the Operator treating sewage in excess of the Threshold Sewage Flow, Owner shall pay on a quarterly basis, Additional O&M Prices for each MLD of sewage above the Threshold Sewage Flow level treated and disposed in an environmentally compliant manner, as determined in accordance with the provisions of this Clause and other relevant provisions of this Contract Agreement. The Additional Operation and Maintenance Price stipulated in the contract for the relevant year shall be multiplied with the additional quantity of the Sewage treated and measured at the outfall point for that particular quarter.

6. Payment of O&M Prices for Operations and Maintenance of Sewerage Network and/or I&D Works

a. Owner shall pay O&M prices on a Monthly basis, from the Operations Starting Date to the Operator, as determined in accordance with the provisions of this Clause and other relevant provisions of this Contract Agreement. The Monthly prices in respect of Operations and Maintenance services shall be paid for a period of 15 years as one twelfth of the quoted annual O&M prices for the relevant year of operation.

b. If the scope of O&M services is varied by the Owner owing to variation in the lengths of sewerage lines and number of pumping stations to be operated and maintained by the Operator during any part of the contract period, the Monthly O&M charges payable to the Operator shall be subject to adjustment on the basis of unit O&M prices provided in the Operator's Price Schedule incorporated in Schedule 5 of the Contract.

c. In the event that the occurrence of the Operations Starting Date is delayed for any reasons, O&M prices shall be paid from the date of commencement of the Operations till the end of the O&M period of 15 years.

d. O & M price for operation of the SPSs quoted in the Operator's Price Schedule comprises fixed and variable components. The said variable component shall be adjusted on the basis of actual quantity of sewage handled by the respective SPS. The adjusted variable component will be

computed by multiplying the quoted Cost of Energy per MLD of sewage pumped (Variable Price) with the actual quantity of sewage handled.

7. Payment of Electricity Dues

a. Owner shall assist the Operator on best effort basis in obtaining electricity required for the implementation of the Contract (covering Construction Period and Operation Period) and such assistance shall be subject to the terms and conditions as provided in this Clause.

b. The Parties hereby agree that the Bill for electricity usage by the Sewage Treatment Plant and SPSs (if applicable) during the Operations Period (the "Electricity Dues"), shall be paid by the Operator to the relevant utility.

8. Right to withhold:

The Design-Build-Operations Engineer / Owner may refuse to approve any such payment, because of subsequently discovered evidence as a result of subsequent inspections or tests, nullify any such payment previously approved and pay to such extent as may be necessary in the opinion of the Design Build Engineer because (a) the work is defective (b) third party claims have been filed or there is reasonable evidence indicating probability of such claims (c) of the Operator's failure to make payment properly to sub-contractors or for labor, materials or equipment (d) of damage to another Operator or to the property of others caused by the Operator (e) of the Operator's neglect or unsatisfactory proceeding of the work (f) Operator owes a liability or a sum to Owner.

When the grounds for withholding payments are removed, payments shall be made for amounts withheld to the extent the Operator is entitled to payment.

FOR NETWORK AND/OR I&D WORKS

PAYMENT BREAK UP SCHEDULE OF CIVIL WORKS (EXECUTION)

[NOTE: THE FOLLOWING IS A TENTATIVE BREAKUP AND SHOULD BE FINALISED BY EA AS PER REQUIREMENT]

PART – I, GRAVITY SEWERS LAYING OPEN CUT METHOD

Sl. No.	Description	Component wise Percentage payment per linear meter
(A)	**PROVIDING SEWER BY OPEN EXCAVATION**	
1	Approval of Design & Drawing	2%
2	Dewatering where required, barricading, traffic diversion, Excavation, (excluding back filling), Timbering/Sheet piling, Bedding of pipes, Supply, laying & jointing of pipes	60%
3	Manholes	10%
4	Interconnecting of newly laid sewer with existing sewerage network if required, otherwise that percentage will be given after reinstatement of road.	3%
5	Back filling, disposal of surplus earth and Temporary reinstatement of roads	5%
6	Temporary shifting and restoration of water mains/ sewer lines & Telephone lines/ cables and other utilities	5%
	Sub-Total(A)	**85%**
(B)	**TESTING & COMMISSIONING**	
1	Sectional Testing	5%
2	Final Testing & Commissioning sewer	10%
	Sub: Total (B)	**15%**
	Grand Total A+B	**100%**

PART II SUPPLY & LAYING OF RISING MAIN BY OPEN CUT METHOD

Sl. No.	Description	Component wise Percentage payment per linear meter
(A)	**SUPPLY & LAYING OF RISING MAIN BY OPEN CUT METHOD**	
1	Approval of Design & Drawing	2%
2	Supply & Laying of rising main including excavation laying jointing etc. all complete.	70%
3	Supply & Fixing of sluice valve and air valves	10%
4	Refilling of trenches with full compaction	3%
5	Disposal of surplus earth including side cleaning including temporary restoration of roads etc.	5%
	Sub-Total(A)	**90%**

(B)	**TESTING & COMMISSIONING**	
1	Final Testing & Commissioning sewer	10%
	Sub: Total (B)	**10%**
	Grand Total A+B	**100%**

PART III SEWAGE PUMPING STATION

I. CONSTRUCTION OF WET WELL BY WELL SINKING METHOD

i	Approval of design & drawing	3%
ii	Initial open excavation	1%
iii	Erection & fixing of cutting shoe	5%
iv	Construction of well staining and its sinking up to 50% depth BGL	25%
v	Construction of well staining & sinking upto 100% depth BGL	26%
vi	Plugging of well, boulder filing etc.	5%
vii	R.C.C. work in bottom of well including bottom finishing with required slopes with cement concrete.	5%
viii	Walkway and plate form	5%
ix	Beam, column including fixing of gantry girder	7%
x	Stair case, M.S. ladder, grill & other miscellaneous work	3%
xi	water tightness test	5%
xii	After commissioning & trial rum	10%
	Total	**100%**

II. SCREEN CHANNELS

i	Approval of design & drawing	2%
ii	Construction of supporting columns	5%
iii	Constructions of base slab	18%
iv	Construction of side walls including partition wall	25%
v	Interconnection with incoming gravity sewer	5%
vi	Construction of Walkway, plate form and RCC stair case for accessibility	30%
vii	water tightness test	5%
viii	After commissioning & trial rum	10%
	Total	**100%**

iii. VALVE CHAMBER

i	Approval of design & drawing	3%
ii	Initial open excavation	2%
iii	M-10 grade Lean concrete	5%
iv	Construction of RCC Raft	20%
v	Construction of RCC side walls	35%
vi	Construction of cover blocks.	10%
vii	Supply and fixing of M.S. plate form for operation of sluice valve & other miscellaneous work	10%
viii	water tightness test	5%
ix	After commissioning & trial rum	10%
	Total	**100%**

iv. MEP BUILDING

i.	Approval of designs and drawings	2%
ii.	Excavation	2%

iii.	Sub Structure & Super structure	
a	Raft footing/ pile foundation	10%
b	Construction of columns and beams	15%
c	Wall up to plinth level including plinth beam	3%
d	Wall up to lintel level including lintel beam	10%
e	Wall up to slab level	5%
f	Roof slab & beams including support for fixing gantry girders	13%
iv.	Doors / Windows/Ventilators/Rolling shutter	
a	Supply at site	3%
b	Fixing in position	2%
v	Flooring/ cable trunk	5%
vi	Plastering	5%
vii.	Internal electrification	2%
viii	Painting/ varnishing	5%
ix	Stair case/ M.S. ladder	5%
x	Drainage including construction of apron around the building	3%
xii	Commissioning including site clearance & Misc. finishing items	10%
	Total	**100%**

v. DG PLATE FORM

i	Approval of design & drawing	3%
ii	Initial open excavation	2%
iii	M-10 grade Lean concrete	5%
iv	Construction of RCC foundation for DG	25%
v	Construction of tubular shade	35%
vi	Construction of MS grill around the plate form with lobby arrangement.	20%
vii	After commissioning & trial rum	10%
	Total	**100%**

vi. MISC. BUILDINGS

i.	Approval of designs and drawings	2%
ii.	Excavation	2%
iii.	Sub Structure & Super structure	
a	Raft footing/ pile foundation/footing	7%
b	Wall up to plinth level including plinth beam	3%
c	Wall up to lintel level including lintel beam	10%
d	Wall up to slab level	5%
e	Roof slab	10%
iv.	Doors / Windows/Ventilators/Rolling shutter	
a	Supply at site	3%
b	Fixing in position	2%
v	Flooring/ cable trunk	5%
vi	Plastering	5%
viii	Painting/ varnishing	5%
ix	Water supply & Sanitary fittings.	12.50%
x	Stair case	6%
xii	Internal electrification.	12.50%
xiii	Commissioning including site clearance & Misc. finishing items	10%
	Total	**100%**

PART- IV ROAD REINSTATEMENT

A. Bituminous Roads

1. Up to WBM /WMM level 55%
2. WBM to load bearing crust level 35%
3. Testing of road after two years maintenance 10%

B. Cement Concrete Roads

1. Up to BOE level 15%
2. Up to M 10 grade Base Concrete 30%
3. Up to finished level with M20 grade cement concrete 45%
4. Testing of road after two years maintenance 10%

C. Interlocking tiles of Cement concrete blocks

1. 90% Payment will be released only against completed part of BOE roads on square meter basis & rest 10% after two years maintenance.

D. Brick on edge (BOE) Roads

1. 90% Payment will be released only against completed part of BOE roads on square meter basis & rest 10% after testing of roads after two years maintenance.

BREAK UP OF PAYMENT FOR ELECTRO MECHANICAL WORKS

i.	Payment to be made against supply & installation	85%
ii.	Payment to be made after testing at Site	5%
iii.	Amount to be paid after commissioning and three months of trial run	10%
	Total	**100%**

Signature of Operator
Name of Operator
Rubber stamp with Designation
Date
Place :

Signature of Engineer:
Name of Engineer
Designation
Date
Place :

Schedule 7

LIQUIDATED DAMAGES - OPERATIONS

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWEROF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

ARTICLE 1. Liquidated Damages (Operations) for STP

Liquidated Damages (GC Section 5.4)

1) In case the Operator fails to meet the technical standards more specifically towards the quality of the treated sewage, the Operator shall pay to the owner Liquidated Damages amounting to INR..... *[Please insert the amount as appropriate for the STP involved.]* per day of occurrence, over and above the costs and compensation that might be required by the Owner to pay to the affected people and parties in the effluent discharge area.

2) Applicability of the Liquidated Damages shall be determined based on the weekly monitoring report of the quality of the treated effluent, submitted by the nominated Laboratory, namely..... *[The EA should specify here the independent laboratory like the one under the control of State PCB, etc.]*. The said Laboratory will test the samples [minimum 3 grab samples representative of different flow conditions (quantum and quality wise) in the day] of the treated effluent drawn every week jointly by the Owner and the Operator and the results of the test report shall be binding on both the parties.

3) If any of the grab samples of the effluent so tested fails to meet with the CPCB /State PCB standards stipulated in the Contract, Liquidated Damages as stated herein above shall be deducted from the O & M payments due to the Operator for all the seven days of the week.

4) The Operator shall maintain the STP for treating the sewage without any interruption by ensuring timely measures for preventive maintenance. However, if the STP is unavailable for treating the sewage for a period exceeding ..... hours for reasons attributable to the Operator, Liquidated Damages shall be levied by the Owner at the rate of INR ....*[Please insert the amount as appropriate for the STP involved.]* per day or part of the day for the period the STP is not available beyond the allowed time of ..... hours as referred to above for repair/rectification. The Liquidate Damages shall apply over and above the costs and compensation which shall be reimbursed by the Operator in case such costs/compensations are required to be paid by the Owner to the affected people and parties in the effluent discharge area.

ARTICLE 2. Liquidated Damages (Operations) for Network and/or I&D Works

1. Liquidated Damages (GC Section 5.4)

In case the Operator fails to meet the Performance Standards listed in the Table below, payments due to the Operator shall be subject to deduction on account of liquidated damages for defaults exceeding the Acceptable Limits. Such deductions shall be over and above the costs and compensation that might be required by the Owner to pay to the affected people and parties in the area where O&M of the sewerage network and/or I&D Works and Pumping Stations has been entrusted to the Operator.

"Acceptable Limit" is the permissible number of instances of defaults or non-adherence to a particular Set of Performance Standards during the Quarter for which payment has been claimed by the Operator.

The Operator shall be required to meet all of the Performance Standards as specified herein below. He shall ensure that defaults from compliance with the said Standards shall not exceed the Acceptable Limit; otherwise Liquidated damages as specified herein shall be applicable.

Performance set	Description of performance set	Acceptable limit[82]	Reduction in payment as% of quarterly O&M Charges[83]	Performance Standard
Set A	Sewerage Network and/or I&D Works Pipeline Breakages	1 per month / 50 km	1% of the quarterly payments for each default exceeding the Acceptable Limit	Sewer Network pipeline breakages that are not repaired within 24 hours (for sewers up 800 mm dia) and 48 hours (for all higher dia) of their being reported, will be considered as 'Breakages'.

[82] *Indicative value provided here, the actual value to be specified by the Owner on a project to project basis.*

[83] *Indicative value provided here, the actual reduction should be specified on a project to project basis by the Owner.*

Set B	Chokes, Blockages and	1 per month / 10 km length	do	Rectify Chokes / blockages within 24 hours of reporting / complaint / identification.
Set C	Pumping Stations	1 per month	do	Instances of failure to maintain optimum wet well levels of pumping stations and or delay in recording wet well levels.
Set D	Pumping efficiency	2 per month	do	Decrease in pumping efficiency by more than 10 % from the level as determined by Design Build Operations Engineer
Set E	Overflow from Pumping Station	1 per month	do	No overflow shall be allowed from the pumping station.
Set F	Replacement of Manhole Covers	1 per month / 10 km	Rs 500 per number of covers not replaced in 48 hours	Replace damaged or stolen manhole covers immediately. Max 24 hours.

Schedule 8

Price Adjustment

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

SCHEDULE 8

1. GENERAL

1.1 This Schedule lays down the procedure for determining the price adjustment to be applied to the following components of the contract price:

(i) Design-Build Price for the STP and Network, if SCC 5.1 (3) stipulates that price adjustment will apply to Design-Build Price.

(ii) Price for Operation & Maintenance of the STP and Network.

1.2 For the purpose of Price Adjustment, 'Base Date' shall be the date 28 days prior to the deadline for submission of bids for the contract. Thus Base date for this contract is..... *[EA should insert the date at the time of signing the contract.]*

1.3 Weightings for labor and various materials to be used in the Price Adjustment formulas laid down in the Tables under paragraphs 3 and 4 of this Schedule shall be based on the figures quoted by the Operator as a part of its bid under the Schedule of Adjustment Data (in the Appendix to Bid), and as accepted by the Owner.

2. PRICE ADJUSTMENT FOR DESIGN BUILD PRICE

2.1 If this Clause applies, the amounts payable to the Operator shall be adjusted for rises or falls in the cost of labour, Goods and other inputs to the Design-Build Services, by the addition or deduction of the amounts determined by the formulae prescribed in this Clause. To the extent that full compensation for any rise or fall in Costs is not covered by the provisions of this or other Clauses, the Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of other rises and falls in costs.

2.2 The adjustment to be applied to the amount otherwise payable to the Operator, as valued in accordance with the Contract prices incorporated in Schedule 5, and certified by the Design-Build-Operations Engineer in Payment Certificates (referred to as 'Interim Payment Certificates') after examining the statements of monthly claims, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be of the following general type:

$Pn = a + b\ Ln/Lo + c\ En/Eo + d\ Mn/Mo + ...$ where:

"Pn" is the adjustment multiplier to be applied to the estimated contract value in the relevant currency of the work carried out in period "n", this period being a month;

"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

"b", "c", "d", … are coefficients representing the estimated proportion of each cost element related to the execution of the Design-Build Services, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

"Ln", "En", "Mn", … are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

"Lo", "Eo", "Mo", … are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

2.3 The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, it shall be determined by the Design-Build-Operations Engineer.

2.4 Until such time as each current cost index is available, the Design-Build-Operations Engineer shall determine a provisional index for the issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.

2.5 If the Operator fails to complete the Design-Build Services within the stipulated Time for Completion, adjustment of prices thereafter shall be made using either (i) each index or price applicable on the date 49 days prior to the expiry of the specified Time for Completion, or (ii) the current index or price, whichever is more favorable to the Owner.

2.6 The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.

3. Determination of Price Adjustment Multiplier for Design Build Price of STP

3.1 The Price adjustment multiplier "Pn" to be applied to the estimated value of work done in a month, as certified in the Interim Payment Certificates shall be determined using the coefficients/weightings and cost indices etc. for local currency as provided in paragraphs 3.2.

3.2 Local currency

Index code	Index description	Source of index	Weighting *
A	Nonadjustable	-	a = 0.15
B	Labor - Consumer price index for industrial workers for .....centre	Labour Bureau, Ministry of Labour & Employment, Government of India	b =
C	Material - All India Wholesale Price Index (all commodities)	Economic Advisor to the Government of India, Ministry of Commerce and Industry	c =
		Total	**1.00**

***** The weightings for various cost indices will be inserted based on the Owner's decision on the relevant details provided by the selected bidder in the Appendix to the Bid. **3.3 Foreign Currency**

Index code	Index description	Source of index[@]	Weighting [++]
A	Nonadjustable		a = 0.15
B	Labor		b =
C	Material		c =
		Total	**1.00**

[@] The source of Indices will be inserted based on the relevant details provided by the selected bidder in the Appendix to the Bid.

[++] The weightings for various cost indices will be inserted based on the Owner's decision on the relevant details provided by the selected bidder in the Appendix to the Bid.

4. Determination of Price Adjustment Multiplier for Design-Build Price of Sewerage Network

4.1 The Price adjustment multiplier "Pn" to be applied to the estimated value of work done in a month, as certified in the Interim Payment Certificates shall be determined using the coefficients/weightings and cost indices etc. for local currency as provided in paragraphs 4.2.

4.2 Local Currency

Index code	Index description	Source of index	Weighting *
A	Nonadjustable	-	0.15
B	Labour - Consumer price index for industrial workers for .....centre	Labour Bureau, Ministry of Labour & Employment, Government of India	
C	Cement - All India Wholesale Price Index for grey cement	Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry	
D	Steel - All India Wholesale Price Index for steel rebars	Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry	
E	Bitumen - Average official retail price of bitumen	IOC depot at.....	
F	POL - average official retail price of High Speed Diesel	Retail outlet of IOC at.....	
G	Plant & Machinery Spares - All India Wholesale Price Index for Construction machinery	Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry	
H	Other materials - All India Wholesale Price Index for all commodities	Office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry	
		Total	**1.00**

***** The weightings for various cost indices will be inserted based on the Owner's decision on the relevant details provided by the selected bidder in the Appendix to the Bid.

The Operator shall note that Paragraphs 5, 5.1, 5.2, 5.3 & 5.4 of this Schedule shall be applicable in respect of payment of O&M prices for Sewerage Network only if operation of an SPS is included in the scope of work.

5. PRICE ADJUSTMENT FOR O&M PRICES

5.1 Owner shall pay O&M prices to the Operator subject to adjustments as per following sub-paragraphs. **5.2 Adjustment for Variation in Electricity Tariff**

O&M prices shall be subject to adjustment on account of variation in the Electricity Tariff during the O&M period with reference to 'Base Rate of Electricity Tariff' specified at the time of invitation of bids, namely INR ..... per KWh. *[EA should insert the same rate as stipulated in BDS ITB 3.11 c.]* The said adjustment shall be determined on the basis of the actual electricity consumption and the Tariff evidenced by the Electricity bills paid by the Operator to the Electricity Utility Company, subject to the following provisions:

(a) Variation shall be limited to the Guaranteed Energy Consumption applicable for the level of effluent treated by STP, and for the level of effluent pumped by the respective SPSs during the quarter.

(b) Guaranteed Energy Consumption for the actual level of effluent handled by the STP and by the SPS(s) if any will be calculated based on the energy consumption/MLD for the relevant year of the O&M period as quoted in the Operator's Price Schedule incorporated in Schedule 5 of the Contract.

The variation applicable as per this sub-paragraph 5.2 shall be claimed by the Operator on **Quarterly** basis.

5.3 Determination of cost of Diesel used in DG set

The Operator shall use back-up power supply from the DG set during the period power supply from the Electricity Utility Company is not available. The DG set equipped with standard accessories will record inter alia (i) energy supplied/generated by it and (ii) total period for which it was operated in a month/quarter. Cost of Diesel for which Operator will be entitled to compensation on account of energy obtained from the back-up power supply unit shall be determined as under:

a. Operator's representative and the Design Build Operations Engineer shall jointly take the readings from the meters and gauges (sealed jointly by them at the commencement of the O&M period) of DG set every month to arrive at the total number of energy units (kWh) = E_1 obtained from the back-up power supply unit.

b. Number of energy units (kWh) obtained from the back-up power supply unit during the month for which Operator shall be entitled to compensation (referred to as '**adjusted units of back-up energy supply**') shall be determined in a series of steps that follow.

The Owner will first determine the short-fall in supply from the Electricity Utility Company.

Short-fall in supply from the Electricity Utility Company (E_2)

= Energy Requirement as per Guaranteed Energy Consumption applicable for the level of effluent treated by STP, and for the level of effluent pumped by the respective SPSs during the month

(-) Units of energy (kWh) available/obtained during the month from the Electricity Utility Company as evidenced by the Bill of the Utility Company for the corresponding month

If the 'Short-fall in supply from the Electricity Utility Company' (E_2) works out to be a negative figure, Operator shall not be entitled to compensation for using the energy supply from the back-up power supply unit.

If E_2 is a positive figure, compensation shall be based on E_1 or E_2 whichever is lower and this lower figure shall be termed as '**adjusted units of back-up energy supply'**.

c. Rated specific fuel consumption of the DG set specified by the Manufacturer in its Specifications will then be used for determining the estimated diesel consumption during the month for producing the 'adjusted units of back-up energy supply'.

d. Cost of estimated Diesel consumption in a month shall then be calculated on the basis of price of diesel prevailing at mid-point of the month in IOC or HPCL's retail outlets in the city where STP and the SPS are installed. Cost figures of three months shall be added to arrive at the Cost of Diesel consumption in a quarter.

5.4 Adjustment in O&M Price for energy taken from the back-up power supply unit

O&M prices quoted in the Operator's Price Schedule incorporated in Schedule 5 take into account energy requirements of the STP and SPSs being met fully by power from the Electricity Utility Company. Hence compensation payable to the Operator for Energy supply taken from an alternate source, namely the back-up power supply Unit shall be corrected as under:

Adjustment in quarterly O&M price = Cost of Diesel consumption in a quarter determined in accordance with sub-paragraph 5.3 (d) above **minus** 'adjusted units of back-up energy supply' determined as per sub-paragraph 5.3 (b) as applicable for the quarter multiplied by the 'Base Rate of Electricity Tariff'.

The variation in O&M price applicable as per sub-paragraphs 5.3 and 5.4 shall be claimed by the Operator on Quarterly basis.

Schedule 9

SCHEDULE OF PERFORMANCE GUARANTEE

& ADVANCE PAYMENT GUARANTEE

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

FORM OF PERFORMANCE GUARANTEE

_____ *[Bank's Name, and Address of Issuing Branch or Office]*

Beneficiary: _____ *[Name and Address of Owner]*

Date: _____

PERFORMANCE GUARANTEE NO.: _____

We have been informed that _____ *[name of Bidder]* (hereinafter called "the Bidder") has entered into Contract No. _____ *[reference number of the contract]* dated _____ with you, concerning a contract to design, build, refurbish and operate a Sewerage Treatment Plant and Sewerage Network and/or Interception and Diversion Works in *[Name of Location]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Operator, we _____ *[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ *[amount in figures]* (_____) *[amount in words]*, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contract is in breach of its obligations under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the earlier of:

(a) six months after the End Date, as defined in the Contract; or

(b) six months after the date of termination of the Contract pursuant to its terms.

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

Yours truly,

[Name of Bank]

_____

Authorised Signature

FORM OF BANK GUARANTEE – ADVANCE PAYMENT

[Name of Contract]

To: *[Name and address of Owner]*

Dear Ladies and/or Gentlemen,

We refer to the Contract Agreement ("the Contract") signed on *[date]* between you and *[name of Operator]* ("the Operator") concerning the Services set out in the Contract to Design, Build, Refurbish and Operate a Sewage Treatment Plant and a Sewerage Network and/or Interception and Diversion Works.

Whereas, in accordance with the terms of the Contract, the Owner agreed to pay or cause to be paid to the Operator an advance payment in the amount of *[number]* percent (____%) of the Contract Price for the Design-Build, Refurbish, Commission, Operate and Maintaining STP and Sewerage Network and/or Interception and Diversion Works for 15 years, namely a payment of: *[amount of foreign currency in words], [amount in figures],* and *[amount of local currency in words], [amount in figures]*.

By this letter we, the undersigned, *[name of Bank]*, a Bank (or company) organised under the laws of *[country of Bank]* and having its registered/principal office at *[address of Bank]*, do hereby jointly and severally with the bidder irrevocably guarantee repayment of the amounts upon the first demand of the Owner without cavil or argument in the event that the bidder fails to commence or fulfil its obligations under the terms of the Contract, and in the event of such failure, refuses to repay all or part (as the case may be) of the advance payment to the Owner.

Provided always that the Bank's obligation shall be limited to an amount equal to the outstanding balance of the advance payment, taking into account such amounts that have been repaid by the Bidder from time to time in accordance with the terms of payment of the Contract as evidenced by appropriate shipping documents or payments certificates.

This Guarantee shall remain in full force from the date upon which the advance payment is received by the bidder until the date upon which the bidder has fully repaid the amount is advanced to the Owner in accordance with the terms of the Contract. At the time at which the outstanding amount is nil, this Guarantee shall become null and void, whether the original is returned to us or not.

Any claims to be made under this Guarantee must be received by the Bank during its period of validity.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

Yours truly,

[Name of the Bank] & Authorized Signature

Schedule 10

TECHNICAL SPECIFICATIONS FOR CONSTRUCTION AND OPERATION AND MAINTENANCE PHASE[84]

TO **(i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORK AND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.**

[84] *Specifications pertaining to general civil works and the material requirements have been specified herewith. However the specifications and the testing requirements shall be specified in accordance with the technology being selected by the bidder and the detailed design submitted.*

FOR STP

GENERAL

The ____ MLD capacity sewage treatment plant to be Designed, Build, , Tested and Commissioned by the Operator / Operator shall comply with the guidelines contained in "Manual on Sewerage and Sewage Treatment" Latest Edition published by the Central Public Health & Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India. The Technical Standards and Specifications contained in this contract shall be read along with the following standard specifications (latest versions) published by the Bureau of Indian Standard listed below:

The list is not exclusive and the operator shall be responsible to follow the appropriate standards:

i) IS 6280 – 1971 – Sewage Screens

ii) IS 8413 – 1982 – Biological Treatment Equipment – Part II and its modifications

iii) IS 10037 – Part I – 1981 & Part II & III – 1983 – Sludge dewatering equipments

iv) IS 10261 – Requirements for settling tank for waste water

v) IS 105533 – Part I, II, III – Chlorination Plants

vi) IS 5600 – 1970 - Sewage and Drainage Pumps

vii) IS 6279 – 1971 – Grit Removal devices

Documents Comprising the Technical Standards Appendix

The Technical Standards Appendix consists of Technical Specification to be followed for during Construction of Sewage treatment Plant and other ancillary/ allied works for all Civil, Mechanical, Electrical, Instrumentation required to be executed under this Contract. Notwithstanding to the said specification, the bidder is instructed the adopt and follow necessary standard and approved Codes /specification wherever required for fulfillment of all the works under this contract.

Supplementing the General Conditions and Design-Build or Operating Services Appendix

The Technical Standards Appendix shall be read along with the GCC / SCC and Design-Build and Operations Services Appendices for the purpose of providing greater specificity of the technical standards which the Bidder is required to meet.

Design-Build or Operations Services Appendix Description

The descriptions contained in the Technical Standards Appendix Chart entitled, "Description of Service" are for the convenience of the Bidder and do not supersede the actual wording of the Design-Build and Operations Services Appendices.

General Quality Standards

The term "General Quality Standard" means a standard of performance which,

(a) is competent, efficient, economical and in accordance with internationally accepted techniques used in the sewer disposal and civil works construction industries;

(b) is in accordance with professional engineering, accounting and consulting standards, as applicable, recognized by national or international professional bodies;

(c) is in accordance with sound management, commercial, technical, design and engineering practices;

(d) employs appropriate technology and safe and effective equipment, machinery and methods;

(e) is in accordance with national and local standards and codes in the Owner's Country;

(f) protects the interests of the Authorities;

(g) is in accordance with the Applicable Law;k

(h) is in accordance with the technical specifications and design standards of the Owner as provided to the Bidder;

(i) is in accordance with the applicable Environmental Assessment and Environmental Management and Mitigation Plan; and

(j) is in accordance with the Design-Build Documents as approved by the Owner.

In the event of any conflict or inconsistency between any standards that comprise the General Quality Standard, local and national standards in the Owner's Country shall prevail over international standards.

The Operator shall, at all times, carry out the Services in accordance with the Technical Standards as specified and, where a specific technical standard of quality of performance has not been specified, the Bidder shall perform the Services to the standard of "General Quality Standards" set out in Section 2.2(1) of the Technical Standards Appendix.

If the Owner is subjected to fines or penalties as a result of the operator's breach of these Technical Standards, such fines or penalties shall be paid by the Bidder

Design-Build Services

In respect of the Design-Build Services, the operator shall ensure that the design of the STP is prepared by qualified designers who are professionally recognized to design the Sewage Treatment Plant and allied services.

The Operator warrants that the operator and its designers have the experience and capability necessary for the design.

The offers shall be based on the operator's own design and operating philosophy which is to be based on the selected modern treatment technologies and should be within the overall framework and guidelines specified in the bid document and its specifications. The bidder's design for the entire facility shall be such that the project shall

- Require minimum land space
- Require minimum energy for treatment of sewage
- Generates treated effluent that can be recycled

Planning of the entire system should be done in such a manner so as to optimize capital and operational costs of treatment of sewage and maintenance of the Plant on whole on sustainable basis.

Section 3. CIVIL WORKS

1 Specific Civil/Structural Work Requirement

1.1 Design Submissions:

Complete detailed design /hydraulic calculations & drawings of foundations and superstructure together with general arrangement drawings and explanatory sketches shall be submitted to the Owner. Separate calculations for foundations or superstructures submitted independent of each other shall be deemed to be incomplete and will not be accepted. Though no GA drawings of all units are required along with the bid, a schematic layout /GAD shall be submitted along with the bid. The design considerations described herewith establish the minimum basic requirements of plain and reinforcement concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed. The Operator shall also take care to check the stability of partly.

1.2 Design Standards

All designs shall be based on the latest International or Indian Standard (IS) Specifications or Codes of Practice. The design standards adopted shall follow the best modern engineering practice in the field based on any other international standard or specialist literature subject to such standard reference or extract of such literature in the English language being supplied to and approved by the Owner or Owner's Representative. In case of any variation or contradiction between the provision of the IS Standards or Code and the specifications given with the submitted bid document, the provision given in the Specification shall be followed.

1.3 Design Loadings

All buildings and structures / underground structures shall be designed to resist the worst combination of the following loads/stresses under test and working conditions these include dead load, live load, wind load, seismic load, stresses due to temperature changes, shrinkage and creep in materials, dynamic loads and uplift pressure.

i. **Dead Load:** This shall comprise all permanent construction including walls, floors, roofs, partitions, stairways, fixed service equipment and other items of machinery. In estimating the loads of process equipment all fixtures and attached piping shall be included, but excluding contents shall be considered. The following minimum loads shall be considered in design of structures:

S.No	Parameter	Load

1	Weight of water	10.0 KN /m3
2	Weight of soil (irrespective of strata available at site and type of soil used for filling etc) However, for checking stability against uplift, actual weight of soil as determined by field test shall be considered	20.0 KN/m3
3	Weight of plain concrete	24.0 KN/m3
4	Weight of reinforced concrete	25.0 KN/m3
5	Weight of brickwork (exclusive of plaster)	22.0 KN/m3
6	Weight of plaster to masonry surface	18.0 KN/m3
7	Weight of granolithic terrazzo finish or rendering screed, etc	24.0 KN/m3
8	Weight of sand (filter media)	25.0 KN/m3

ii. **Live Load:** Live loads shall be in general as per IS 875. However, the following minimum loads shall be considered in the design of structures.

S.No	Location	Live Load
1	Floor supporting Pumping Machinery	1000 kg/sq.m
2	Storage, Maintenance Bay, Air Blower	750 kg/sq.m
3	Platform, Staircase, Corridors, Walkways	500 kg/sq.m
4	Toilet	200 kg/sq.m
5	Roof Slab	150 kg/sq.m

In the absence of any suitable provisions for live loads in IS Codes or as given above for any particular type of floor or structure, assumptions made must receive the approval of the Owner's Representative prior to starting the design work. Apart from the specified live loads or any other

loads due to material stored any other equipment load or possible overloading during maintenance or erection/construction shall be considered and shall be partial or full whichever causes the most critical condition.

iii. **Wind Load:** Wind loads shall be as per IS: 875- 2002 Part-III.
iv. **Dynamic Load:** Dynamic loads due to working of plant items such as pumps, blowers, compressors, switchgears, traveling cranes, etc shall be considered in the design of structures.
v. **Other Loads:** In addition to earth pressure and water pressure etc., the surcharge of 1 Ton/sq.m shall be taken into account in the design for channels, tanks, pit etc.
vi. **Earthquake Load:** This shall be computed as per IS: 1893 – 2000.

1.4 Joints

Movement joints such as expansion joints, complete contraction joints, partial contraction joints and sliding joints shall be designed to suit the structure as per relevant IS code provisions. Expansion joints of suitable gap at intervals not more than 30 m shall be provided in walls, floors and roof slabs of water retaining structures.

Construction joints shall be provided at right angles to the general direction of the member. The locations of construction joints shall be decided on convenience of construction. To avoid segregation of concrete in walls, horizontal construction joints are normally to be provided at every 2 m height, GI 18 guage/PVC water stops of suitable type and minimum 230 mm width, 6 m thick shall be used for walls and base slabs.

1.5 Water Retaining Structures

Liquid retaining/conveying structures including the members covering the same (such as roof of a chamber, channel etc.) shall be designed by uncracked method of design as per BIS: 3370 and 6494. Basement RC walls and slabs below ground shall also be designed by uncracked method of design as liquid retaining structures. Shear shall be checked by working stress method as per BIS: 456. Minimum temperature and shrinkage reinforcement shall be 0.3% in each direction.

All underground or partly underground liquid containing structures shall be designed for the following conditions:

- Liquid depth up to full height of wall: no relief due to soil pressure from outside to be considered.
- Structure empty (i.e. empty of liquid, any material, etc) full earth pressure including saturated condition and surcharge pressure wherever applicable to be considered.
- Structures shall be designed for uplift in empty conditions as per water table indicated in the geotechnical report or high flood level, whichever is maximum. No reduction factor for the uplift force shall be considered.
- The dead weight of the empty structures should provide a safety factor of not less than 1.2 against uplift pressures during construction and in service.

- Wall shall be designed under operating conditions to resist earthquake forces from earth pressure mobilization and dynamic water loads;
- Underground or partially underground structures shall be checked against stresses developed due to any combination of full and empty compartments with appropriate ground/uplift pressures from below to base slab
- The walls and base slabs shall be designed for saturated earth/water pressure corresponding to high flood level or finished plot level whichever is higher.
- For design purpose, sub soil water level is to be considered as 2 meter below the average natural ground level. (Uplift pressure on the foundation shall be considered as per water table at site, in the rainy season. However, for design purpose ,minimum water table shall be considered at 2 m below the average ground level

1.6 Foundation

- The minimum depth of foundations for all structures, equipment's buildings and frame foundations and load bearing walls shall be as per IS: 1094.
- The earth fill above virgin ground level till formation level shall be taken as a surcharge load and shall be added in the loads coming on foundations appropriately
- Care shall be taken to avoid the foundations of adjacent buildings or structure foundations, either existing or not within the scope of this Contract Suitable adjustments in depth, location and sizes may have to be made depending on site conditions. No extra claims for such adjustments shall be accepted by the Owner.
- Special attention is drawn to danger of uplift being caused by the ground water table
- Plinth level of all structures/top of tanks shall be at least (1000) mm above high flood level.

1.7 Design Requirements

The following are the design requirements for all reinforced or plain concrete structures:

- All blinding and leveling concrete shall be minimum 100 mm thick in concrete grade M15 for Building & 150 mm thick in concrete grade M20 for Water Retaining Structures as per IS -3370 (Part- 1)-2009 latest version..
- All structural reinforced concrete shall be with a maximum 25 mm aggregate size for footings and base slabs and with a maximum 20 mm aggregate size for all the Water Retaining Structures & other structural members.
- All liquid retaining structures shall be designed as per IS: 3370. The minimum grade of concrete shall be M30 using Sulphate resistant Cement.
- All Buildings, Pipe Pedestals, Thrust Block, Pump Foundation & other structures shall be designed as per IS-456. The minimum grade of concrete shall be M20.
- The maximum free water cement ratio shall not exceed 0.5 for all liquid retaining structures.

- The amount of reinforcement in each of the two directions at right angles within each surface zone should not be less than the minimum specified as IS:3370 or IS:456 which ever is applicable for the type of structure.
- Use of pressure relief valves to reduce uplift pressure due to ground water table shall not be allowed.
- All buildings shall have a minimum 1.0 m wide, 100mm thick plinth protection paving in M15 grade concrete or stone slabs/tiles. All plinth protection shall be supported on well-compacted strata.

The following minimum thickness shall be used for different reinforced concrete members irrespective of design thickness.

S.No	Civil Member	Width(mm)
1	Walls for liquid retaining structures	200
2	Base Slab of liquid retaining structures	350
3	Wall foundation (At Junction of Base Slab & Wall) of liquid retaining structures	400
4	Roof Slab of liquid retaining structures	150
5	Walls of Launders	150
6	Base slab of Launders	125
7	Floor slabs including roof slabs, walkways canopy slabs	100
8	Walls of cables/pipe trenches, underground pits, etc	125
9	Footing – Edge Thickness	250
10	Footing – At the Face of Column	450
11	Column	230 (width) 300 (depth)
12	Parapets, chajja	100
13	Precast trench cover	75
14	Beam	230 (width) 300 (depth)

1.8 MINIMUM COVER TO MAIN REINFORCEMENT

S.No.	Member	Details	Cover (mm)

1	Slab	Free Face	20
		Face in contact with earth	30
2	Beam	Top /Bottom	40
		Side	30
		Face in contact with earth	40
3	Column and pedestal	Super Structure	40
		Face in contact with earth	40
4	Retaining wall, Basement and Pit wall	Free side	30
		Face in contact with earth	30
5	Liquid Retaining Structure	Face in contact with liquid	40
		Face in contact with earth	40
		Free face	40
6	Foundation	Bottom	60
		Top	60

1.9 Minimum Bar Diameter

S.No	Member	Diameter (mm)
1	Major Foundation	10
2	Block Foundation Main Bars	8
3	Block Foundation – Tie Bars	8
4	Minor Foundation (Local Foundation etc.)	8
5	Column, Pedestal – Main Bars	12
6	Column, Pedestal – Ties	8
7	Beam – Main Bars	12
8	Beam – Anchor Bars	10
9	Beam – Stirrups	8
10	Slab – Main Bars	8

S.No	Member	Diameter (mm)
11	Slab – Distribution Bars	8
12	Wall – Main Bars	10
13	Wall – Distribution Bars	8
14	Minor elements such as chajjas, Lintel Beams etc	8

1.10 Bar Spacing

S.No	Member	Minimum (mm)	Maximum (mm)
1	Foundations	125	200
2	Slabs	100	300
3	Stirrups for Beams	100	300
4	Ties for Columns, Pedestals	100	300
5	Walls	100	300

• Bar spacing shall be provided in multiple of 25 mm.

The design submitted by the operator shall be proof checked from the nearest IIT / Engineering college (Approved by the competent authority), for which the scrutiny charges shall be borne by the operator. The delay in checking designs by the third party as above shall be treated as the delay on the part of the operator for operation of the tender clause.

2 MATERIALS IN GENERAL

The term "materials" shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Bidder for incorporation in the Works.

Expect as may be otherwise specified for particular parts of the works the provision of clauses in "Materials and Workmanship" shall apply to materials and workmanship for any part of the works. All materials shall be new and of the kinds and qualities described in the Contract and shall be at least equal to approved samples.

As soon as practicable after receiving the order to commence the works, the Bidder shall inform the Owner's Representative of the names of the suppliers from whom he proposes to obtain any materials but he shall not place any order without the approval of the Owner's Representative which may be

withheld until samples have been submitted and satisfactorily tested. The Bidder shall thereafter keep the Owner's Representative informed of orders for and delivery dates of all materials.

Materials shall be transported handled and stored in such a manner as to prevent deterioration damage or contamination failing which such damaged materials will be rejected and shall not be used on any part of the Works under this contract.

2.1 Cement

The Cement shall be Sulphate Resistant Cement grade - 43 in all water retaining structures and SRC 43 grade cement for other structures, confirming to the relevant B.I.S. codes and approved by the Owner's Representative. Manufacturers Test Certificate shall have to be furnished. Minimum cement consumption for RCC M20 shall be considered as 350 kg/cum and for RCC M25 shall be 380 kg/cum. mixing of fly ash in the concrete shall not be considered. Approved Manufacturers of Cement of reputed firm with ISO certification shall be used

2.2 Reinforcement Steel

Reinforcement Steel shall confirm to BIS Specification 432-1966 (with up to date revision) and B.I.S. Specification 1786-1985 (with up to date revision). All Reinforcement Steel will be TMT Grade approved by the Owner.

2.3 Minimum Cement Content

The minimum cement content for each grade of concrete shall be as per table below.

S.No.	Grade of Concrete	Minimum Cement Content in Concrete (Kg/m3 of finished concrete)
1	M15	240
2	M20	300
3	M25	300
4	M30	320

Please refer clause no. 8.2.4 Table no: 5 for reinforced concrete of IS code 456 – 2000 (latest version)

3 SAMPLES AND TESTS OF MATERIALS

The operator shall submit samples of such materials as may be required by the Owner and shall carry out the specified tests directed at the site or at the supplier's premises or at the laboratory approved by the Owner or the Owner's Representative. Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Owner.

The operator shall give the Owner seven days' notice in writing of the date on which any of the materials will be ready for testing or inspection at the supplier's premises or at a laboratory approved

by the Owner. Owner or the Owner's Representative shall attend the test at the appointed place within seven days of the said date on which the materials are expected to be ready for testing or inspection according to the Bidder, failing which the test may proceed in his absence unless instructed by the Owner's Representative to carry out such a test on a mutually agreed date in his presence.

The operator shall in any case submit to Owner within seven days of every test such number of certified copies (3) of the test results as the Owner's Representative may require.

Approval by the Owner's Representative as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Owner's Representative powers under the Contract. The provisions of this clause shall also apply to materials supplied under any nominated sub-contract.

4 ORIENTATION

The works shall be laid out within the confines of the site in order to be compatible with the existing infrastructural facilities, inlet and outlet pipe work/channels and nearby water bodies. Underground services requiring to be relocated in order to accommodate the proposed site layout shall be relocated by the operator to alignments approved by the Owners Representative.

4.1 Buildings and Structures

All the building and structure works shall generally comply with the following Owner's Requirements unless otherwise specified elsewhere:

All building works shall be of reinforced concrete framework.

All external walls shall be in 230 mm thick brick masonry built in cement mortar (1:5). Transoms and mullions of 115 mm x 230 mm size with four numbers 6 mm bars and 6 mm links at 150 mm c/c shall be provided to form panels not exceeding 3,500 mm x 3,500 mm in size. All internal partition walls except for toilets shall be in 230 mm thick brick masonry built in cement mortar 1:5 with transoms and mullions as in (b) above. Toilet partition walls shall be in 115 mm thick brick masonry built in cement mortar 1:4 and shall have transoms and mullions as in (b) above and shall form panels not exceeding 1,200 mm x 1,200 mm in size.

Finishes to concrete liquid retaining structures shall be:

a. F1 - External surfaces, buried

b. F2 - External surfaces exposed and up to 300 mm below ground level

c. F2 - Internal surfaces

Finishes to other concrete structures shall be:

a. F1 – Buried

b. F1 - Exposed, where plastering is specified

c. F2 – Exposed

All internal masonry surfaces finish shall have 12 mm thick plain faced cement plaster in cement mortar (1:4) with neat cement finish on top. Over this, one coat of primer and two coats of plastic emulsion paint of approved quality and shade shall be provided.

All external masonry and concrete with rough board finish shall have 20 mm thick sand faced cement plaster in two coats, base coat 12 mm thick in cement mortar 1:4 and finishing coat 8 mm thick in cement mortar 1:4. Waterproofing compound of approved make and quality shall be added to the cement mortar in proportions as specified by the manufacturer.

All external surfaces above ground level shall have one coat of primer and two coats of waterproof cement based paint of approved quality and shade. A coat of silicone water repellent paint shall also be applied thereon.

Toilet areas, walls and ceilings, shall have one coat of primer and two coats of plastic emulsion paint. Toilet floor slab shall be filled with brick bat coba (broken bricks in lime) and provided with waterproofing as per the specifications of an approved specialist waterproofing company. The finished floor level in toilet areas shall be 25 mm below general finished floor level elsewhere in the building.

The flooring in all areas except toilets and staircases, pumping stations, chlorination building, centrifuge building, workshop, store room D.G. room shall be in 250 mm x 250 mm x 20 mm thick marble mosaic tiles of approved make unless otherwise specified, shade and pattern and placed in cement mortar 1:4 to give overall thickness of 50 mm. Half tile skirting shall also be provided in these areas.

The flooring in the pumping stations, chlorination building, centrifuge building, workshop, D.G.room shall be 60mm thick cement flooring with metallic concrete hardener topping, under layer of 42mm thick cement concrete 1:2:4 (1 cement : 2 coarse : 4 graded stone aggregate 16mm thick nominal size) and top layer of 18mm thick metallic concrete hardener consisting of mix 1:2 (1 cement : 2 stone aggregate 6mm nominal size) by volume & mixed with metallic hardening compound of approved quality @ 3 kg/m2 including cement slurry and rounding off edges.

The flooring in Operator's room, loading/unloading bay, MCC cum Panel room shall be in 25mm thick Kota stone slab of approved shade and pattern and placed over 20 mm thick base of cement mortar 1:4 to give overall thickness of 45 mm. Half tile skirting shall also be provided in these areas.

Toilet areas shall have 450 mm x 450 mm x 25 mm thick polished Kota stone tiles placed in cement mortar 1:4 to give an overall thickness of 50 mm. 2100 mm high dado, in 150 mm x 150 mm x 6 mm thick glazed tiles (approved make, shade and pattern) placed in cement mortar 1:3 shall also be provided in these areas.

The flooring along with skirting in administration cum laboratory building shall be 20 mm thick mirror polished, machine cut granite slab of approved shade and pattern placed in cement mortar (1:4). 150mm high skirting shall be provided in these areas. Granite stone shall be provided for laboratory platforms fixed over double sandwiched cuddappa support as directed and the edges of granite is to be embedded into the wall.

The toilet facilities shall include at least:

a. 3 Nos. Water closets with white porcelain Orissa pan minimum 580 mm long with low level flushing cistern of 10 litres capacity.

b. 4 Nos. urinals of sizes 600 mm x 400 mm x 300 mm flat back type in white porcelain separated by a marble partition of size 680 mm x 300 mm.

c. 3 Nos. wash basins of size 510 mm x 400 mm in white porcelain with inlet, outlet and overflow arrangements.

d. 3 Nos. mirror of size 400 mm x 600 mm wall mounted type fitted over wash basins.

e. 2 Nos. plastic liquid soap bottles

f. 2 Nos. chromium plated brass towel rails minimum 750 mm long.

g. All stopcocks, valves and pillar cocks shall be heavy duty chromium plated brass.

h. All fittings such as `P' or `S' traps, floor traps, pipes, down take pipes etc.

The sewage from toilet blocks shall be led to the wet well of terminal sewage pumping station if present or included under this contract or to the closest gravity sewer.

All staircases shall have 25 mm thick chequered mosaic tiles for treads and 25 mm thick plain mosaic tiles for risers of approved make and shade and half tile skirting set in cement mortar in 1:4 to give an overall thickness of 50 mm.

All concrete stairs shall have aluminum nosing over 2 mm thick rubber strip of width same as nosing for the full length of the tread. Nosing shall be fixed with countersunk screws. Stairways shall be provided to permit access between different levels within buildings. Staircase shall be minimum 1000mm wide unless specified otherwise. Staircases in general shall not be steeper than 40°. Staircases having space constraints may be steeper than 400. The maximum vertical run for a single flight of stairs shall be 3.0 M.

All roof tops and overhead tanks shall be made accessible with ladder provision. Vertical step ladders fitted with landing point extensions will be permitted where considered appropriate by the Engineer to access areas not frequently visited.

Steel staircases shall be constructed of standard channel stringers with M.S. grating treads 25mm thick with non skid nosing. Steel Ladders shall be minimum 600mm wide and shall not exceed 6m of straight run. The ladders shall be painted with epoxy paint.

All hand railing shall be provided with G.I "C" Class Pipe confirming to latest Indian standards. The minimum height of hand railing shall be 1m.

The reinforced concrete roofs shall be made waterproof by application of an approved roof polythene / bitumen membrane / brick bat coba. The finished roof surface shall have adequate slope to drain quickly the rain water to R.W down take inlet points.

All roof floors shall have minimum 750 mm height solid concrete block parapet wall where accessible is provided and shall have minimum 300 mm height solid concrete block parapet wall where accessible is not provided.

For roofing drainage, cast iron or uPVC rainwater down takes with C.I. bell mouth or u PVC bend and C.I. or uPVC grating at top shall be provided. For roof areas up to 40 sq m minimum two nos. 100 mm diameter down take pipes shall be provided. For every additional area of 40 sq m or part thereof, at least one no. 100 mm dia. down take pipe shall be provided.

Top surfaces of chajjas and canopies shall be made waterproof by providing a screed layer of adequate slope or application of an approved roof membrane and sloped to drain the rain water.

Building plinth shall be minimum 450 mm above average finished ground level around building or high flood level whichever is more.

All doors, windows, rolling shutters shall have lintels above. Chajja protection to lintels on external walls shall be such as to prevent the rain water splashing into the building. Chajja projection of minimum 750 mm for rolling shutters, 600 mm for doors and 450 mm for windows shall be provided to prevent the rain water splashing into the building. Chajja shall be projected 150 mm on either side from size of doors/windows/rolling shutters. All windows and ventilators shall have 25 mm thick Kota stone sills bedded in cement mortar (1:3).

All doors and windows shall be painted with two coats of synthetic enamel paint over a priming coat (ready mixed Zinc Chromate Yellow primer of approved brand and manufacturer confirming to I.S.: 127-106, 341 and 340).

All doors, windows and ventilators shall be made of aluminium confirming to latest version of IS: 1948. All fixtures for doors, windows and ventilators shall also be of aluminium. Aluminium grills

shall be provided in all the windows. Doors shall be in two panel and both panels shall be glazed/unglazed. Minimum weight of aluminum doors & windows shall be as follows

1. Single Glazed Window : (Weights indicated shall be aluminum)
    - Open able Outer Frame: Weight 0.70 kg/Rmt
    - Shutter Frame: Weight 0.97 kg/Rmt
    - Intermediate Mullion: Weight 0.97 kg/RMt.
    - Beading: Weight 0.31 kg/Rmt
    - Fixing Louvers windows/ventilators
    - Outer Frame: Weight 0.46 kg/Rmt
2. Double Glazed Window
    - Outer Frame: Weight 0.72 kg/Rmt
    - Shutter Frame: Weight 0.97 kg/ Rmt
    - Intermediate Mullion: Weight 0.98 kg/ Rmt
    - Beading: Weight 0.31 kg/ Rmt
3. Sliding Windows
    - Bottom & Top Frame: Weight 0.70 kg/m
    - Shutter Frame: Weight 0.42 kg/m
    - Interlocking Section: Weight 0.47 kg/m
4. Aluminum Door
    - Outer Frame: Weight 2.508 kg/Rmt
    - Shutter Frame: Weight 2.508 kg/Rmt
    - Bottom Stile: Weight 2.508 kg/Rmt
    - Glazing shall be 5.5 mm thick glass.

a) Openings of the windows & ventilators shall be minimum 25% of the external wall area.
b) Ventilator shall be provided where height of floor is more than 3m.
c) All windows and ventilators shall have wire mesh. Frame of doors, windows and ventilators shall be of aluminum of standard rolled section. Doors, Windows and Ventilators shall be of size as per schedule to be submitted by the Operator for approval of Engineer. The minimum size shall be as per below:
    a. Door of opening size 1.2m x 2.1m
    b. Door of opening size 0.75m x 2.1m for toilets
    c. Glazed widows of minimum size 1.2m x 1.2m
    d. Ventilators of minimum size 0.6m x 0.6m
d) Rolling shutters shall be made of 80 x 1.25 mm MS laths. Rolling shutter shall be of minimum size 3m wide x 3.0m high. Rolling shutter shall be provided in MCC cum panel room, chlorine toner shed, at entry and exit of the pump house for access to pumps, motors, valves, panels and as wherever required.
e) All concrete channels and ducts used for conveying liquid shall have inside finish of type F2. The width of concrete channels shall not be less than 500 mm. All open channels shall be provided with Stainless Steel Type 304 hand railings or concrete walls to a minimum height of 1 m from

the access surface elevation. All concrete surfaces of structures conveying raw sewage or primary effluent shall be protected with Epoxy Coating as specified in Clause 10.21.

f) Kerbs to be provided below the hand railing on the catwalks/pathways should be as per relevant sections of Factory Act. It shall not be less than 150mm.
g) All exposed surfaces of inserts embedded in concrete shall be painted with two coats of enamel paint over one coat of red oxide zinc chrome primer. Surfaces in contact with concrete shall not be painted.
h) All structural steel members shall be painted with two coats of enamel paint over one shop and one field coat of red oxide zinc chrome primer.
i) All rooms in the treatment plant buildings shall be provided with appropriate sign boards indicating the function of the rooms involved written in Marathi and English Languages.
j) The design of buildings shall reflect the climatic conditions existing on site. Process buildings shall as far as is possible permit the entry of natural light , and the use of glazed panelling shall be kept to a minimum and preference given to wall openings protected by weather canopies.
k) Emergency exit doorways shall be provided from all buildings in order to comply with local and international regulations .Stairways and paved areas shall be provided at the exit points.
l) Toilet blocks in process buildings and control blocks shall be provided with a sink with two drinking water taps of 20 mm size with adequate inlet and outlet connections.
m) All the walkways in shall have minimum 1 m width and shall be covered with mosaic tiles.
n) Hand railings shall be made up of G.I "C" Class Pipe confirming to latest Indian standards.
o) For structures containing water or process liquid, the top of the wall shall be at least 0.5m higher than the maximum water surface level calculated at high flood level and peak plant flow. The top level of internal plant roads and approaches shall be at least 0.5m above the site High Flood Level.
p) If the High flood level is more then Ground Level then road shall be constructed on the earthen embankment. Earthen embankment shall be constructed with side slope of atleast 2 horizontal to 1 vertical. Stone pitching shall be provided at both sides of the embankment as per IS: 8237. Top width of embankment shall be taken as 6.0m. Top level of embankment shall be 0.5m above high flood level. Excavated earth from the plant can be used for embankment construction and if required, extra earth can be borrowed from the borrow pit as approved by Engineer.

4.2 Roadways, Pathways & Hard standings

a. Internal roads shall be provided around the treatment plant to link in with the existing units and the approach road and permit access to the plant for necessary maintenance, delivery of consumables and personnel access. All roads shall be of asphalt macadam and minimum 3.75 meters wide. Vehicular access shall be provided for all Plant structures and buildings. All roads shall be provided with drainage and shall be constructed to prevent standing water.
b. Hard standing areas with shading facility shall be provided to permit the parking of vehicles involved in the delivery of consumables from blocking site roadways during unloading or loading..

5 Site Drainage

The operator shall provide a site drainage system. The system shall comprise of the following:

- Storm Water Drainage

- Foul Drainage (if any)

5.1 Storm Water Drainage

(a) Storm water drains adjacent to the existing and proposed roads (under this Contract) shall be sized for a rainfall intensity of 50 mm/hr, allowing for 100% runoff. Drains adjacent to roads shall be in stone masonry in CM (1:4) of appropriate thickness, topped with 75 mm thick M10 concrete and internally flush pointed in cement mortar (1:4), 20 mm thick. The minimum width of drain shall be 450mm.

(b) The storm water drainage system shall also be designed to cater the run-off from the existing plot areas and structures, if necessary depending upon the site topography.

5.2 Foul Drainage

(a) The foul drainage system shall accept discharge from toilets, washrooms, offices and the laboratory. The foul drainage system shall be conveyed to the nearest public sewer wherever exist or to a pumping station or a new soak pit followed by septic tank shall be constructed.

6 Cable and Pipe work Trenches

(a) Cable and pipe work trenches shall generally be constructed in reinforced concrete. However, 500 mm x 500 mm size or smaller trenches, not on fill may be constructed in 200 mm thick solid cement concrete blocks over 150mm thick M 15 PCC base. The trenches will be 20mm thick plastered internally with cement mortar (1:4) and externally in cement mortar (1:3).

(b) All floor cut-outs and cable ducts, etc. shall be covered with M20 precast concrete covers (Heavy Duty) or MS grating as per direction of Engineer in outdoor areas and M.S. chequered plates, suitably painted of adequate thickness in indoor areas. All uncovered openings shall be protected with hand railing. The pipe, cable trenches shall be suitably sloped to drain off rainwater to a suitable location.

(c) Layout of trenches outside the buildings shall allow space for construction of future trenches where necessary with due consideration for planning for future developments. This aspect shall be brought to the notice of the Engineer while planning the works.

7 Pipes and Ducts

(a) R.C.C ducts for drainage shall have minimum 1 metre pre-cast cover (M20 concrete, Heavy duty) while laid under roads. Access shafts of size not less than 600 mm x 1000 mm shall be provided.

(b) All drains (except storm water drains adjacent to roads) shall be covered and designed structurally for appropriate loads.

8 Main Gate

(a) Proposed treatment plant shall have minimum one main gate to access the plant irrespective of existing gate at the premises of existing plant site. Minimum width of main gate shall be 6m. Main gate shall have 1.5m wide wicket gate. Main gate shall have as external framework of GI pipes and internal framework of MS flats. Gate shall be fixed on RCC columns. The design and pattern of gate with drawing shall be submitted for approval of the Engineer. The gate shall have all necessary hinges, locking arrangement, rolling arrangement and painting complete, as approved by the Engineer.

9 Landscaping

(a) The site shall be landscaped once the works are substantially complete. Landscaping area shall be marked in the layout plan of STP.

(b) Landscaping shall include planting of suitable trees and development of lawn/grassed areas. Landscaping in general shall meet ecological and environmental conditions of the site. Road widths shall determine the size of the tree height and spread to be selected for planting. Trees suitable for local conditions shall be selected as approved by the Engineer. Medicinal and fruit trees shall be avoided. Landscaping shall be maintained in good condition till the completion of the contract.

10 Tree Planting

(a) Pits dug a few days in advance of actual planting shall be allowed to weather and be filled with top soil mixed with manure. Size of the pit shall be as per standard requirement. Only one tree shall be planted in each pit. A guard made of bamboo with wire mesh or bricks or M.S. ring as approved by Engineer, shall be provided.

11 EARTH WORK AND EXCAVATION

11.1 General

Applicable provisions of Conditions of contract shall govern work under this section. The Bidder shall report any water conditions encountered and will be given directions as to the type of procedure to be adopted in such cases. The Indian Standards wherever referred to herein shall be the latest edition of such Standards.

11.2 Excavation for Foundation, Trenches, Pits, etc.

All foundation trenches shall be excavated to the full-widths and depths shown on the drawings or to such greater or smaller depths as may be found necessary or so ordered to him.

Should any excavation be taken down below the specified levels, the operator shall fill in such excavation at his own cost with concrete as specified for foundations, well rammed in position until it is brought up to the level. The operator shall notify to the Owner when the excavation is completed and no concrete or masonry shall be laid until the Owner has approved of the soil for each individual footing, rafts, etc.

The operator shall keep the site clear of water at all times. To this end he shall provide arrangements for building or pumping of water as required. All foundation pits shall be refilled to the original surface of the ground with approved material, which shall be suitably consolidated. No extra will be paid for bailing out water collected in excavation due to rains, ordinary springs etc.

11.3 Earth Filling

The space around the foundations in the trenches or sites shall be cleared of all trash and loose debris and filled with approved excavated earth, all clods being broken. Filling shall be done in 200 mm layers; each layer to be moistened and well rammed. This shall be done in step with the foundation masonry or foundation concrete work the difference between the tops of masonry and filling not exceeding a day's work. The top of filling shall be finished off 150 mm above ground level to allow for settlement only pit or depressions occurring within twelve months of completion shall be filled up and rammed by the Bidder or his own expense.

11.4 Shoring, Planking & Shuttering

Shoring shall be done when sides of excavation do not stand up by themselves and sloping or stepping is not feasible or economical.

The shoring shall consist of vertical planks 38 mm to 50 mm thick and of Available width and required length. The planks shall be held by walling, vertical places and struts, and this to form a frame. The struts shall be not more than 1.5 m. apart, and the timber shall be sufficiently strong not to wrap. The planks shall be held tight by means of wedges between them and walling. The planks shall be driven in by cutting the earth beneath their toes or driving each plank separately after removing the wedges. The planks shall be driven in vertically and shall be set touching one another.

The shoring shall be adequate to prevent caving in of the trench walls of subsidence of areas adjacent to the trench. In narrow trenches of limited depth, a simple form of shoring shall consist of a pair of 40 to 50 mm thick and 30 cm wide planks set vertically at intervals and firmly strutted. For wider and deeper trenches a system of wall plates (Wales) and struts of heavy timber section is commonly used. Continuous sheeting shall be provided outside the wall plates to maintain the stability of the trench walls. The number and the size of the wall plates shall be fixed considering the depth of trench and type of soil. The cross struts shall be fixed in a manner to maintain pressure against the wall plates which in turn shall be kept pressed against the timber sheeting by means of timber wedges or dog spikes.

11.5 Wet Foundation:

As soon as water is encountered in foundations, a sump shall be dug for removing the water. The bottom level of this sump shall be kept 500 mm or more below the lowest level of the excavation. The difference between the levels of the bottom of the excavation and of the sump shall be kept

constant as excavation depth is increased. If the excavation is to be taken to a substantial depth and a large quantity of water is encountered, two sumps shall be excavated and deepened alternatively so that the pump does not require to be stopped whilst the sump is deepened.

11.6 Earthwork in Site Levelling

All materials required for the purpose of filling shall be taken from high areas and stockpile, which are to be levelled to specified reduced level as required. Roots, sods, wood or other organic matter shall not be placed in the fill. Before a new layer is laid the existing ruts or other unevenness in the surface of the layer shall be removed and the surface of the layer shall be scarified and roughened by borrowing and ploughing to obtain bond with the material to be placed. The materials shall be placed continuous horizontal layers not greater than 200 mm thickness. The earth fill shall be kept slightly sloping from center to the edges to avoid formation of pools during the rain.

Section 4. CONCRETE

12 Concrete

12.1 General

Applicable provisions of Conditions of Contract shall govern work under this section.

All concrete work, plain or reinforced shall be carried out in strict accordance with this specification and any working drawing or instructions given from time to time to the operator. The operator's rates shall allow for wastage in all materials as well as for all tests of materials and for concrete. No concrete shall be cast in the absence of the Owner's representative or any other person duly authorized by him. The operator's Engineer shall personally check that both the formwork and reinforcement have been correctly placed and fixed, and shall satisfy himself that all work preparatory to the casting is completely ready, before calling the Owner's representative for final inspection and approval and for which purpose at least 24 hours' notice shall be given by the operator. The Indian Standards wherever referred to herein shall be the latest edition of such Standards.

12.2 Cement

Cement shall be ordinary Portland cement as per I.S. 269 or Sulphate Resistance Cement as per IS 12330. Cement tests shall have to be carried out at operator's expense as and when directed.

12.3 Aggregate

The fine and coarse aggregate shall conform to IS: 383 & IS: 456. The necessary test indicated in IS – 383 and IS – 456 shall have to be carried out to ensure the acceptability and shall meet prior approval of the Owner.

12.4 Reinforcement

The epoxy coated reinforcement conforming to IS 13620 or latest relevant Indian Standards shall be of tested quality. It shall also comply with relevant part of IS. 456. All epoxy coated reinforcement shall be clean and free from dirt, oil, paint, grease, mill scale or loose or thick rust at the time of placing. The reinforcement shall be bent to the shapes shown on the drawings prior to placing and all bars must be bent cold. The Steel shall be placed in such a way that it is rigidly held in position while concrete is being cast. The correct clearance from the form shall be maintained by either precast mortar blocks or by metal supporting chairs to be supplied by the operator free of charge. The intersections of rods crossing one another shall bound together with soft pliable wire No. 16 S.W.G. at frequent intervals so that reinforcement will not be displaced during the process of depositing concrete. The loops of binding wire should be tightened by pliers.

12.5 Water

Water shall conform to IS: 456, clean and free from alkali, oil or injurious amounts of deleterious material. As far as possible, the water should be of such quality that is potable. If any chemical

analysis of the water is necessary and ordered the same shall be got done at approval laboratory at the operator's expense.

12.6 Concrete Proportioning

The concrete proportion shall be as indicated on the approved drawings and shall conform to IS: 456.The minimum cover to main reinforcement shall be 25 mm or the diameter of the bar whichever is greater. In the case of surfaces exposed to corrosive action as in sumps, the cover shall be increased up to 50 mm as directed.

Type of joints, spacing of joints, use of all jointing materials and other features pertaining to the provision of movement joints in liquid retaining structures shall be got approved prior to commencement of construction. All reinforced concrete work shall be thoroughly and efficiently vibrated during laying by use of vibrators.

For liquid retaining structures M:30 grade (SRC) shall be used, the same shall be deemed to be satisfactorily watertight if the external faces show no signs of leakage and remain apparently dry over the period of observation of 7 days after allowing a period of 7 days for absorption after filling. Covered tank, where all faces are not accessible for inspection, shall be kept filled with water for 7 days and thereafter the drop of water over the next 7 days shall not exceed totally a depth of 12.5 mm per day. Approved corrective measures, if necessary, shall be undertaken by the Bidder at his own expense. The operator shall use appropriate water proofing compound during the process of pouring of concrete in required proportion.

12.7 Workmanship

All concreting work shall be carried out according to the IS: 456 'Indian Standard Code of Practice for Plain and Reinforced Concrete for general Building Construction'. It should, however, be note that for Over 60 m3 of concrete placed or for every one day's work a minimum of 6 (six) cubes shall be cast for test purposes and tested at the operator's expense in an approved laboratory.

12.8 Formwork

The formwork shall conform to IS: 456. Centering ; Only steel / plywood centering shall be used

12.9 Curing

The concrete shall be cured according to IS: 456 or as directed.

12.10 Concrete Finish:

The concrete surface on removal of form work shall be such that no finishing is necessary. If however the surface is not satisfactory, the operator shall, if so instructed, remove unwanted projecting parts by chipping and smoothening the surface with cement at his own expense and coated with corrosion resistance epoxy paint. .

12.11 Construction Joints / Water Stops

These shall be in accordance with IS: 456 or as shown on the approved drawings.

The centering for forming, the construction joint shall be firmly fixed and adequately slotted for reinforcement extending beyond the joint. If any concrete has set, care shall be taken not to disturb the reinforcing steel in casting the second half of a member with a construction joint and thereby crack the concrete previously placed. The PVC joints shall be of the 'rebated' or 'keyed' type and shall have a minimum width of 300 mm inclined 'feather' or 'straight joints' shall not be permitted. The Joints/Water stops shall be got approved by the Engineer before their placement into the structure.

12.12 Expansion Joints

Expansion joints shall be provided at positions shown on the approved drawing or as directed and shall comply strictly with the details shown on construction drawings. Reinforcement shall not extend across any expansion joint and the break between the two sections MUST be complete. Unless otherwise specified, the gap shall be filled with an elastic joint filler consisting of the following ingredients (by weight), preheated to a temperature of 190 (375 F).

a) Very find sand 60%

b) Hot bitumen emulsion 33%

c) Cement 5%

d) Fine chopped hemp 2%

12.13 Operator's Supervision

The operator shall provide constant and strict supervision of all the item of construction during progress of work, including the proportioning and mixing of the concrete and bending and placing of reinforcement. Before any important operation such as concreting or stripping of formwork is begun, adequate notice shall be given.

12.14 Laying Cement Concrete in Foundations & Under Floors

Before laying the concrete, the bottom and sides of the trench up to the proposed height of the concrete shall be moistened. The concrete shall be tamped immediately after laying.

12.15 Protective Epoxy Paint Treatment:

Epoxy Paint of standard specifications manufactured/purchased from a reputed firm approved by IS shall be applied to the outside Concrete surface of R.C.C. Underground sump and all mild steel works within and near the sump. The coverage capacity of layers shall be at 125 Microns D.F.T. 7.60 sq. mt. /Litre .(Exposed steel inserts, embedded in concrete and ladders, submerged in water shall be provided with epoxy paint 360 microns)

12.16 Chases, Holes, Recesses and Inserts:

All chases, holes and recesses for foundation bolts, various services and other requirements must be formed as shown on the drawings or as directed by the Owner's Engineer during the execution of the work, without extra charge. The operator shall fix all necessary inserts in the concrete for support of hangers for pipes and cables, ceiling clamps for lights and fans or for duct etc. If any of the inserts are to be supplied by other agencies not extra payment will be made to the Bidder for placing the inserts position.

12.17 Load Testing of Structures

Load tests shall be carried out in accordance with IS: 456, if required by the Executive Engineer.

Section 5. BRICK WORK

13 Brick Work

13.1 General

Applicable provisions of Conditions of Contract shall govern the work under this section. The operator shall build the whole of brickwork shown on the drawings with first-class bricks in cement mortar. The Indian Standard wherever referred to herein shall be the latest edition of such Standards.

13.2 Materials

Bricks	The bricks used shall generally conform to IS: 1077
Cement	The cement used shall conform to IS: 269
Sand	The sand used shall conform to IS: 1344
Water	The water used shall be clean and free from injurious amounts of deleterious materials. As far as possible, the water should be of such quality that it is potable

13.3 Mortar Proportion

Unless otherwise specified, the proportions of cement-sand-mortar by volume for various classes of work shall be as under:

Type of work	Cement	Sand
Ordinary brickwork for building	1	5

Brickwork in pillars	1	4
Half-brick thick or brick-on edge partition wall	1	4

13.4 Workmanship

The cement and sand shall be thoroughly mixed dry in specified proportions. Water shall then be added by a sprinkler just sufficient to make a stiff and workable paste. The mortar shall be used within half an hour of mixing. The mortar, which is unused within half an hour of mixing, shall be removed from the site.

13.5 Brick-work

All the bricks shall be kept in water till they are completely soaked & only thoroughly soaked bricks shall be used in the work. The operator shall set out & build all brickwork to the respective dimensions, thickness and height, as shown on the drawings.

The operator shall build all brickwork uniformly, no one portion being raised more than 1 meter above another at one time. The operator shall keep wet all brickwork for at least 10 days after laying. The surface of unfinished work shall be cleaned and thoroughly wetted before joining new work to it.

In curved brickwork, the bricks shall be dressed to shape obtain joints redial to the curve. The joints shall not exceed 12 mm in thickness and should extend the full thickness of the curved brickwork.

13.6 Damp-proof Course

Damp-proof course shall be provided at positions where ever necessary. In masonry walls of buildings, it shall normally be placed above the external ground level. It shall be laid for the full width of solid walls and shall be prepared as specified.

A layer of cement concrete 1:2:4 (cement: sand: coarse aggregate) mix, and of specified thickness shall be provided. If a damp-proof course requiring the use of bitumen felt is specified, bitumen used shall conform to IS: 1322 and workmanship shall conform to IS: 1609. All exposed surface of the damp-proof course shall be finished fair and smooth. The external edge shall be chamfered if specified, and shall be finished flush with masonry surface.

Section 6. FLOORS AND PAVEMENTS

14 General

Applicable provisions of Conditions of Contract shall govern work under this section. The Indian Standards wherever referred to herein shall be the latest edition of such standards.

14.1 Types of Floors and Pavements

The principal types of floors and pavements considered in this specification are as under:

a) Cast-in-situ artificial stone flooring (plain)

b) Natural stone slab flooring

c) Pre-cast artificial stone flooring (Plain/Textured)

14.2 Materials

- **Cement**

  Ordinary Portland cement and white and colored cement shall conform to IS: 269.

- **Lime**

  Where lime is required to be used, it shall conform to IS: 712 and slaking of lime shall be done according to IS: 1635.

- **Aggregates**

  The aggregates shall conform to IS: 383. Fine aggregates shall range in size from 1.5 mm to 6 mm. unless specified otherwise. Not more than 5 percent of grains shall pass IS sieve 15 (0.151 mm mesh) and not more than 10 per cent shall pass IS sieve 30 (0.296 mm mesh). Coarse aggregate shall all pass through 19 mm mesh, unless specified otherwise and shall be graded as directed. The coarse aggregate for concrete pavements for approaches and driveways shall all pass through 25 mm ring and shall be formed by mixing 80% of 25 mm to 12 mm size and 20% of 12 mm to 6 mm size. The above proportion shall be altered to suit workability if so approved.

- **Natural Stone Slabs**

  The stone slabs if used shall be best quality obtainable from Neemuch, Kotah, Shahabad, Tandur or other places as specified and shall be hard, even durable, uniform in color and free from cracks, flakes and other defects. No stone shall be thinner at its thinnest part than 25 mm. unless otherwise specified; the stones shall be 300 mm x 300 mm in size dressed square and with straight edges. The top surface of stones shall be smooth or polished as specified and edges dressed to a true fir or chisel dressed as directed.

- **Water**

  Water shall be clean and free from injurious amounts of deleterious materials. As far as possible, water shall be of potable quality.

14.3 Cast in situ Artificial Stone Flooring

Grey and colored artificial stone is to be composed of 4 parts of fine stone chips 12 mm and below 2 parts of sand and properly screened to one part of cement. The topping in all cases and to consist of clean and fine sand and cement (2:1) and sufficient skin thickness to be kept and

finally trowelled with neat cement finish perfectly smooth to satisfaction. In the case of dados and skirting the total thickness is to be 19 mm of which the bottom layer is to be 12 mm and the toping 6 mm thick in all cases both the layers are to be laid simultaneously without hiatus so that it will in effect be one complete layer; the mixing be made in two different lots.

14.4 Natural stone slab flooring

The stone slabs shall be evenly and firmly bedded to the required level and slopes as directed. Unless otherwise specified, the thickness of joints shall not exceed 6 mm for unpolished stone slabs and 1 mm for polished stones. The joints shall be raked out to an adequate depth and pointed flush or slightly sunk, as directed, with cement-sand mortar of 1:2 proportions. The stone slabs shall be laid to pattern which shall be approved prior to ordering the stones. The flooring shall be kept wet with wet sand or water for at least seven days. The flooring shall be well washed and shall be perfectly clean and free from all mortar stains etc. when completed

Section 7. PLASTERING AND POINTING

15 General

Applicable provisions of Conditions of Contract shall govern work under this section. The Indian Standards wherever referred to herein shall be the latest edition of such Standards.

15.1 Cement Plaster Materials

Cement shall confirm to IS: 269 and Sand shall confirm to IS: 1542. Other materials, tools and Accessories, they shall confirm to relevant IS codes listed above and to the requirements specified in IS: 1661.

15.2 Proportioning and thickness of Cement Plasters:

The proportions of materials, number of coats and thickness of each coat shall be as a specified or as directed.

15.3 Workmanship

Unless otherwise specified, all plasterwork shall be carried out as per IS: 1661 “Code of Practice for Cement and Cement-Lime Plaster Finished on Walls and Ceilings”.Special finishing textures to the plaster shall be executed according to Clause 16 of IS: 1661 and/or as directed.

15.4 Curing

After the completion of the work, the pointed face shall be kept well wetted for at least for 10 days in the case of Cement Pointing.

Section 8. PAINTING AND GLAZING

16 General

Applicable provisions of Conditions of Contract shall govern work under this section. The Indian Standards wherever referred to herein shall be the latest edition of such standards.

16.1 Painting of Iron and Steel Work

Painting of iron and steel work shall generally be carried out as per IS: 1447 (Part I).

16.2 Preparation of Surfaces:

The surface to be painted shall be cleaned free of dirt, oil rust, mill scale and be thoroughly dry before painting. Cleaning, degreasing, and descaling wherever necessary shall be carried out as specified in IS: 1477 (Part I) and the method adopted for surface preparation shall have prior approval.

16.3 Primer Coat:

Unless otherwise specified, the primer coat for steel and iron work shall be of Red Lead paint, conforming to IS: 102. The Red Lead primer shall be applied by means of approved brushes. The Red Lead paint shall be allowed to dry sufficiently hard before the application of the succeeding coat A red lead painted surface shall not however be left exposed permanently, as it is liable to heavy chalking. The primer coat shall be applied as specified in IS: 1477 (Part-I) and the number of coats shall be as necessary for as directed.

16.4 Finish Coat

The type of intermediate and finish coat and the number of coats to be applied shall be as necessary or as directed. Intermediate and finish coats may be oil bound bituminous, aluminum or other types of paints. Aluminum conforms to IS: 165. The intermediate and finish coats for structural steel work, sheet metal work and cast iron work shall be applied as specified in IS: 1477 (Part-I).

Section 9. Glazing Materials

17 Glass

All glass used in the work shall be best quality glass free from specks, bubbles, smokes, wanes, air holes and other defects, Unless other-wise specified, sheet glass shall be transparent and of the following weights. For panes up to 600 mm x 600 mm in size, glass weighing not less than 7.97 kg/sq.m. shall be used for panes 750 mm x 750 mm to 900 mm x 900 mm size, the weight of glass shall be 9.76 kg/sq.m. Unless other-wise specified, for sizes of glass above 900 mm x 900, plate glass shall be used.

17.1 Putty

Putty for use on wooden frames shall conform to IS: 419 and on metal frames to IS: 420.

17.2 Workmanship

All glass be cut according to the sizes required as per drawings. Glazing of metal doors, windows and ventilators shall conform to IS: 1081 and glazing of timber doors, windows, and ventilators shall conform to IS: 1003, unless specified otherwise. For glazing wooden doors and windows, the wooden frame, particularly the rebate, shall be well oiled to prevent oil from putty being sucked in by wood. The Bidder shall thoroughly clean all glass and replace all putty or glass damaged during the work.

Section 10. MISCELLANEOUS STEEL AND IRON WORK

18 General

Applicable provisions of Conditions of Contract shall govern work under this section.

The Indian Standards wherever referred to herein shall be the latest edition of such Standard.

18.1 Iron Grills

The grills for Windows, verandahs, balconies, etc. shall be of mild steel or wrought iron as specified for the work. The design of grills and shapes and sizes of various components shall be as approved. The edges, angles and corners shall be clean and true to shape. The joints shall be mechanically inter-locked and overlapping areas spot welded in such a way that the grill is rigid.

Where moulded grills are specified, the moulded work shall be as approved, and shall have clean, straight and sharply defined profiles. The operator shall do the necessary cutting, fitting, drilling, tapping, scribing etc. required to fix grills to adjacent surfaces. The grills shall be fixed plumb, in line and level. Unless otherwise specified, grills shall be painted with two coats of red lead paint conforming to IS: 102 before they are fixed.

18.2 Rolling Shutters

Rolling shutters, where specified shall be of the size to suit the openings and shall be positioned as shown on the drawings and/or as directed.

The rolling shutter shall be fabricated from 18 B.G. Steel and machine rolled with 75 mm rolling contras with effective bridge depth of 12 mm lath sections, interlocked with each other and ends locked with malleable cast iron. The guides shall be either rolled or pressed deep channel sections 75 mm deep and 25 mm wide fitted with necessary fittings and fixtures.

The suspension shaft shall be formed from solid drawn seamless tubes 60 mm O.D. of wall thickness of 25 mm in 3 segments coupled 2 with 2 pairs C.I. dog-tailed flange coupling forming one complete unit eliminating deflection in the center to a minimum.

The springs shall be imported high tensile English flat springs 50/60 mm breadth and 1.6/1.8 mm thickness hardened and tempered. These shall be fitted inside the fabricated housing on either ends,

which counterbalance the shutter curtain. The ball bearings shall be double row self aligning ball bearing fitted inside C.I. housing fixed on side brackets holding the suspension shaft at either end

.The suspension of the curtain shall be belted in specially fabricated cages formed from MS flats, and plates all are welded. The hood cover shall be made of 20 gauge G.P. sheets with necessary stiffeners and framework to prevent sag, the bottom lock plate shall be made of 3 mm thick M.S. plate and 95 mm wide reinforced with angle/T iron of suitable section with 6 mm dia. M.S.rivets interlocked with last stride of curtain.

The locking arrangement shall consist of hasp and staple on the bottom plate, lockable from both sides. Unless otherwise specified, for overall area of rolling shutters up to 9 sq. m. pull and push type hand-operated shutters shall be used, for area between 9 and 12 sq. m. Pull and Push type shutters shall be provided with ball bearings; for area larger than 12 sq. m, Mechanical Gear type shutters shall be supplied.

18.3 Collapsible Gates

Collapsible gates shall be of the size and type as specified by the Owner's Engineer. The gates shall be manufactured out of M.S. channel pickets of size 20 mm x 10 mm and flats 20 mm x 6 mm. The top runner flat shall be at least 50 mm x 12 mm in section. The bottom guide shall consist of a channel or two angles of specified size laid in the flooring to guide the free movement of the gate. The gate shall move in the guide channel on rollers of adequate size fixed at the top and bottom of the gate as specified. The gate shall be painted with one coat of red lead paint conforming to IS : 102 before fixing in position.

Section 11. WOODWORK AND JOINARY

19 Wood:

All wood required to be used, shall be dry, well-seasoned, Bulsar teak wood and shall be free from knots, cracks or any other kind of defects frames for doors and windows.

19.1 Jointing Materials:

All nails, screws, fixtures shall be of standard quality as approved by the Owner.

19.2 Cutting Edges:

Cutting edge for well to be fabricated as per the drawing approved by Owner's engineer The structural steel to be used, should confirm to IS: 226-1961 and IS: 2062-1962. The steel shall be free from defects as mentioned in IS: 226-1962 and shall have a smooth uniform finish. Material shall be

free from loose mile scale, rusting or other defects affecting its strength and durability. The test certificates shall have to be submitted for the structural steel used in cutting edge.

21 ILLUMINATION:

All internal and external areas shall be provided with lighting. The illumination levels to be achieved shall be as follows:

AREA	LUX
Office and labs	300 Lux
Switchgear Room	200 Lux
Control Room	300 Lux
Pump House	200 Lux
DG set room	200 Lux
Chemical and general store	150 Lux
Chemical Plant room	200 Lux
Other indoor areas	100 Lux
Outdoor plant from and	50 Lux
Building entrance	100 Lux
Indoor Plant Area	200 Lux
Outdoor Plant Area	50 Lux
Transformer Area	100 Lux
Roads	10 Lux

Fluorescent luminaries shall be used primarily for internal lighting. High pressure vapour or metal halide type luminaries shall be used in indoor application where their use is appropriate. If mercury or metal halide is used in indoor then they should be supplemented with fluorescent luminaries to assure that minimum illumination levels are maintained following momentary power dips. All other internal

areas shall be lit with fluorescent luminaries. Where specific recommendations of lux level are not covered above, illumination level in such areas shall be finalized in consultation with Owner.

Owner shall be required to measure levels of illumination after completion of lighting installation work and short fall in illumination level shall be made good by the Bidder. Complete set of calculations showing, room, index, copy MF shall be given during detailed engineering.

21.6.1 Switches / sockets of piano type shall be used in general and in offices of staff, control room, MMI room, decorative modular switches shall be used. Suitable fans shall be provided in rooms/ plant areas as per standards. For exhaust fans it must be provided in panel rooms, pump rooms, chemical rooms, stores, toilets and at least 20 air changes per hour must be maintained.

21.6.2 The following type of lighting fixtures shall be proposed:

a) Decorative type 2x36W fixtures for fluorescent luminaries inside office/ administrative buildings and control rooms.

b) Corrosion resistant fixture with canopy made of FRP for fluorescent luminaries for corrosive areas like chlorine handling or chemical store or area with corrosive smell/gases etc.

c) Industrial type vitreous enameled fixture for fluorescent luminaries inside 415V switchgear, MCC room and pump house.

d) In outdoor process areas, lighting fixtures shall be sodium vapour type subjected to minimum of IP protection class.

e) All outside lights as plant field lights, building outside lights, flood lights etc. which are to be switched on only during night hours should be controlled through photo cell/ clock switch installed at a central place. All lights shall have minimum IP65 protection class.

f) Street lighting wiring shall be through buried underground.

g) All bulb fittings (except fluorescent lamps) will have screw type caps.

h) For outdoor lighting, the lighting feeder shall be operated through a contactor, controlled by photocell/ clock switch and shall also have a manual by pass switch.

21.6.3 Luminaries shall be installed to permit ease of maintenance i.e. it shall not be necessary to shut down plant in order to carryout maintenance or to access luminaries located over areas of water etc. The Operator shall provide all equipment necessary to carryout maintenance on the lighting installation and demonstrate its operation to the satisfaction of Owner

21.6.4 Indoor lighting circuit will be arranged in such a way that 50% lighting can be put off in each room through switches. All lighting circuits will be wired with 2.5sq.mm. Stranded copper wire or through 2.5 sq.mm. armoured cable laid in cable trays. Sub circuit from switch to fixture could be wired with1.5 sq.mm. stranded copper wire in MS conduits or armoured copper cable of similar size provided total voltage drop in any lighting distribution board to last lighting point shall not exceed 2%. All lighting circuits will have separate neutral, separate earth from Lighting Distribution Board. For illumination of roads, outdoors areas where operation of equipment or units required and sub station area, lighting fixtures of appropriate type (such as street lighting type, flood lighting type, post top lanterns etc.) incorporating high pressure sodium vapour lamps shall be proposed. Street light poles shall not have less than 7500 mm height above the finished road level and the arm shall not project more than 1200 mm along the road width. Poles of bigger heights may also be used if some outdoor areas are to be illuminated. Poles of 4 / 4.5 Mtrs using post top lantern may be used in gate office walk way or in front of office area. Complete area, streets, lanes, boundary shall be covered with street lighting.

21.6.5 Receptacles (Lighting & Small Power) :

a) Decorative and industrial type units of above shall be proposed in all plant areas, offices, stores, workshop, plant room and they shall be located at least two numbers in each room. Distance between two receptacles shall not be more than 8 – 10 mtr. All small 5 amps 5 pin lighting & small power sockets shall be wired by multi stranded copper wire of 2.5 sq. mm laid in rigid MS conduits along with earth wire of1.5 sq.mm flexible copper wire or equivalent size armoured cables. All wiring shall be coded with Red, Yellow, Blue & Black as per the phase used. If required, wiring can be done alternatively through armoured copper cables of similar size laid in MS perforated trays of minimum 2.0 mm thick.

b) Three phase power receptacles (convenience outlets) suitable for operation of 415V,3 Phase 4 wire, 50 Hz power supply shall be proposed. In indoor areas one such unit shall be provided to cover areas of 20 meter radius (or at least one in each room housing plant items) and in outdoors areas on such unit shall be provided at 50 meter interval. Actual requirement of such units shall be finalized by MMC during detailed engineering. One three phase receptacle shall be provided near entrance of each building for utilities like welding.

c) Single phase 15 Amp 5 Pin / 6 Pin receptacles will be provided in each room and in halls they will be provided in such a way that with 15 meter cord we should reach every place in building. These shall be wired with 4 sq. mm copper earth wire in MS rigid conduits along with 2.5 sq. mm earth wire. Not more than two sockets shall be looped in one circuit. Alternatively they can also be connected through armoured cable of 4 sq. mm running in appropriate cable trays.

21.6.6 Separate lighting panels and lighting distribution boards shall be installed and they shall not take tapping for power from motor control centers or power distribution boards.

Section 12. WOODWORK AND JOINARY

20 Wood:

All wood required to be used, shall be dry, well-seasoned, Bulsar teak wood and shall be free from knots, cracks or any other kind of defects frames for doors and windows.

20.1 Jointing Materials:

All nails, screws, fixtures shall be of standard

Section 13. PIPING WORK

21 Cast Iron Pipes & Fittings

21.1 All protection and bedding of sewers work shall be carried out in strict accordance with the specification and methods laid out in the CPHEEO manual.

21.2 Applicable Codes

The manufacturing, testing, supplying, jointing and testing at work sites of cast iron pipes and fittings shall comply with all currently applicable statutes, regulations, standards and codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the codes shall be referred to. If requirements of this specification conflict with the requirements of the code of standards, this specification shall govern.

- IS:210 - Specification for grey iron casting
- IS: 290 - Specification for coal tar black paint.
- IS: 638 - Specification for sheet rubber jointing and rubber insertion jointing.
- IS:782 - Specification for caulking lead
- IS:1387 - General requirements for the supply of Metallurgical material
- IS: 1537 - Specification for vertically cast iron pressure pipes for water, gas and sewage.
- IS:1536 - Specification for centrifugally cast (spun) iron pressure pipes for water, gas and sewage
- IS: 1538 - Specification for cast iron fittings for pressure pipes for Water, gas and sewage.
- IS: 1500 - Method for Brinell hardness test for grey cast iron.
- IS: 2078 - Method for tensile testing of grey cast iron.
- IS:5382 - Specification for rubber sealing rings for gas mains, water mains, and sewers
- IS: 6587 - Specification for spun hemp yarn.
- IS: 3114 - Code of practice for laying of cast iron pipes.

22 Mild Steel ERW Pipe

The manufacturing, testing, supplying, jointing and testing at work sites of mild steel pipes and fittings shall comply with all currently applicable status, regulations, standards and codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the codes shall be referred to. If requirements of this specification conflict with the requirements of the code standards, Engineer-in-Charge decision shall be final.

Materials

a. IS:226 : Specification for structural steel (standard quality).
b. IS: 2062 : Specification for structural steel (fusion welding quality).
c. IS: 6631 : Specification for steel pipes for hydraulic purposes.
d. IS:3589: Specification for electrically welded steel pipes for water, gas and sewage (150 mm to 2000 mm nominal dia).
e. IS:6392: Specification for steel pipe flanges
f. IS:814 : Specifications for electrodes for metal arc welding of structural steels: Part 2 welding sheets.

Code of Practice

a. IS: 5822 : Code of practice for laying of electric welded steel pipes.
b. IS: 11906: Recommendations for cement mortar lining for mild steel pipes and fittings for transportation of water.
c. IS:10221 : Code of practice for coating and wrapping of underground mild steel pipelines.
d. IS: 816 : Code of practice for use of metal arc welding for general construction in mild steel.

23 HDPE Pipes

These pipes have been used for carrying the effluent from distribution boxes to Feeding boxes of the Reactors. These pipes shall meet specifications as per IS: 4984.

23.1 Jointing

HDPE pipe shall be jointed properly with HDPE socketted specials to get smooth inner side surface without any extrusion to avoid any obstruction to the flow of wastewater. If in any particular case butt welding has to be done, smooth inner surface of pipe without intrusion inside shall be ensured.

24 Glazed Stone Wares Pipes

The drain pipes and filtrate pipes are to be made up of GSW. The GSW pipes to be provided should be of IS Specifications. They should be properly laid to proper gradient and as per drawings and approved by Engineer in Charge.

25 VALVES

25.1 Gate (Sluice) Valves

Gate Valves shall be either solid wedge or knife gate unless specifically defined on the drawings.

The materials used for the manufacture of each component shall be the best available for the specific purpose and shall not, in any case be inferior to the following:

Cast Iron	-	IS. 210 Grade 20
Stainless Steel	-	IS. 1570 Grade, B.S. 970 Type EN, ASTM A 473.
Gun Metal	-	BS.1400-LG 2 -C or the equivalent Indian Standard.
Cast Steel	-	Plain Carbon Steel complying with IS. 1570 Grade, or BS: 970 Grade 431 S 29.

Valve Bodies shall be in cast steel for sewage treatment plants, Spindle shall conform to Stainless Steel and Valve Gates shall conform to Stainless Steel

26 Specifications Referred

The specifications contained herein are not exhaustive and for such items of works which may arise and which are not covered by this specification, or by the relevant Indian Standards, the provisions in the P.W.D. Handbook Vol. I and II (latest edition) shall apply. A list of few important Indian Standards is given below: Wherever reference to the Indian Standards mentioned below or otherwise appears in this specification, it shall be taken as a reference to the latest version of the standard.

IS No.	Description
General	
IS : 456	Code of Practice for Plain and Reinforced Concrete for General Building Construction
IS 3764	Safety code for excavation
IS : 1200	Method of measurement of building and engineering (Part 1 to 28) works
IS : 3385	Code of practice for measurement of Civil Engineering works.
IS : 1642	Fire safety of buildings (General): Details of Construction Code of Practice.
IS : 4082	Recommendations on stacking and storing of construction materials at site.
Sand	
IS: 2116	Sand for Masonry, Mortar
IS: 1542	Sand for Plaster
Aggregates	
IS: 383	Aggregates, Coarse and fine from National Sources for Concrete.
IS: 515	Aggregates for use in Mass Concrete Natural and Manufactured.
Cement	
IS : 12330	Specification for sulphate Resisting Portland cement.
IS : 1489	Specification for Portland pozzolana cement
IS : 12269	Specification for 53 grade ordinary Portland cement.
Concrete Plain & Reinforced	

IS No.	Description
IS : 457	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
IS: 3370	Concrete Structures for the Storage of liquids (Part I & Part II, III & IV)
IS : 432	Specification for mild steel and medium tensile steel (Part 1 and 2) bars and hard drawn steel wires for concrete reinforcement
IS : 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement.
IS : 4326	Code of practice for earthquake resistant design and construction of building.
IS : 10262	Recommended guidelines for concrete mix design.
Code for Construction safety	
IS : 3696	Safety code for scaffolds and ladders. (Parts I and III)
IS : 7969	Safety code for handling and storage of building materials.
IS : 8989	Safety code for erection of concrete framed structures.
Brickwork	
IS : 1077	Common Burnt Clay Building Bricks.
Paving and Floor Finishes	
IS : 1237	Flooring Tiles, Cement Concrete
IS : 1443	Cement Concrete Flooring Tiles, Laying and Finishing of
Plastering & Pointing	
IS : 1661	Cement and Lime, Plaster Finishes on Walls and Ceilings
Roof Coverings	
IS : 459	Asbestos Cement Sheets, Unreinforced Corrugated Sheets
IS : 730	Fixing Accessories for Corrugated Sheet Roofing
Steel & Iron Work	
IS : 226	Structural Steel (Revised)
IS : 800	Use of Structural Steel in General Building Construction, code of Practice for Pipes & Fittings Pipes
IS : 3486	Cast Iron Spigot & Socket Drain Pipes
IS : 1538	Cast Iron fittings for Pressure pipes for water, Gas & Sewage
IS : 1536	Centrifugally Cast Iron Pressure Pipes for water , Gas & Sewage.
IS : 458	Concrete pipes with or without reinforcement
IS : 783	Code of practice for laying Concrete pipes.
IS : 3114	Code of practice for laying of C.I. Pipes
IS : 1726	C.I. Manhole covers and frames intended for use in drainage works.

This list does not necessarily cover all the Standards referred to.

[EA will list detailed specifications for Electro mechanical and Electrical works specific to the Design/Technology being proposed]

27 Technical Specifications for Electrical Works

All works shall be carried out in accordance with the requirements of:

i. IE Rules

ii. State Electricity Board

iii. Rules and regulations of Local authorities, and

iv. The standards in this specification

The Operator is responsible for applying and obtaining necessary statutory approvals and shall ensure workmanship of good quality and shall assign qualified supervisor / engineers and competent labour who are skilled, careful and experienced in carrying out similar works.

Latest applicable standards specified below.

Code No.	Title
IS 13118 / BS 5311 / IEC 56, 694	Circuit Breakers
IS 3427 / BSEN60298 / IEC298	Metal Enclosed switchgear
IS 2705 / BS 7626	Current Transformers
IS 3156/BS 7625/IEC 186	Voltage Transformers
IS 5578, 11353	Arrangement for Switchgear Busbars, Main Connections and Auxiliary wiring
IS 2544 / BS 3297 / IEC 273	Busbar Support insulators
IS 13947 (Part 1) / IEC 947-1 / BSEN 60529	Degree of Protection
IS 3231, 3842 / BS 142 / IEC 255	Electrical Relays for Power system protection
IS 1248 / BS 89 / IEC 51	Electrical Indicating Instruments
IS 9385 / BS 2692 / IEC 282	High Voltage Fuses
IS 722, 8530 / BS 5685 / IEC 145, 211	AC Electricity Meters
IS 613	Specification for copper rods and bars for electrical purposes
IS 6005 / BS 3189	Code of practice for phosphating iron and steel
IS 9920 / IEC 129, 265 & 298	Alternating current Switches for voltages above 1000 V

Code No.	Title
IS 13703 / BS 1362 / IEC 269	Low voltage fuses
IS 3452 / BS 3676	Toggle switches
IS 10118	Code of practice for selection, installation and maintenance of switchgear and control gear
IS6875/BSEN 60947/IEC 947	Control switches

Title	Code No.
Basic climatic and mechanical durability tests for components for electronic and electrical equipment	**IS:9000**
Environmental tests for electronic and electrical equipment	**IS:9000**
Metal clad base material for printed circuits for use in electronic and telecommunication equipment	**IS:5921**
Transformers and inductors (power, audio, pulse and switching) for electronic equipment	**IS:6297**
Printed wiring boards	**IS:7405**
Environmental requirements for semi-conductor devices and integrated circuits	**IS 6553**
Terminals for electronic equipment	**IS:4007**
Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 V DC	**IS:8623/BS: 5486 /IEC:439**
Air break switches	**IS : 13947 (Part –3)BSEN60947-3**
Miniature circuit breakers	**IS 8828/BSEN:60898**
HRC cartridge fuses	**IS:9224/BS:88**
Contactors	**IS:13947(Part–3) /BS:775/ IEC:158-1**
Control switches/push buttons	**IS:6875**
Indicating instruments	**IS:1248/BC:89/ EC:51**

Title	Code No.
Degree of Protection	**IS:13947-(Part1)/IEC:947-1**
Climate-proofing of electrical equipment	**BSCP:1014**
Code of practice for phosphating iron and steel	**IS:6005/BS:3189**
Semi-conductor converters	**IEC:146**
Semi-conductor rectifier equipment safety code	**IS:6619**
Specification for copper rods and bars for electrical purposes	**IS : 613**

Code No.	**Title**
IS2026/BS171/IEC76	Power Transformer
IS3639	Fittings and Accessories
IS1180	Auxiliary Transformer
IS6600/BSCP.1010/IEC354	Loading of oil immersed transformer
IS335/BS 148/IEC296	Transformer Oil
IS2099/BS223/IEC137	Bushings for > 1000V, AC
IS7421	Bushings for ≤ 1000V, AC
IS13947 (Part 1) / IEC947-1	Degree of Protection
IS3637	Buchholz Relay
IS 1271/BS2757/IEC85	Insulation Materials for Electrical Machinery
IS 3202/ BSCP1014/ IEC354	Climate Proofing
IS 1886	Installation & Maintenance of Transformers
IS 2705	Current Transformers

IS 375	Marking & arrangement for switchgear, busbars, main connection and auxiliary wiring
IS 2147	Degree of Protection
IS 3202	Climate- proofing of electrical equipment
IS 5082	Aluminium Busbars

IS 8081	For Non-segregated phase bus-ducts.
IS 3202	Code of Practice for climate – proofing of electrical equipment
IS 2516	Alternating current Circuit Breakers (Relevant part/Section)
IS 3231	Electric Relays for Power System Protection
IS13947	Switchgear General Requirements
IS 3427	Metal Enclosed switchgear and control gear
IS 4237	General requirements for switch gear and control gear for voltage not exceeding 1000 volts
IS 694 Part I & II	PVC insulated cables (for voltages up to 1100V with copper and aluminium conductors)
IS 8623	Factory Built Assemblies of SWGR and Controlgear for Voltages upto and including 1000V AC & 1200V DC
IS 13947-P3	Air Break Switches
IS 8828	Miniature Circuit Breakers
IS 13703	Low voltage Fuses
IS13947	Contactors
IS13947	Starters
IS 6875	Control Switches / Push buttons
IS 2705	Current Transformers
IS 3156	Voltage Transformers
IS 1248	Direct Acting Electrical Indicating instruments
IS 2147	Degree of protection provided by enclosures for low voltage switch gears.
IS 2959	AC Contactors of voltage not exceeding 1000 volts
IS 11353	Marking and Identification of Conductors and Apparatus Terminals
IS 722	A.C. Electricity Meters
IS 10118	Selection installation and maintenance of switchgear and controlgear
IS : 2834	Shunt capacitors for power systems
IS : 2544	Specification for Porcelain Post Insulators (3.3 KV and above)
IS : 5553	Series Reactors (Part II)
IS : 12672	Internal fuses and internal overpressure disconnectors for

	shunt capacitors
IS:7098 (Part-II)	Cross linked polyethylene insulated PVC sheathed cables for working voltages from 3.3 kV up to and including 33 kV
IS : 5831	PVC insulation and sheath of Electric cables
IS : 6474	Polyethylene insulation and sheath for electric cables
IS : 8130	Conductors for insulated electric Cables
IS : 3975	Mild Steel wires, strips and tapes for armouring of cables
IS : 10810	Methods of test for cables
IS : 3961 (Part II)	Recommended current ratings for cables PVC insulated and PVC sheathed heavy duty cables
IS : 1753	Aluminium Conductors for insulated cables
IS : 10418	Specification for drums of Electric cables
IS : 2633	Methods of testing weight, thickness and uniformity of coating on hot dipped galvanized articles
IS : 209	Specifications for Zinc
IS : 694	PVC insulated cables (for Voltage up to 1100 V)
IS : 1554 (Part I)	PVC insulated heavy duty electric cables for working voltage up to and including 1100 volts
IS : 5831	PVC insulation and sheath of Electric cables
IS : 6474	Polyethylene insulation and sheath for electric cables
IS : 8130	Conductors for insulated electric Cables
IS : 3975	Mild Steel wires, strips and tapes for armouring of cables
IS : 10810	Methods of test for cables
IS : 3961 (Part II)	Recommended current ratings for cables PVC insulated and PVC sheathed heavy duty cables
IS : 1753	Aluminium Conductors for insulated cables
IS : 10418	Specification for drums of Electric cables
IS : 2633	Methods of testing weight, thickness and uniformity of coating on hot dipped galvanized articles

IS : 209	Specifications for Zinc
IS2026/BS171/IEC76	Power Transformer
IS3639	Fittings and Accessories
IS1180	Auxiliary Transformer
IS6600/BSCP.1010/IEC354	Loading of oil immersed transformer
IS335/BS 148/IEC296	Transformer Oil
IS2099/BS223/IEC137	Bushings for > 1000V, AC
IS7421	Bushings for ≤ 1000V, AC
IS13947 (Part 1) / IEC947-1	Degree of Protection
IS3637	Buchholz Relay
IS 1271/BS2757/IEC85	Insulation Materials for Electrical Machinery
IS 3202/ BSCP1014/ IEC354	Climate Proofing
IS 1886	Installation & Maintenance of Transformers
IS 2705	Current Transformers
I.S. 3043 – 1987.	Earth Pits

28 Mechanical equipment

Mechanical equipment shall be required for following units based on chosen technology:

i. Inlet chamber and distribution box/channel.

ii. Screen channels, mechanically cleaned fine screens.

iii. Grit chambers with grit removal equipment and classifiers.

iv. Parshall flumes, Plant by-pass and distribution box to Treatment units

v. Disinfection facilities and Parshall flume for Plant effluent

vi. Sludge pumps, thickened sludge pumps.

vii. Sludge gravity thickeners.

viii. Anaerobic digesters.

ix. Gas holders and gas burners.

x. Belt-filter press equipment and polymer feed for sludge drying in dewatering building.

xi. Filtrate sump and pumps in dewatering building.

xii. Compressors and accessories.

xiii. Various sizes of interconnecting piping.

xiv. Fire-fighting equipment as per state Government department of Fire services.

xv. Power generation units, with gas engines and accessories.

All mechanical equipment such as screens, de-gritting devices, sluice gates, sludge thickeners, centrifuges, belt presses etc which comes into contact with sewage or sludge shall be fabricated in non corrosive materials and metallic parts in contact with sewage shall conform to Stainless steel. All walkways shall be in RCC or stainless steel with stainless steel handrails. Provide appropriate explosion proof construction and devices at any enclosed locations components where incoming sewage is exposed to atmosphere.

Mechanical screens shall be operated with Shaftless screw conveyors to transfer screenings to the screw compactor to dewater and compact the screenings. The screen will be controlled by a timer as backup to level control, so that, the cleaning mechanism can run at a set interval.

The deposited grit will be removed from the grit chambers by appropriate and efficient removing mechanism. Grit removal shall be accompanied with a grit classifier and grit washing system to ensure the grit is free from organic matter before disposal.

All overflow weirs will be made from stainless steel and all fittings and fixtures will be stainless steel.

Parshall flumes downstream of each grit chamber structure shall be required where an ultrasonic flow meter will be installed for measuring and adding the total flow of raw sewage entering the site.

Isolation weir gates and bye pass shall be required to control and/or isolate flow to any one units

Treated sewage shall be disinfected

The gravity thickeners shall be provided where required to reduce the volume of sludge before feeding the anaerobic digesters depending on chosen technology. Thickener fixed bridge and rotating scraper mechanism shall be in Stainless steel.

Thickened sludge will be pumped into sludge digesters wherein continuous pump recirculation/mixing shall be done to stimulate anaerobic sludge digestion. Design of the anaerobic digester shall allow sufficient height of the digester to remain filled with gas. This gas can be used for future power generation.

Storage of biogas shall be required and accomplished by either gas holders or, if floating digester covers are provided, be contained within the floating cover of the anaerobic digester.

A gas flow meter for measuring gas shall be provided and installed in the digester control room. The gas flow meter shall be electrical transmitting type, ring balancing with transmitter, indicator and integrator, recorder all complete.

The digested sludge shall be dewatered by belt-filter press equipment and addition of polymer. Necessary arrangements shall be made to dispose of the sludge after dewatering..

The treated effluent shall be conveyed to the disinfection point and final disposal point above the normal high water level of the nala or river identified for final disposal.

29 Process Instrumentation, Control. and SCADA System

The instrumentation shall include online measurement of influent and effluent parameters for sewage, sludge and sludge gas. **Process Instrumentation, Control. and SCADA System** shall include continuous monitoring the process parameters, process flow, tank level and other equipment protection devices. These measurements shall be connected to a network of Programmable Logic Control (PLC) based unit process controllers that will generate pre-programmed monitoring and control actions for process, equipment and other control devices.

A Supervisory Control and Data Acquisition (SCADA) system, networked to the PLC unit process controllers shall acquire and display process parameters, process flow, tank level, etc., monitor and issue remote control actions for maintaining process control. The SCADA system shall also achieve pre-determined process parameters and originate custom performance reports for management reporting.

FOR NETWORK

Section 14. General

The Sewerage Network to be Designed, Built, refurbished if applicable, operated and maintained, as detailed in the ITB/BDS sections, Tested and Commissioned by the Operator shall comply with the guidelines contained in "Manuals on Sewerage and Sewage Treatment - Part A - Engineering, Part B - O&M, and Part C - Management" Latest Edition(s) published by the Central Public Health & Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India.

Documents Comprising the Technical Standards

The Technical Standards consist of Technical Specification to be followed during Construction of Sewerage Network and other ancillary/ allied works for all Civil, Mechanical, Electrical, and Instrumentation required to be executed under this Contract. Notwithstanding the said Specifications, the Operator shall adopt and follow necessary standards and approved Codes /specification wherever required for fulfillment of all the works under this contract.

Supplementing the General Conditions and Design-Build and Operating Services

The Technical Standards specified in Schedule 10 shall be read along with the GCC / SCC and Design-Build and Operations Services Schedules for the purpose of providing greater specificity of the technical standards which the Operator shall meet.

General Quality Standards

The term "General Quality Standard" means a standard of performance which,

(a) Is competent, efficient, economical and in accordance with internationally accepted techniques used in the sewer disposal and civil works construction industries;
(b) Is in accordance with professional engineering, accounting and consulting standards, as applicable, recognized by national or international professional bodies;
(c) Is in accordance with sound management, commercial, technical, design and engineering practices;
(d) Employs appropriate technology and safe and effective equipment, machinery and methods;
(e) Is in accordance with national and local standards and codes in the Owner's Country;
(f) Protects the interests of the Authorities;
(g) Is in accordance with the Applicable Law;
(h) Is in accordance with the technical specifications and design standards of the Owner as provided to the Operator;
(i) Is in accordance with the applicable Environmental Assessment and Environmental Management and Mitigation Plan; and
(j) Is in accordance with the Design-Build Documents as approved by the Owner.

In the event of any conflict or inconsistency between any standards that comprise the General Quality Standard, local and national standards in the Owner's Country shall prevail over international standards.

The Operator shall, at all times, carry out the Services in accordance with the Technical Standards as specified and, where a specific technical standard of quality of performance has not been specified, the Operator shall perform the Services to the standard of "General Quality Standards".

If the Owner is subjected to fines or penalties as a result of the operator's breach of these Technical Standards, such fines or penalties shall be paid by the Operator

Design-Build Services

In respect of the Design-Build Services, the operator shall ensure that the design of the Sewerage Network is prepared by qualified designers who are professionally recognized to design the Sewerage Network and allied services.

The Operator warrants that the operator and its designers have the experience and capability necessary for the design. Planning of the entire system should be done in such a manner so as to optimize capital and operational costs of treatment of sewage and maintenance of the Plant on whole on sustainable basis.

Section 2 SCOPE OF WORK & CONTRACTUAL REQUIREMENTS

The scope of work under this contract shall include but not limited to the following and as specified in Bill of Quantities.

i. Review of Owner's proposals and designs: The Operator has to (i) undertake field survey of the entire area proposed for coverage with sewerage, (ii) check the actual levels with the levels used in the owner's proposal, (iii) review designs of sewerage system and sewage pumping proposals provided by the owner, (iv) re-design the sewers (using CAD Software) and undertake detailed design of sewage pumping systems wherever necessary and prepare revised drawings, (v) submit the revised designs & drawings and obtain approval of the Owner. The payment will be made as per the quoted rates in bill of quantities for conducting survey, reviewing and redesigning. The Bidder has to consider this aspect and make provision, while quoting the rates for Sewer pipe (less than 300mm), supply, laying and jointing item in the tender.

ii. Conducting Survey for laying of lateral sewers (less than 300 mm diameter) for proposed alignment and levels, at every 30 meters interval and other necessary locations before execution of the work including all data required for generating L section and GIS maps of sewer network. Submission of survey drawings showing L-Sections, ground levels at every

30 meters interval and other necessary locations, detailed strip plans showing adjacent structures etc., in AutoCAD for approval of the Engineer before execution of the work.

iii. Also, conducting Survey for laying of sewers (equal to or greater than 300 mm diameter) for proposed alignment and levels, at every 30 meters interval and other necessary locations before execution of the work including all data required for generating L section and GIS maps of sewer network. Submission of survey drawings showing L-Sections, ground levels at every 30 meters interval and other necessary locations, detailed strip plans showing adjacent structures etc., in AutoCAD for approval of the Engineer before execution of the work. The Operator shall take prior approval of the Owner before surveying in any changes in locations or alignments from the original proposals.

iv. Earth work excavation for pipeline trenches and manhole chambers including depositing on bank including, danger lighting and using sight rails and boning rods at every 100 meters and wherever necessary, including shoring, strutting, bailing out water, as directed with all lifts etc., complete & lead as per Bill of quantities for different strata and depth ranges.

v. De-watering for Excavation in all classifications in watery situation or foul conditions towards, including overnight recuperation for all depth ranges, with all lead and lifts etc., complete.

vi. Providing erecting and removing casurina pole three tier Barricading using poles of 7.50 to 10 cms. Dia. and 1.50m height above ground fixed vertically at intervals of 2.0 to 2.5 m C/C and horizontally at 0.50 m, above ground level, including fixing poles in the ground for a minimum depth of 0.30 m and tied with coir rope firmly including cost and conveyance of all materials, labour, lead and lift charges complete.

vii. Carting of excavated Earth of all types to a lead distance detailed in bill of quantities & stacking of earth at identified suitable site and re-carting back the stacked earth to the same site by vehicle, including loading , unloading charges for to & fro, with all lifts, labour, HOM of machinery etc. complete. Lead distance indicated is one side distance only. Bidder shall quote the rate for to & fro lead distance.

viii. Disposing off the excess excavated earth of all types to a distance detailed in bill of quantities by vehicle, including neatly stacking, loading, unloading, with all lifts, labour, HOM of machinery etc. complete

ix. Providing and installing steel trench sheeting or sheet piling for both sides of the trench with mild steel sheets not less than 6.5 mm thick, stronger knife edge, recessed spreader sockets, 3" single or double wall shields, to be designed by the Operator to withstand all types of soils, maximum depths of 6m to 12m, as per the design drawing and or as approved by the Engineer-in-charge. Including labour charges for installing and removing the sheet piling at various reaches of sewer line construction, including loading, unloading, transporting to the suitable location etc complete as directed by the Engineer-in-charge. (Measurement shall be taken one side only).

x. Manufacturing / Procurement, Supplying, Laying and Jointing the specified diameters of following pipes, for sewers in .....[85] AREA:

[85] *Project shall specify the relevant details.*

- **Glazed Stoneware (GSW) pipes** confirming to IS: 651 with latest revisions & amendments, Spigot & Socket (S&S) type jointed with hemp yarn dipped in tar and with CM 1:1.5 as per IS: 4127 or with rubber gaskets applied with approved glue before inserting of gaskets at manufacturing site, as per standards EN:295, including cleaning the socket & spigot ends with soap solution and applying talcum powder for detecting cracks and jointing at site by pushing, etc. complete. (For cement joint sulphate resisting cement shall be used)
- **RCC NP3 S&S RCC SPUN / VIBRATED CAST PIPES (REINFORCED)** as per IS:458, with latest revisions & amendments, and manufactured using Sulphate Resisting Cement (SRC) confirming to IS 12330, with rubber rings as per IS:5382, and laying as per IS:783 with latest revisions & amendments etc. complete.

- **DI K-7 class pressure pipes with CM lining using SRC** as per IS: 8329 with latest revisions & amendments, with rubber rings as per IS: 5382, and laying as per IS: 12288 with latest revisions & amendments, with matching specials, fittings and jointing materials for sewers at road / railway crossings by trench less method etc. complete.
- **Corrugated HDPE pipes conforming to BIS 16908- part 2-2013**

xi. Construction of all appurtenant structures such as Wire cut Brick, RCC Cast in-situ / Pre-cast manhole structures, using SRC (sulphate resisting cement confirming to IS 12330 with latest revisions) with SFRC frames & covers, plastic encapsulated M.S. footsteps, drop manholes, ventilating shafts, pipe supports, drain and road crossings, etc. as per Bill of Quantities, approved drawings and relevant IS codes including all temporary works and safety measures.

xii. Interlinking the existing sewer lines with proposed lines and vice versa.

xiii. The contract covers, Conducting Level Survey of proposed and Existing sewerage system by Collecting ground levels, invert level of sewers, size and type(material of construction) of Sewers and at every manhole, including depth of manhole and measuring length in between manholes and safely closing the manhole cover, preparation and submission of Drawings in AutoCAD with all particulars in complete manner as per specification and as directed by the Engineer in charge for cross verifying the adaptability of existing sewer network with the proposed, which will be verified by Owner's engineers, and decision will be given to retain or reject the part or whole of the existing sewer network.. Levels shall be carried from the nearest Bench mark given by EMPLYER for conducting this survey.

xiv. Providing PVC / GSW pipes for House Service Connections from Manholes / Sewer lines as per specifications and approved drawings and as directed by the Engineer etc. including all materials such as connecting pipes, earthwork, pipe line laying and jointing, bedding etc. complete as per Bill of Quantities items of work.

xv. Construction of sewage pumping stations including Electro mechanical works

xvi. Backfilling the trenches in layers of specified thickness, material as per detailed specifications and items in bill of quantities.

xvii. Providing Road or Railway crossing by adopting Trench less Method (i.e. pipe ramming method/ manual pipe jacking method)) as per items in bill of quantities at locations shown in the approved drawings, specifications and as directed by the Engineer.

xviii. Taking all measures for complying to the Environmental Management Plan and monitoring the same as per detailed specifications.

xix. Operator shall be responsible for providing insurance as provided in Contract data.

xx. Testing and commissioning the sewers after laying and construction of manholes as per detailed specifications.

xxi. Restoration of Bituminous road with WBM and 20mm thick premix carpet with liquid seal coat as per MORTH specifications and cement concrete roads as per specifications and as directed by the Engineer including preparation of sub-grade, all construction materials, tools and plants etc., complete.

xxii. Submission of as built drawings of sewer lines & its appurtenances, including L-sections and plans as per specifications including existing laterals for which the Operator has conducted the existing system level survey showing the entire sewer network in the scope of this contract. The scope also covers associated civil works including protective works, encasing of pipes with concrete and RCC NP-3 / D.I. and HDPE, PVC pipes at road crossings, all safety measures etc.

xxiii. All works shall be done as per the specifications in Bill of Quantities and in compliance to the Technical, Financial bids and as directed by the Engineer. The work shall be executed on item rate basis. Indicative Drawings related to the works to be done, are given for guidance of the

Operator. For the execution of Works, exact details will be given in construction drawings based on the alignment drawings given by the Operator. The prospective bidder is expected to visit the site of works at his own expense to fully study the local conditions and to familiarize with the working area and local conditions and include all such factors in his quoted rates.

xxiv. Trial run of the System:-After commissioning of works or a section of the completed works, the Operator shall conduct trial run to demonstrate satisfactory performance to the Engineer prior to declaring commencement of O&M.

Operator's Inspection of Sites

The Operator is deemed to have visited the sites and familiarized himself of the conditions and restrictions under which the work will be executed. The omission of any details shall not relieve the Operator of his prima facie obligation and responsibility under the Contract to carry out and successfully complete the contract. The Owner will entertain no monetary or other claims, made by the Operator on the grounds of 'want of knowledge'.

Work plan

The Operator shall prepare the work plan for the execution of works, which includes procurement of pipes before starting of the works. The Operator shall submit the planning (Survey, reviewing and redesigning, Construction, Quality control, and Commissioning) within 14 days after issue of letter of acceptance and take necessary approvals for the same. The planning's shall be done on MS project and indicate, resources such as material, manpower, cash-flow etc. to complete the works as per agreed time. The planning shall include all allowances to guard against delays caused due to inclement weather or its effects (such as floods or draughts), fire or industrial disputes, unless such events could not reasonably have been foreseen by an experienced Operator.

Alignment Survey and the L-Sections

The Operator shall carry out the Survey work for laying of lateral sewers (less than 300 mm diameter) for proposed alignment and levels, at every 30 meters interval and other necessary locations, before execution of the work, including all data required for generating L section and GIS maps of sewer network. Operator shall submit the survey drawings showing L-Sections, ground levels at every 30 meters interval and other necessary locations, detailed strip plans showing adjacent structures etc., in latest version of AutoCAD for approval of the Engineer before execution of the work. The Operator shall be deemed to have considered this aspect and made provision, while quoting the rates for Sewer pipe (less than 300mm), supply, laying and jointing item in the tender. If the alignment and flow directions of the sewers are to be changed according to the site conditions and the Engineer In-charge agrees to that, the Operator has to redo the alignment and level survey at every 30 m and junction points, and submit all the details in latest version of Auto Cad in soft form to OWNER, for re-design of that particular stretch and take up the work on receipt of approved designs from OWNER.

Also, the Operator shall carry out the Survey work for laying of branch/ sub-main /main / trunk sewers (more than 300 mm diameter) for proposed alignment and levels, at every 30 meters interval and other necessary locations, before execution of the work, including all data required for generating L section and GIS maps of sewer network. Operator shall submit the survey drawings showing L-Sections, ground levels at every 30 meters interval and other necessary locations, detailed strip plans showing adjacent structures etc., in latest version of AutoCAD for approval of the Engineer before execution of the work. The Operator shall take prior approval for location and length of the survey work for this paid item. The payment will be made as per the quoted rates for conducting survey in bill of quantities. If the alignment and flow directions of the sewers are to be changed according to the site conditions and the Engineer In-charge agrees to that, the Operator has to redo the alignment and level survey at every 30 m and junction points, and submit all the details in latest version of Auto Cad in soft form to OWNER, for re-design of that particular stretch and take up the work on receipt of approved designs from OWNER. The alignments, L-section and location of manholes may be changed at site if required, and after approval of the Engineer.

The Survey work for all the sewer lines (for all diameters of sewers) alignment shall also include the following:

a) All the Survey works shall be carried out from G.T.S. Benchmarks, using Total Station instrument of standard make, and by qualified survey personnel. The survey shall consist of field data collection and related attribute information collection of all the aspects using GPS and transferring to GIS map of sewer network before and after laying of sewer pipes and allied structures, as required by OWNER.
b) Field attribute collection for Mapping with respect to existing sewerage network does not require any digging in the field. The existing maps / OWNER field staff knowledge can be utilized by the Operator to provide the data for mapping the said network and it will be paid as per the survey work item in Bill of quantities.
c) Network entity's attribute information like pipe dia, pipe type, ground material, depth of the pipe, manhole type; manhole size, manhole depth etc. shall be submitted.
d) The data pertaining to House Service Connections (connection to consumers) have to be collected up to building footprint and submitted.
e) The Operator shall communicate regularly, with the OWNER regarding the GIS mapping survey data and for clarifications.

Section 3 Technical Specifications

1 Applicable I.S. codes or other Standards

The Technical Standards and Specifications contained in this contract shall be read along with the following standard specifications (latest versions) published by the Bureau of Indian Standards listed below:

IS: 3764 with latest revisions & amendments ~ Excavation work- code of safety

IS: 12330 with latest revisions & amendments ~ Specification for Sulphate resisting Portland cement.

IS: 8112 with latest revisions & amendments specification for 43 grade OPC cement

IS: 651:1992 with latest revisions & amendments ~ Specification for Salt glazed stone ware pipes & fittings.

IS: 4127:1967 with latest revisions & amendments ~ Code of practice for Laying of Glazed Stoneware Pipes

EN: 295 with latest revisions & amendments ~ Specification for GSW pipes with rubber gasket joints.

EN: 681 & ASTM C-425 with latest revisions & amendments ~ Specification for Rubber gaskets and jointing of GSW pipes.

IS 458-1988, IS4350-1967 with latest revisions & amendments ~ Specification for pre-cast Concrete Pipes.

IS: 783-1959 with latest revisions & amendments ~ Code of Practice for Laying of Concrete Pipes

IS: 8329:2000 with latest revisions & amendments ~ Specification for Ductile iron Pipes

IS: 12288 with latest revisions & amendments ~ Code of practice for use & laying of ductile iron pipes

IS: 4984:1995 with latest revisions & amendments ~ Specification for HDPE Pipes

IS: 16098 (part 2): 2013 - Structured wall piping system for non-pressure drainage & sewerage

IS: 4111 (Part 1 to 4) with latest revisions & amendments ~ Code of practice for ancillary structures in sewerage system.

IS: 10910 with latest revisions & amendments ~ Specification for polypropylene & its co-polymers coatings.

IS 12592 with latest revisions & amendments ~ Specification for manholes covers and frames.

IS: 3597 with latest revisions & amendments ~Method of tests for concrete pipes.

IS: 5382 with latest revisions & amendments ~ specification for rubber sealing rings for gas mains, water mains and sewers.

IS: 383-1970 with latest revisions & amendments ~ Aggregates of Concrete

IS 456:2000 with latest revisions & amendments ~ Code of practice for Plain & reinforced concrete.

IS: 516 with latest revisions & amendments ~ Methods of test for strength of concrete

IS: 2212-1962 with latest revisions & amendments ~ code of practice for Brickwork

IS: 1957 (Part-I) with latest revisions & amendments ~ Construction of Rubble Stone Masonry.

IS: 1957 (Part-II) with latest revisions & amendments ~ Construction of Ashlar Stone Masonry.

IS: 2250 with latest revisions & amendments ~ Code of practice for preparation and use of masonry mortars

IS: 73 with latest revisions & amendments ~ Specification for Paving Bitumen.

IS: 215 with latest revisions & amendments ~ Specification for Road Tar.

IS: 217 with latest revisions & amendments ~ Specification for Cutback Bitumen.

IS: 460 (Part 1 to 3) with latest revisions & amendments ~ Specification for Test Sieves.
IS: 2386 (Part 1 to 8) with latest revisions & amendments ~ Methods of test for aggregates for concrete.
IS: 2720 with latest revisions & amendments ~ Method of Test for soils.
IS: 6241 with latest revisions & amendments ~ Method of test for determinations of stripping value of road aggregates
IRC: 16 with latest revisions & amendments ~ specification for priming of Base course with Bituminous Primers.
IRC: 17 with latest revisions & amendments ~ Tentative for single coat Bituminous surface Dressing.
IRC: 19 with latest revisions & amendments ~ Standard specification and code of practice for water bound macadam
IRC: 29 with latest revisions & amendments ~ Specification for bituminous concrete for road pavement
IS 6280 – 1971 – Sewage Screens
IS 8413 – 1982 – Biological Treatment Equipment – Part II and its modifications
IS 10037 – Part I – 1981 & Part II & III – 1983 – Sludge dewatering equipments
IS 10261 – Requirements for settling tank for waste water
IS 105533 – Part I, II, III – Chlorination Plants
IS 5600 – 1970 - Sewage and Drainage Pumps
IS 6279 – 1971 – Grit Removal devices
The list is not exclusive and the operator shall be responsible to follow the appropriate standards.

Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise stated in the Contract. Where such standards and codes are national, or relate to a particular country or Region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be acceptable subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Operator and submitted to the Engineer at least 28 days prior to the date when the Operator desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure equal or higher quality, the Operator shall comply with the standards specified in the documents.

2 Samples and Tests

a) The Operator shall be responsible to develop a quality control program and to provide all necessary materials, apparatus, instruments, equipment, facilities, and qualified staff for sampling, testing and quality control of all the materials used for the works under this Contract.
b) The Operator shall obtain the approval of the Engineer for the quality control programme developed by him and incorporate any modifications suggested by the Engineer at no extra cost. Without limiting the generality of the foregoing, the Operator shall either –establish a testing laboratory at the site of works which is adequately equipped and staffed to carry out all sampling and testing in accordance with the requirement set out in the Specifications and /or

these Special Specifications and provide all field equipment and apparatus as necessary to conduct all specified in-situ tests and/or any Tests on Completion, or arrange for routine sampling, testing and reporting, as required, through a certified independent testing laboratory approved by the Engineer.

c) All costs of such sampling, testing and reporting of test results will be borne by the Operator, and the Operator shall include sufficient provisions in his tendered rates to allow for independent sampling and laboratory testing under the direction of the Engineer of the required tests at no additional cost. The Operator shall furnish certified copies of all test reports to the Engineer within 5 days of completion of the specified tests (The tests shall be conducted immediately prior/after delivery at site as directed by the Engineer In-charge / on due date of sample testing, as per relevant IS for In-situ items.)

d) The Operator shall, within 21 days after the date of the Letter of Acceptance, submit to the Engineer for his consent a detailed description of the arrangements for conducting the quality control program during execution of the Works, including details of his testing Laboratory, equipment, staff and general procedures. If following submission or at any time during the progress of Works, it appears to the Engineer that the Operator's quality control programme is not adequate to ensure the quality of the Works, the Operator shall produce a revised program as desired by the Engineer, which will be adequate to ensure satisfactory quality control.

e) Tests during Construction

For ensuring the requisite quality of construction, the Materials and Works shall be subject to the quality control tests as described in relevant IS as specified /applicable and as directed by the Engineer. The testing frequencies set forth are desirable minimum and the Engineer shall have full authority to get the additional tests carried out by the Operator as frequently as he may deem necessary, to satisfy himself that the Materials and Works comply with the appropriate Specifications. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted Engineering practices as per the directions of the Engineer.

f) **Third Party Inspections**

The Operator shall, at his own or manufacturer’s cost, at manufacturers premises, provide the necessary gauges, supply and prepare all test pieces and supply all labour and apparatus for testing which may be necessary for carrying out the tests as required as per relevant latest Indian Standard for all materials specified.

The Owner appointed Third party inspection agency will inspect and certify the quality of specified materials as per relevant latest Indian Standard with all amendments. The inspection and certification charges will be paid directly by OWNER to the Third Party Inspecting and certifying Agency. The Operator shall be responsible to obtain permission and provide all facilities to carry out such testing as required.

A mutually agreed quality assurance plan with, minimum requirements as specified below will be developed which provides for inspection and certification by the Third party inspection agency at specified times during the manufacture, fabrication and installation at site of such items.

List of Items, which will be subject to, third party inspection and stages of inspections are as tabulated below:

Sl. No.	ITEMS	STAGES OF INSPECTION
1).	RCC Pipes & rubber rings.	Visual and dimension check. Quality of raw materials as per IS: 458 with latest revision and amendments. Physical requirements as per IS: 458 with latest amendments. Hydrostatic Test Three edge bearing Test & permeability test as per IS: 458 with latest amendments. All other Tests as may be found necessary as per relevant Indian standards. Rubber ring for corrosion/elongation as per relevant IS Code and All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.
2).	Stoneware Pipes, specials & rubber rings.	General Quality, Visual and dimension check as per as per IS: 651 with latest revision and amendments. Hydraulic and water Absorption test as per as per IS: 651 with latest revision and amendments. Acid and Alkali resistance test as per as per IS: 651 with latest revision and amendments. Crushing strength test as per as per IS: 651 with latest revision and amendments. EPDM Rubber rings for Elongation and other test as per relevant standard. All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.
3).	PVC pipes and Specials	1. General Quality, Visual and dimension check as per as per relevant IS with latest revision and amendments. 2. Hydraulic test as per relevant IS with latest revision and amendments. 3. Acid and Alkali resistance test as per as per relevant IS with latest revision and amendments. 4. All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.
4).	DI Pipes, rubber rings & Specials.	Visual and Dimensions Check Review of Chemical and Physical test certificates as per relevant IS standards.

Sl. No.	ITEMS	STAGES OF INSPECTION
		Hydraulic Test Checking of Cement Mortar lining/ coating for strength, thickness, cracks etc, Rubber Ring for Corrosion / Elongation as per IS code Three edge bearing test / Bursting Test and All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.
5).	HDPE Pipes, Corrugated HDPE pipes & Specials	1. Visual and Dimensions Check 2. Review of Chemical and Physical test certificates as per relevant IS standards. 3. Hydraulic Test and 4. All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.
6).	SFRC manholes covers and frames (Heavy Duty)	1. Tests conforming to IS 12592 part I-1989 and part II-1991 with latest amendments, Load test etc. and 2. All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.
7).	Valves.	1. Visual and dimension check 2. Review of material test certificate for valve body and internals. 3. Operational Smoothness. 4. Hydraulic test / leakage test as per applicable codes. and 5. All other tests as per relevant standards as mentioned in this Technical specifications and approved QAP.

3. Sign Board

The Operator shall provide sign boards at the sites of the Works of approved size and design as directed by the Engineer, which provides (i) the name of the Project and National Mission for Clean Ganga; (ii) the logo of "Namami Gange" (iii) the names and addresses of the Owner, Operator and Consultants; (iv) short description of the Project, (v) the Contract amount (vi) the starting and completion dates.

Such sign boards shall be located at specified places in the project coverage area as directed by the Engineer. Operator shall take care of signboard and replace it in case of loss, damage, theft etc., the sign boards may be in English or Hindi/ local language or in both as directed by the Engineer.

4. Protection of Utilities

a. The Operator is required to examine carefully the locations of the works and their alignments. Operator is to make enquiries and co-ordinate with all the departments /authorities concerning all utility lines such as water pipes, sewers, gas pipe, telephone (underground and /or overhead) lines,

optic fibre cables, electric and telecommunication cables (underground and /or overhead) , any other utility lines etc.; to determine and verify to his satisfaction the character, sizes, position and lengths of such utilities from authentic records.

b. The Operator shall be wholly responsible for the protection of such utilities as may be required, and shall not make any claim for extra work or extra time that may be required to protect such utilities. Any damage, to the Utilities shall be restored/ repaired at Operator's own cost. Shifting of any utilities if required will be taken up by OWNER or any other agency separately after site inspection.

c. In case of water supply house Service connections, if the connections encountered in the corridor of execution of the Bill of Quantities item of work of this package is damaged even after taking all precautions by the Operators for the safety of the structures, the cost of the item shall be paid to the Operator as per approved Bill of Quantities item rates in the contract.

d. In case the alignment of the pipeline crosses the high tension electrical transmission lines belonging to the other authorities/ departments, the Operator shall take all precautions necessary to see that the work is carried out with care and safety, without disturbing such transmission lines. The Operator will be responsible to carry out all construction activities in such reaches in consultation with the owners of such facilities. However, satisfactory completion of the entire work will be the responsibility of the Operator.

5. Performance Requirements:

The performance requirements have been spelt out in various parts of the Contract specification. The Operator shall ensure that, he fully understands and complies with all the requirements specified in the Contract. However, in the event of any conflicting performance requirements spelt out in the documents, the Operator shall promptly bring such matters in writing to the attention of the Engineer for Engineers decision. The Engineer's decision will be conveyed to the Operator in writing and which is final. The Operator shall fully comply with Engineer's decision on the matter. The Operator is deemed to have read and understood all performance requirements before bidding and he shall have no claim whatsoever with respect to the Engineer's final decision on the matter.

6. Operator's Obligations:

The Clauses in this section are meant to provide general guidelines and Compliance requirements to the Operator. It does not however relieve the Operator from taking every other step and precautions as deemed necessary to complete the works successfully within the specified Contract period and bid amount. Also, compliance to the approved Environmental management plan and monitoring the same is part of the contract.

Environmental Management Plan and Monitoring.

The Operator shall be responsible for the mitigation measures to be taken for complying to the Environmental management plan and monitor as described below.

Environmental Management Plan - Construction Phase

[EA to insert project specific EMP here.]

7. PENALTY ON ACCOUNT OF NON-COMPLIANCE

If the operator in the opinion of the engineer in-charge does not comply to the environmental management plan and monitoring, the engineer in-charge reserves the right to stop the work and any delay on account of this will be on the part of the operator and penalty as per liquidated damages clause in conditions of contract and contract data shall be imposed upon approval by the concerned engineer, owner.

8. Confined Space Safety Procedure:

The Operator shall implement a well-prepared Space Entry Safety Procedure to work in Confined areas / Elevated areas. Such procedures shall incorporate all aspects of staff work activities, internationally adopted best practices, site staff and workmen training, hazard awareness, first aid procedures, particularly applicable to workmen in Elevated / Confined space, provision and use of appropriate safety equipment's, personal hygiene, safety / emergency procedures, method of easy evacuation of workers etc. The Operator has to develop and implement his own safety procedures. He should also provide necessary insurance to the workers involved in the execution of work.

9. Special Traffic Precautions

Operator's Attention is specially drawn to the requirements by the traffic police and road authorities and specification regarding traffic control, access and reinstatement of road surface. It is necessary to obtain permission from traffic Inspector of Police prior to taking up any stretch of road for excavation and sewer laying. It is necessary to carry out the work in such a manner as to cause minimum interference with the public use of roads, footpaths and other thoroughfares.

10. Working in Restricted areas

In addition to the clause stated in other section of the special specification the Operator shall determine prior to constructing the lengths of sewers where access to properties commercial, domestic and institutional will be restricted.

The identification of these areas shall be agreed in consultation with the Engineer, Police and Urban local body. In this case it may be necessary to operate one-way traffic system or to close roads. The Operator shall be responsible for liaising with the police and other local representatives to obtain permission to close roads or restrict traffic movement. No additional time will be allowed for these pre-construction activities. Where roads are closed alternative routes are to be determined in conjunction with the authorities. Sign Boards are to be placed at both junctions of the route indicating "ROAD CLOSED & WORK UNDER PROGRESS". The expense for the same shall be borne by the Operator. The Operator shall discuss these arrangements with the occupants of houses affected to ensure that their disruption is kept to a minimum. The Operator is to offer assistance to residents who are infirm or need special arrangements for access during construction.

In narrow roads and streets it may not be possible to operate excavation machinery in such cases hand excavation is to be done. The method of operation, length of sewer to be excavated, method of barricading, property access, dewatering, shoring, pipe laying, backfilling and road reinstatement shall be stated in a 'Method Statement' to be submitted at least 4 weeks before work is scheduled to commence in a particular location. The written agreement of the Engineer shall be obtained to the method statement. If any additional safeguards are required by the Engineer these shall be incorporated in the method statement at no extra cost and the method statement is to be resubmitted.

The Operator will ensure that the noise created by his activities is suppressed. Adequate silencers fitted to construction machinery, particularly compressors and drills. Dust is to be kept to a minimum by using water sprinklers. Utility service connections shall be maintained to every property throughout the construction phase and thereafter. If any defect/ damage is caused it shall be repaired immediately and at the Operator's expense. The disruption to the normal activities of residents and other members of the public is to be kept to an absolute minimum. Providing adequate noise control and other nuisances are kept to a minimum, extended working hours may be permitted with the agreement of the Engineer and local residents. No additional payment shall be made for any of these arrangements unless otherwise specified. Adequate lighting shall be provided by the Operator at his cost if night working is adopted.

11. Interfaces with other packages

If this contract Package will have interface with other contracts, the Operator shall only undertake the end connections of sewers at the interface points, after the sewer has passed the hydraulic test on completion of end connections. The Operator shall lay the bedding and backfill for sewers in normal manner.

12. MEASUREMNTS & PAYMENTS

a. MEASUREMENTS

i. Quantities

The quantities set out in the Bill of Quantities are the estimated quantities for the Works, and they are not be taken as the actual and correct quantities of the Works to be executed by the Operator in fulfillment of his obligations under the Contract.

ii. Works to be measured

The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value of the works in accordance with the contract and the Operator shall be paid that value in accordance with applicable clauses of this contract. The Engineer shall, when he requires any part of the works to be measured, give reasonable notice to the Operator's authorized agent, who shall:

Forthwith attend or send a qualified representative to assist the Engineer or his representative in making such measurement, and supply all particulars required by the Engineer or his representative.

Should the Operator not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or his representative or approved by him shall be taken to be the correct measurement for such part of the works. For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare such records and drawings as the work proceeds as he deems necessary or appropriate and the Operator, as and when called upon to do so in writing, shall within 14 days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If after examination of such records and drawings, the Operator does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Operator, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

iii. Method of Measurement

The Works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.

b. PAYMENTS

No part payments will be made for all items of works under this contract, except for pipeline works, which will be paid as mentioned in contract data.

13. Earthwork excavations

a. General

The Earthwork Excavation for laying of sewers shall be carried out as per applicable IS specifications, specification in the Bill of quantities and applicable clauses in this specifications.

The Operator shall make all excavations required for laying and jointing of the pipeline and construction of pertinent structures as required by the project. Except where otherwise required by the project or instructed by the Engineer, all excavation shall be in open cut, to the specified widths and depths with shoring, strutting and bracing. The Operator is advised to satisfy himself and shall be deemed to have

quoted rates accordingly with regard to the likely conditions that may be met with during the execution of the works, with regard to the underground obstructions or conditions, necessary dewatering requirements including well point system or other means of dewatering the trenches before, during and after excavation, laying of bedding material, laying and jointing sewers, hydraulic testing and till backfilling, construction of manholes, pipe supports etc., in sub terrain underground water, rain water, sewage and waste water etc.

Earth work excavation for pipeline trenches and manhole chambers including depositing on bank including, danger lighting and using sight rails and boning rods, including shoring, strutting, bailing out water at every 100 metres wherever necessary as directed in the various strata with lead upto 30 meters and all lifts etc., complete. A minimum of three numbers of sight rails are to be maintained at all times during pipe laying between manholes, including barricading as per directions of Engineer In-charge of work. (The Excavation cost should include the cost of shoring, strutting to facilitate for laying, jointing & testing of sewers, manholes).

Classification of Excavation

All Soils includes the following,

(a) Soft clay, soft murrum, gravel shale etc. including. Stiff heavy clay, hard shale or compact murrum requiring drifting tool or pick axe or both and shovel closely applied.

(b) Gravel, soft laterite, kankar and cobble stone having maximum diameter in anyone direction between 75 mm and 300 mm.

(c) Soling of road paths etc., and hard core.

(d) Macadam surfaces such as water-bound and bitumen/tar bound.

(e) Lime concrete, stone masonry in lime/cement mortar below ground level.

(f) Soft Conglomerate, where the stones may be detached from the matrix with pick axe.

(g) Generally any material which requires the close application of pick axe or scarifiers to loosen and not offering resistance to digging, greater than that offered by the hardest of any soil mentioned above.

Disintegrated Rock (D.I.R.) soft rock and medium hard rock includes,

(a) Ordinary rock comprising of lime stone, sand stone, hard laterite fissured rock, conglomerate or other soft or disintegrated rock which may be quarried or split with crow bars.

(b) Un-reinforced cement concrete which may be broken up with crow bars or pick axe and stone masonry in cement mortar below ground level.

(c) Boulders which do not require blasting having maximum diameter in any direction of more than 300 mm; found lying loose on the surface or embedded in river bed, soil, talus, slope, wash, and terrace material of dissimilar origin.

(d) Hard laterite does not require blasting. It is to be classified under ordinary rock which does not require blasting.

Hard Rock includes,

Any rock or cement concrete or RCC, excavation of which require the use of mechanical equipment or chiselling.

All soils

The Earth work excavation in all soils, including the ones mixed with boulders of up to 30 cms size, includes excavation both by **manual and machine excavation** based on location of excavation and space constraints. The quoted rates are applicable for both manual and machine excavation, the location and extent of manual and machine excavation should be as described below,

Manual excavation

The manual excavation for laying the sewers in pipeline trenches shall be carried out as decided and directed by the Engineer In-charge, along the alignment of such narrow roads and main roads where it is not possible for machine excavation and, at excavations in deeper depths of more than 3m, providing all safety measures to workmen at Operator's risk, also, manual excavation is to be adopted at the possible locations of underground utilities to safeguard against damage.

Machine excavation

The machine excavation for laying the sewers in pipeline trenches shall be carried out along the alignment of wide roads and in depths where there are no underground utilities without causing any damage to public property, and inconvenience to public

Disintegrated Rock, Soft Rock and Soft Shale

This category includes excavation in disintegrated rock, soft rock, soft shale and in medium rock comprising of lime stone, hard shale, schist, fissured rock, and all types of laterite with varying densities and composition requiring chiseling which can be cut by shovel and but without resorting to blasting.

Hard Rock

This category includes excavation in hard rock requiring hand and/or mechanical chiselling. In case of difference in opinion between the classifications of rocks, the decision of the Engineer shall be final and binding on the Operator.

14 **Shoring and Bracing**

a) As per Specifications and directions of the Engineer, the Operator shall supply, fix and maintain necessary sheathing, shoring and bracing etc., in steel or wood, as may be required to support the sides of the excavation, to protect workmen in the trench and to prevent any trench movement which might any way injure or delay the work, change the required width of the trench, make unsafe condition for adjacent pavements, utilities, buildings or other structures above or below ground.

b) Sheathing, shoring and bracing shall be withdrawn and removed as the backfilling is being done, except when the Engineer may agree that such sheathing, shoring and bracing be left in place, at the Operator's request. In any case, the Operator shall cut off any such sheathing at least 600 mm below the surface and shall remove the cut off material from the trench.

c) All sheathing, shoring and bracing which is left in place under the foregoing provisions shall be removed in a manner so as to, not endanger the completed work or other structures, utilities or property, whether public or private.

Excavation in Rock

Excavation in rock shall be carried out without resorting to any kind of blasting, to a depth, 150 mm more than the bottom level of pipe and to a width equal to the diameter of the pipe plus specified working space on either side as given in drawing / as mentioned above. Unless otherwise directed by the Engineer, rock excavation shall be progressed at least by 20 m in advance of the pipe length proposed to be laid.

Limits of excavation.

The trench for laying of sewers and construction of manholes shall be excavated in accordance with the relevant applicable Indian standard, as per the approved drawings, or as directed by the Engineer. The width at bottom of trenches for sewers, unless otherwise specified in the approved construction drawings, or directed and approved by Engineer, for different diameters of pipes laid at different depths shall be as given below,

a) For all diameters, up to an average depth of 1.20 m, width of trench in mm is equal to diameter of pipe plus 300 mm.

b) For all diameters for depths above 1.20 m, width of trench in mm is equal to diameter of pipe plus 400 mm.

c) Not with standing (a) and (b) the total width of trench should not be less than 0.75 meters for depths exceeding 0.90 meters.

The width at top of trenches for sewers shall depend on depth of sewer, location and alignment of sewer, as per the approved construction drawings and directions of Engineer. Unless other wise specified in the drawings or directed by Engineer, for providing of sheet piling as per specifications in Bill of quantities, the top widths for excavations up to 2 meters depth shall be equal to bottom width (i.e. vertical side cuts.) and for depths beyond two meters depth, for all types of soils/rock, steps shall be provided of 0.30 m width on either side of the trench at every lift of 2 meters and as per the directions of Engineer. The quoted rates for excavations in accordance with the above specifications shall include all shoring and strutting for all depths.

The depth of excavations shall limit to the specified gradients/reduced levels as per the approved construction drawings at ends, considering the necessary beddings / encasement / surround.

The Operator shall not excavate beyond the dimensions specified as above. Should the excavation occur beyond the dimensions specified therein, because of the negligence of the Operator, the Operator shall fill the excess space with granular material or concrete as directed by the Engineer. Nothing extra shall be paid to the Operator on account of this. The Operator shall quote the rates for excavation items, limiting the trench widths as above for whatsoever depths encountered, including necessary arrangements as

required. Any extra claim and increase in quantity other than the widths specified above, shall not be entertained or paid.

15 Trial pits

Trial pits shall be excavated by the Operator, as directed to do so, along the lines of the trenches as shown on the drawings in advance of the excavations for the purpose of satisfying himself as to the location of underground utilities, obstructions or soil strata's and conditions. Trial pits shall be excavated preferably by manual excavation. The Operator has to take the permission of the concerned Executive Engineer, OWNER, before taking up the work.

It involves, Earth work excavation for trial pits in all kinds of strata and for all depths, recording necessary details of underground utilities and kind of strata, including depositing on bank excavated earth, including barricading, posting safety sign boards, shoring, strutting, bailing out water, wherever necessary as directed with all lead and lifts etc., complete. Any damage to the existing utilities unless otherwise specified shall be repaired at Operator's own cost. The Precautionary measures shall be taken by the Operator while making trial pits and shall inform the Engineer before commencing such works. The Operator will be paid as per the item in BOQ on account of this work.

a. Dewatering

Extra charges will be paid at quoted rates, for excavation in all classifications in watery situation or foul conditions towards dewatering including overnight recuperation for specified depth ranges with all lead and lifts etc., complete, including cost of installation and running of dewatering system such as well point system / any other system wherever required.

Dewatering shall be done in accordance with specifications. The Operator shall be responsible for the adequate pumping, drainage and bailing out of water from the excavation in case of inundation etc., of trenches. The sewer lines shall be laid above normal ground water table level and as directed by the Engineer. Dewatering shall be either continuous or intermittent using Diesel pump or any other method approved by the Engineer. The method of dewatering shall depend on site condition and should be furnished by the Operator and approved by the Engineer. The method of dewatering shall be either well point system or sump pumping. The effectiveness of each method will depend upon the nature of the soil, the proportions of the trench and degree of lowering required. Pumping test may be necessary to determine which method is Suitable.

If sump pumping is not practicable other control methods shall be considered and should be approved by the Engineer. The trenches should be kept dry till the completion of work, which includes excavation, pipeline laying, jointing, testing and commissioning and backfilling. Precaution should be taken against the floatation of the pipes.

The Operator shall conduct ground studies if found necessary and the cost for such studies has to be borne by the Operator himself. The Operator shall be responsible for the adequate pumping, drainage and bailing out of water met due to all causes from the excavation for laying sewer lines, construction of manholes, wet wells and all types of constructions. In case of failure to make such provisions or any other provisions, which may result in unsuitable sub-grade conditions, the Operator shall replace and repair the sub-grade as directed to the satisfaction of the Engineer, at his own cost and responsibility. Should the Operator select to use a gravel sub-grade with or without un jointed pipes with the gravel layers to facilitate flow of water to pumps or other points of disposal, such gravel sub grade with or without conveying pipes shall not be measured or paid as an extra item.

Sump pumping

This method may be used in highly and moderately permeable soils such as gravels, sand and gravel mixtures. This method is simple and cheap to install and used with watertight trench sheeting to limit the volume of flow. To prevent the boiling in the bottom of the trench the following precaution should be taken

- Drive sheeting deeper to lengthen drainage path
- Use open pipe surrounded in gravel as a sump.
- Move the sump to one side of the trench

To prevent removal of fines from soil causing loss of strength in the soil and undermining of the trench bottom and side support

- Surround suction inlet with protected graded filter
- Increase flow rate through the soil by using open pipe surrounded with gravel.

The delivery side of the pump should be monitored by taking samples of water and checking the proportion of fines being removed. If fines are being continuously withdrawn or there are signs of trench instability, sump pumping should be stopped and alternative methods to the considered.

Well pointing

In this method, well points are installed at regular intervals on one or both sides of the trench and linked parallel to a header main connected to a pump. Well points are usually installed at 0.6 to 2.0m centre to centre by jetting them in ground with dense layers or cobbles & boulders it may be necessary to pre bore the layers. The efficiency of the well points is increased by sanding in the well point and riser using a column of sharp sand. This Method has an advantage of drawing water away from the trench and in suitable conditions is effective in lowering the water by 4 to 6m. It will also reduce the hydrostatic heads on the trench support system. It is of greatest use, in sand, the heavy flows in permeable ground, such as gravels, the well points should not to be so close together that the method becomes impractical. In clays the rate of seepage is too small for the system to be properly effective. Silts can be stabilized in certain conditions by using special procedures.

The well pointing shall be either single sided well point or double sided well point. For higher depths double sided well point with multi stage shall be considered. Should the Operator select to use a gravel sub-grade to facilitate flow of water to pumps or other points of disposal, such gravel sub-grade shall not be measured or paid for as an extra item. Operator should assess the availability of extra earth required for refilling in case of shortage in any particular reach well before quoting rates. Even in case the Operator resorts to mechanical excavation, the Operator should take care of proper refilling, consolidation and disposal of surplus earth. Disposal of ground water is to be away from the area of influence of the pipe laying area Suitable temporary pipelines are to be laid to existing watercourses.

b. Slips and slides

The Operator is responsible for proper protection of excavations made by him from any slips and slides. All slides and caving shall be handled, removed or corrected by the Operator without any extra compensation at whatever time and under whatever circumstances they may occur. The excavations shall be made good and brought to necessary depth, width and levels without any extra cost. Special care should be taken to protect the safety of the workmen, staff and public or whoever at the site.

c. Stacking of excavated material

Pursuant to specification in Bill of Quantities or directions of Engineer in-charge of execution, the excavated material shall be stacked at suitable locations so as not to cause any inconvenience to the public or traffic, with all safety measures in accordance with IS 3764 with latest revisions and amendments. The excavated material shall be placed away from the sides of the trench. The excavated materials shall be stacked at a suitable distance, keeping in view the safety aspect of working personnel due to sliding and slippage based on nature of soil and condition. The Operator shall be solely responsible for the untoward incident caused due to his negligence of stacking the excavated material. Under circumstances where in, sewers have to be laid in narrow pathways, the excavated material shall be transported or placed with all lifts & lead as detailed in bill of quantities to the nearby suitable place or as decided by the Engineer and brought back after laying and jointing for refilling of the trenches as per specifications under clause 19.12.

d. Barricading

The Operator shall Provide, erect and remove casurina pole three tier barricading using poles of 7.50 to 10 cms. Dia. And 1.50m height above ground fixed vertically at intervals of 2.0 to 2.5 mtrs. C/C and Horizontally at 0.50 mtrs, above ground level, including fixing poles in the ground for a minimum depth of 0.30 mtr. and tied with coir rope firmly including cost and conveyance of all materials, labour, lead and lift charges complete. The work will be paid as per the item in the BOQ.

e. Carting and Re-Carting of Excavated earth

The carting of excavated earth, of all types and at all depths, from trenches is to be carried out, for laying of sewers and construction of manholes in narrow roads and other roads where there is a space constraint, and at locations directed by the Engineer In-charge. where the trenches are to be backfilled with the same excavated earth, the excavated earth shall be Carted to a lead distance detailed in bill of quantities & stacking of earth at identified suitable site and re-carting back the stacked earth to the same site by vehicle, including loading, unloading charges for to & fro, with all lifts, labour, HOM of machinery etc. complete. Lead distance indicated is one side distance only. Bidder shall quote the rate for to & fro lead distance., Also, Disposing off the excess excavated Earth of manhole chambers & pipeline trenches of all types to a lead distance detailed in bill of quantities by vehicle, including neatly stacking, loading , unloading, with all lifts, labour, HOM of machinery etc. complete

The responsibility of locating the site for stacking or disposal of excavated earth shall be the responsibility of the Operator, in coordination with the OWNER. Stacking/Disposal of earth shall not cause inconvenience to public or other agencies and should not cause environmental problems. The location and extent of the above specified work shall be taken up by the Operator, only after the approval and proper directions by the concerned Engineer, OWNER. The work will be paid as per the item in BOQ.

f. Safety measures

Pursuant to Specifications in bill of quantities, relevant Indian standards or directions of the Engineer, the Operator shall provide adequate safety measures. They shall include:

(a) Barricading all sides of the open trenches.

(b) Red danger lights as can be easily visible from dusk to dawn at an interval of 20 m and at all the road crossings.

(c) Traffic signals and display boards giving direction for diversion of traffic at the appropriate places as may be directed by the Engineer.

(d) Adequately safe wooden plank / board or steel plate over the trenches at every 15 meters interval or less depending upon access requirement to commercial, institutional and domestic properties to facilitate crossing by the public residing on either side of the trench.

(e) Round the clock watch and ward maintaining all safety regulations at the site of work and protecting the site from unauthorized intrusions.

(f) The work due to the above facilities/arrangements by the Operator will be paid for the items in bill of quantities and the cost for the remaining shall be deemed to be included in the relative items of work.

Progress of Excavation

(g) The Operator shall adjust excavation of trenches in such lengths that the pipes can be laid in such exposed portion of the trench within 3 days / less than 3 days as per criticality of site condition and directions of the Engineer.

(h) Unless otherwise directed by the Engineer, the following limitations for lengths of open trenches shall rule for a pipeline in one continuous reach.

(i) Not more than 50 m in built up area and 150 m elsewhere shall be opened in advance of pipe laying.

(j) Not more than 50 m of pipeline left uncovered after pipe laying in built up areas and not more than 150 m elsewhere.

g. Excavation for Manholes, Other Appurtenant and Structures.

(a) Excavation for Manholes and other appurtenant structures shall be done in accordance with the applicable clause of this Section. The Operator shall excavate as required for all the structures with foundations to firm, undisturbed earth up to the level of the underside of the structure.

(b) If the excavation is in rock, the Operator shall excavate all rock at least to the minimum limits shown in approved drawings.

(c) The standard details for trenches and to the grade of the bottom of Manholes and other structures are as per applicable clauses in this section and construction drawings issued for the execution of work. Where the bottom of the structure is in rock, it should be ensured that no rock shall project above the lower surface of the concrete in such a manner so as to reduce the required thickness of concrete placed simultaneously as an integral part of the foundation and to the outside of structure foundation where structure is to be built.

(d) The Operator shall excavate the trench / pit to provide necessary working space on all sides and for accommodating any sheathing, shoring or bracing etc.

h. Works Included in Excavation

The following works as per specifications are also included in excavation and the term 'Excavation' shall construe to mean all such items of work. The quoted rates should include the same:

(a) Provision of side space or additional space in the trench / pit for working and /or accommodating sheathing, shoring, bracing, etc.

(b) Supply, installation and removal after the work, all-sheathing, shoring and bracing required, protecting the excavation where required or where such work is recommended by the Engineer.

(c) The bidder shall verify the site conditions and wherever such dewatering is required it is considered that the rates quoted for dewatering item of work are inclusive of dewatering of surface and sub-surface water.

(d) Protection of excavations.

(e) Providing adequate safety measures.

(f) Additional work in connection with overhead wires and poles.

(g) Excavations for socket and collar hollows.

(h) Supplying and fixing of sight rails and boning rods in the trench to facilitate measurement of work etc. complete

(i) Temporary approaches to roads, properties etc., affected by excavation at no extra cost.

i. Sheet piling

(a) Trenching at locations along the alignments of Trunk sewers or other locations where vertical cutting of trenches is necessary as directed by Engineer, Sheet piling shall be provided as per the item in bill of quantities and the specifications in this section.

(b) The Operator shall Provide and install steel sheeting or sheet piling for both sides of the trench for various depths detailed in bill of quantities, with mild steel sheets not less than 6.5 mm thick, stronger knife edge, recessed spreader sockets, single or double wall shields to be designed by the Operator to withstand all types of soils, maximum depths upto 12 m, as approved by the Engineer including all materials, equipment and labour charges for installing and removing the sheet piling at various reaches of sewer line construction, including loading, unloading, transporting to the suitable location etc complete as directed by the Engineer-in-charge.

(c) The location and extent of sheet piling shall be got approved by the Operator from the concerned Engineer, OWNER prior to starting this work. Measurement for the sheet piling work shall be taken and paid for, on one face of wall shield only. Sheet piling will be measured for payment by the number of square meters of sheet piling completed and accepted, as computed from the horizontal and vertical payment lines shown on the plans or as ordered. The limits used for payment will be the actual horizontal limit of temporary sheet piling installed and accepted, and the vertical limit will be as measured from the bottom of the exposed face of the sheeting to the top of the trench. No measurement will be made for end extensions.

25 Measurements for excavation

(a) The Earthwork excavation shall be measured net. Unit of measurement shall be in cubic meters, and the measurements are limited to deci-meters (Two decimal places). Dimensions for the purpose of payment shall be reckoned on the horizontal area of the excavation at the base for foundation of the walls, columns, footings, tanks, rafts or other foundations/structures to be built, multiplied by the mean depth from the surface of the ground in accordance with the specifications and construction drawings. Excavations in side slopes will not be paid for. Operator may make such allowance in his rates to provide for excavation in side slopes keeping in mind the nature of the soil and safety of excavation. No payment will be made for working space except where clearly indicated in the drawing or is essential in the opinion of the Engineer. Where concreting is

proposed against the excavated sides, no such over excavation will be permitted. In such cases over excavation shall be made good by the Operator with concrete of the class as in the foundations at his own cost.

(b) Trench excavation for sewers shall be measured using the dimensions detailed in the standard section shown on the construction drawings. Excavation beyond the widths or depths required will not be paid for, any additional concrete or bedding material required as a result of over excavation will be at the Operator's expense.

(c) Backfilling for trenches shall be measured and paid separately. Volume of rock excavated shall be calculated on the basis of length, breadth and depth of excavation indicated on the construction drawings and the limits of excavation clause of this section. No payment will be made for excavation/over break beyond payment line specified. Where such measurement is not possible as in the case of strata intermixed with soil, excavated rock shall be properly stacked as directed by the Engineer and the volume of rock stacked will be calculated on the basis of stack measurements after making appropriate allowance for voids. The allowance to be made for voids shall be decided by the Engineer.

(d) Excavation in paved roads, pavements and concrete shall be billed separately and will be measured in cubic meter The quantities of paved roads and pavements will be calculated from the length of the trench excavated measured between the centers of two adjacent manholes multiplied by the standard width indicated on the drawings or the applicable clause in this section for the particular diameter of pipe and the actual measured depth of the road surfacing material. The quantities of concrete broken out during excavation will be calculated from the actual measured quantities.

- **Glazed Stoneware (GSW) Pipes**

Manufacture of pipe

The Stoneware Pipes shall conform to IS: 651-2007 with latest amendment. The method of manufacture of GSW pipes with rubber joints shall be such that the form and dimensions of the finished pipes are accurate. The pipe shall be free from visible defects such as fire cracks or hair cracks without any broken blisters.

The thickness of barrel and socket for various diameters of pipes shall be as specified in IS: 651 / EN 295 as applicable. The push on type jointed, stoneware pipes of 1.0m length shall have pre-fixed Rubber Gaskets confirming to EN: 681 fixed with approved glue at manufacturing unit. Each pipe unit shall be of 0.6-1.0 m length, exclusive of the internal depth of socket.

Testing of pipes at manufacturing unit

During manufacture, tests on Glazed stoneware pipes shall be carried out as per IS: 651 / EN 295 standards. The pipes shall be tested in accordance with **relevant clauses of this Technical specification** and with Clause 7 of IS: 651/ any other latest relevant IS standard, and tested in accordance with the methods described in relevant IS including the following,

1. Hydraulic test
2. Absorption test
3. Test for Acid Resistance

4. Test for Alkali Resistance
5. Crushing Strength test.

Marking

Marking shall be done conforming IS: 651 / EN 295 or any other relevant IS codes approved by the Engineer. The following information shall be clearly marked on each pipe,

a). Internal diameter of pipe.

b). Class of pipe.

c). Date of manufacture and

d). Name of manufacture or his registered trade-mark or both.

Carting & Handling

All Pipes and fittings/specials shall be transported from the factory to the work sites at places along the alignment of pipeline as approved by Engineer in lengths not more than the length of the transporting vehicle. Operator shall be responsible for the safety of pipes and fittings/specials in transit, loading/unloading. Every care shall be exercised in handling pipes and fittings/specials to avoid damage. While unloading, the pipes and fittings/specials shall not be thrown down from the truck on to hard surfaces. They should be unloaded on timber skids with steadying ropes and / or by any other approved means. Padding shall be provided between coated pipes, fittings/specials and timber skids to avoid damage to the coating. Suitable gaps between pipes should be left at intervals in order to permit access from one side to the other. As far as possible, pipes shall be unloaded on one side of the trench only. The pipes shall be checked for any visible damage (such as broken edges, cracking or spalling of pipe) while unloading and shall be sorted out for replacement. Any pipe, which shows damage in the opinion of Engineer, shall be discarded and replaced by new one without extra cost. Dragging of pipes and fitting/specials along road or pipeline alignment shall be prohibited.

Trenching

Trenching includes all excavation which shall be carried out either by hand or by machine and shall be carried out in accordance with all requirements of Earth work excavations clause. Wherever a socket or collar of pipe or fitting / special occurs, a grip is to be cut in the bottom of the trench or concrete bed to a depth of at least 75 mm below the bed of the pipe so that the pipe may have a fair bearing on its shaft and does not rest upon its socket. Such grip shall be of sufficient size in every respect to admit the hand all round the socket in order to make the joint, and the grip shall be maintained clear, until the joint has been approved by Engineer.

Bedding

Before laying of GSW sewer pipes, necessary bedding (granular, concrete cradle, concrete arch etc.) shall be provided in accordance with approved construction drawings and as per detailed specifications 24.1 to 24.6 of this section

Laying of pipe

Laying of GSW pipes shall conform to the Code of Practice IS: 4127 / EN 295. Pipes shall be laid underground with a minimum earth cover of 1m. Pipes shall be generally laid in sections of 300 m or for

the entire length of GSW portion of branch sewers whichever is less. The stoneware pipes shall be laid with sockets facing up the gradient, on desired bedding. All pipes shall be laid perfectly true, both to line and gradient. At the close of each day's work or at such other times when the pipe is not being laid, the end of the pipe should be protected by a close fitting stopper. Any Pipes, fittings or materials placed / used, before there testing and approval shall be removed and replaced with tested and approved material.
Wherever **GSW Pipes are laid in depth's equal to or greater than 4.50 meters,** the GSW pipe shall be encased all-round with 1:1.5:3 concrete as per item in Bill of Quantities, clauses/specifications in this section and approved drawings. The pipe encasement shall be done with all necessary care, so that the pipe does not get damaged during concreting and it shall be the responsibility of the Operator to replace the GSW pipes if damaged, without any extra cost.

Jointing of pipes

- The jointing of GSW pipes shall be carried out by the following two methods as described below, Jointing of GSW pipes shall be made by placing tarred gasket of hemp yarn soaked in thick cement slurry round the spigot of each pipe which shall be slipped into the socket of the previously laid pipe. The pipes shall then be adjusted and fixed in the correct position. After adjusting, the gasket shall be caulked tightly, so as to fill not more than $1/4^{th}$ of the total depth of the socket. The remainder of the socket shall be filled with stiff mixture of cement mortar in the proportion of 1:1.5 (1 cement: 1.50 fine sand). Finally, a fillet shall be formed round the joint with a trowel forming an angle of 45degree with the barrel of the pipe.
- All extraneous material shall be removed from the inside of the pipe and the joints shall be cured for at least seven days.
- The jointing of salt glazed stoneware (SGSW) pipes shall also be made with EPD Mrubber rings (seals according to EN 681 and ASTM 425) as per Bill of Quantities item of work and in accordance with procedure in standard EN 295. The GSW pipes shall be confirming to IS 651 / 1992 (with fifth revision) in all respects. The rubber seal joints pipe will not have grooves in interior of socket and exterior of the spigot. The rubber gasket shall be prefixed at socket at the factory by the manufacturer and will be rigidly fixed with appropriate glue. The rubber gasket will be fixed with glue at the entrance of the socket and spigot end will be push fit to have leak proof joint.

Measurement of pipes

The length of the sewer pipes shall be measured between the inner surfaces of consecutive manholes at the invert level of the pipes along the central line of pipeline to the nearest centimeter.

Testing at work site

After laying and jointing of pipes is completed, the pipe line shall be tested at work site as per all the requirements in of this section and as approved by the Engineer.

Backfilling

Backfilling shall be in accordance with requirements specified in this section for backfilling.

- **REINFORCED CEMENT CONCRETE PIPES**

Manufacture of pipe

The RCC pipes to be used for lateral, branch and trunk / outfall sewers shall be of class NP-3, Spigot and Socket (S&S) type, RCC SPUN / VIBRATED CAST PIPES (REINFORCED), with rubber gasket jointing, manufactured in Conformity with IS 458. All the Pipes shall be manufactured using **Sulphate Resisting cement only**. The ends of the pipes shall conform to Clause 5.3 of IS 458 as applicable for S&S joints. The rubber ring shall conform to IS 5382 and IS 12820 as applicable for sewer lines and shall be of type 'IA'. The diameters of pipes shall be as required for sewers as per designs and drawings.

The method of manufacture shall be such that the form and dimensions of the finished pipes are accurate within the limits specified in relevant IS: 458. Pipes manufactured in compliance with IS: 458 shall be either water cured or steam cured in accordance with the relevant requirements of IS: 458.

The Internal diameter, wall thickness, length of barrel, reinforcement (longitudinal and spiral), type of ends and minimum clear cover to reinforcement, strength test requirements, tolerances on - overall length, internal diameter or dimensions of sockets / spigots of pipes shall be as per the relevant clauses / tables of IS: 458. Minimum clear cover to reinforcement shall be 15 mm. The tolerances regarding overall length, internal diameter of pipes or socket and barrel wall thickness shall be as per relevant clauses of IS: 458. Each pipe unit shall be in lengths of 2 m to 4 m based on availability, ease in handling, transportation and laying.

The workmanship and finish for the pipe will conform to the relevant Indian standard specification; Cleaning of pipes shall conform to relevant Indian Standard specification.

Special coating for Inside Surface of RCC Pipes

The RCC pipes shall be provided with special coatings wherever there is possibility of excess generation of hydrogen sulphide gas during transportation of sewage through sewers. The location, length of coatings shall be as given in construction drawings or as approved by the Engineer.

The work involves, Supply and application of Polymer based protective Elastomeric coating / Lining with zero V.O.C. for complete inside surface of RCC sewers, with minimum dry film thickness of 1mm, Acid resistant, Abrasive resistant, Adhesive to concrete surface, Durable and pinhole / break free, with smooth surface after application, complete as per the Clauses in this Section, including all labour, HOM of machinery, with all lead lifts, taxes etc. complete. spray coating / Lining shall be applied by approved and controlled mechanical spray method, for RCC sewers of diameters 400mm to 800 mm prior to delivery of sewers to site or applied at site, as approved by approving authority, including all surface preparation, testing, as per directions of the Engineer in charge. Rate shall be inclusive of cost of all materials, tools and plants, testing and inspection etc. complete, or

Polymer based protective Elastomeric smooth coating / Lining with zero V.O.C. by spray method for complete inside surface of RCC sewers, with minimum dryfilm thickness of 1mm, Acid resistant, Abrasive resistant, Adhesive to concrete surface, Durable and pinhole / break free, smooth surface after application, complete as per the Clauses in this Section, including all labour, HOM of machinery, with all lead, lifts, taxes etc. complete, spray coating / Lining applied by approved method, for RCC sewers of diameters equal to and greater than 900mm prior to delivery of sewers to site or applied at site, as approved by approving authority, including all surface preparation, testing, and directions of the Engineer

in charge, Rate shall be inclusive of cost of all materials, tools and plants, testing and inspection etc. complete.

Specifications for Protective Coating to inside surface of RCC sewers

POLYMER BASED COATING: The inside of RCC pipes (of dia 400mm & above) & manholes (if required) shall be coated with an approved dual-component, solvent-free polymer protective coating of minimum 1mm dry film thickness. The protective coating shall be spray-applied to the inside of the pipes using suitable plural component spray equipment so as to form a completely impermeable, pin-hole-free & seamless lining. It shall form a good bond with host concrete surface, be resistant to acids & abrasion. It shall meet the following properties.

A – ACID RESISTANCE	
Acid & Chemical Resistance (to ASTM 3908- mod 365d immersion)	Change in weight (not more than).
Sulphuric Acid 22%	0.07%
Hydrochloric Acid 10%	0.07%
H2S-120,000ppm (Sour Brine)	0.66%
Sodium Hydroxide 25%	0.07%
Sodium hypochlorite(sat sol)	0.66%
Salt water – 310g/l (Sat. Sol)	0.22%
Ammonium Hydroxide-20%	nil
Nacl/water-solution -10%	nil
Wastewater anaerobic digesters	0.37%
Wastewater API mo	1.1%
B – BOND	
Bond / Adhesion to concrete (to ASTM D 4541)	> 1.5 n/sq mm
D - ABRASION RESISTANCE	
Abrasion resistance (to ASTM D 4060 with Taber CS17-1000/1000rev)	< 15 mg loss
Shore D Hardness (to ASTM D-2240)	45
C – DURABALITY	
Volume solids %	100
Tear resistance (to Die Cast ASTM D 624)	> 85 Kn/m
Tensile strength (to ASTM D412)	>20 n/sq mm
Elongation (to ASTM D-412)	> 425%
Water absorption(to ASTM D 570 (2hr @95 C)	0.16

Flash Point (Pensky martin)	>93 deg C

a) The coating shall be suitable for long term service at any temperature within the range between -10 Deg C and 100 Deg C and resistant to raw sewer, industrial sewer, treated sewer, effluents, chemicals, sea water, abrasives. The coating shall not be affected by high humidity or moisture during application.
b) All the coating materials including primer & finish coats shall be from a single manufacturer of repute, certified to ISO 9002 standards having a minimum 10 years experience in similar products & in projects of similar size and value as this project.
c) The material provided shall be tested in both liquid (lab-draw down films) and field applied samples and shall meet the properties specified for the project and defined in the approved manufacturer's product data sheet.
d) All pre-coating concrete repairs, coating and lining works shall be carried out only by experienced & reputed Operator's who are authorized, approved, and certified applicators of the approved coating manufacturer & certified by the manufacturer for the type of application detailed in this project.
e) The Operator should submit, the approved coating manufacturer's detailed Method Statement for Coating Application along with their Quality Assurance / Inspection & Testing Plan to engineer in charge prior to commencement of coating activity.

Surface Preparation & Primer application

i. Prior to commencement of coating activity, all concrete surfaces to be coated shall be free from oil, grease, loose particles, decayed matter, moss, curing compound residue or algal growth. All such contamination and laitance must be removed by use of abrasive sweep blasting, high pressure water jetting, or other approved manual/ mechanical means.

ii. Concrete element's surface irregularities, honeycombs spews must be removed and repaired by a method approved by the engineer.

iii. Primer as recommended by the approved coating manufacturer shall be applied prior to coating application & the correct over coating time intervals shall be followed as per manufacturer's approved method statement of application.

iv. The coating system shall be spray applied & shall gel/set rapidly. It shall form a uniform monolithic film without any layering.

v. The pipes shall be coated either at pipe factory or at other department-approved coating yard prior to actual laying.

Testing

I. The finished coating shall be uniform, smooth & have a dry film thickness of minimum 1000 microns, when tested with a standard dft gauge/ Elcometer.
II. The dry film thickness shall be measured at points as instructed & predetermined by the engineer in charge by fixing SS strips. The coating shall be uniform, smooth & pin hole free.

Personal Safety Requirements

a) The personnel at site shall strictly adhere to Standard guidelines during the chemical coating activity, at all times. The approved coating manufacturer shall supply complete standard requirement schedules for the personnel to follow, prior to start of any coating application. The general requirements are:-
b) Observe the owners standard policy at all times and obey all written and verbal instructions from site managers and representatives.
c) Wear all PPE at all times including Hard Hat, Safety glasses, Boots, Gloves and masks as required.
d) When preparing and applying coatings and chemical materials all PPE must be worn including Gloves, safety glasses and protective paper masks.
e) When using high pressure plural component spray equipment, all personnel working in the application area must wear double filter breathers with OSHA or of atleast equivalent make.

Physical & chemical properties & testing methods

TABLE A – PHYSICAL PROPERTIES

Property	Allowable Standard	Method
Tensile Strength	Longitudinal 17.25 Mpa Transverse 17.25 Mpa	ASTM D 638
Elongation at break	Longitudinal 225% Transverse 225%	ASTM D 638
Hardness	54-62	Din 535.5
Plasticier Permanence	0.4%	ASTM D 1203
Water Absorption	0.1%	ASTM D 570
Water soluble matter	0.05%	ASTM D570
Porosity	No pin holes	Spark Tester 7 KV

TABLE B – CHEMICAL PROPERTIES

Chemical Agent	Test Method	Change in Weight Not more than
Sodium Hypo–Chloride 1%	ASTM D 543 (7 days at 20 C)	0.20%
Ferric Chloride 1%		0.60%
Sodium Chloride 5%		0.15%
Sulphuric Acid 20%		0.12%
Nitric Acid 1%		0.20%
Sodium Hydroxide 5%		0.10%
Ammonium Hydroxide 5%		0.40%
Soap & Detergent Solution 2%		0.40%

Testing of pipes at manufacturing unit

During manufacture, tests on concrete shall be carried out as per IS: 456, IS 458 / relevant IS with latest revisions and amendments.

The specimen of pipes shall be tested in accordance with with IS: 458 and tested in accordance with the methods described in IS: 3597 including the following,

a) Hydrostatic test.
b) Three edge bearing test
c) Absorption test.

Marking

Marking shall be done as per IS: 458 or any other relevant IS codes approved by the Engineer. The following information shall be clearly marked on each pipe,

a) Internal diameter of pipe.
b) Class of pipe.
c) Date of manufacture and
d) Name of manufacture or his registered trade-mark or both.

Carting & Handling

Carting and handling of RCC pipes and fittings shall be in accordance with relevant clause of this section (GSW pipes specifications).

Trenching

Trenching includes all excavation which shall be carried out either by hand or by machine and shall be carried out in accordance with all requirements of Earth work excavations clause. Wherever a socket or collar of pipe or fitting / special occurs, a grip is to be cut in the bottom of the trench or concrete bed to a depth of at least 75 mm below the bed of the pipe so that the pipe may have a fair bearing on its shaft and does not rest upon its socket. Such grip shall be of sufficient size in every respect to admit the hand all round the socket in order to make the joint, and the grip shall be maintained clear, until the joint has been approved by Engineer.

Bedding

Necessary bedding (granular, concrete cradle, concrete arch etc.) shall be provided in accordance with approved construction drawings and specifications before laying of RCC sewer pipes.

Laying of the pipe

Laying of concrete pipes shall conform to the Code of practice of IS: 783. Pipes shall be laid underground with a minimum earth cover of 1m. Pipes shall be generally laid in sections as per standard practices and as directed by the Engineer. The RCC pipes shall be laid with sockets facing up the gradient, on desired bedding. All pipes shall be laid perfectly true, both to line and gradient. At the close of each day's work or at such other times when the pipe is not being laid, the end of the pipe should be protected by a close fitting stopper.

All pipes, fittings and material shall be tested and approved by the Engineer before being laid. Any pipes, fittings or material placed before they are tested and approved shall be removed and replaced with tested and approved material. Before laying the pipe, necessary bedding shall be provided wherever required as mention in this section.

Jointing of pipes

The pipe joints shall be flexible joints, jointed by rubber ring of type 'IA', as per IS 783-1985. The sections of the pipe shall be jointed in such a manner that there shall be as little unevenness as possible along the inside of pipe. Care should be taken while jointing to provide the correct gap between the end of spigot and back of the socket to ensure flexibility at each joint and correct location. The joints shall be finished as directed by the Engineer.

The quality of rubber rings, tolerances, etc., shall be in conformity with IS 5382-1985 and latest revisions. After jointing, extraneous material, if any, shall be removed from the inside of the pipe

Measurement of pipes

The length of the sewer pipes shall be measured between the inner surfaces of consecutive manholes at the invert level of the pipes along the central line of pipeline to the nearest centimeter.

Testing at work site

After laying and jointing of pipes is completed, the pipe line shall be tested at work site as per all the requirements of this specifications and as approved by the Engineer.

Backfilling

Backfilling shall be in accordance with requirements specified in these specifications.

28 DUCTILE IRON (DI) PIPES

Manufacture of pipe

DI pipes and fittings (Class K7) shall be in accordance with IS: 8329 and IS: 9523. Pipes and fittings shall be procured from reputed manufacturers with Engineer's approval. Engineer shall at all reasonable times have free access to the place where the Pipes and fittings are manufactured for the purpose of examining and testing the pipes and fittings and for witnessing the test and manufacturing.

All tests specified either in this specification or in the relevant Indian Standards specified above shall be performed by the Manufacturer / Operator at his own cost and in presence of Engineer if desired. For this, sufficient notice before testing of the pipes and fittings shall be given to Engineer

If the test is found unsatisfactory, Engineer may reject any or all pipes and fittings of that lot. The decision of Engineer in this matter shall be final and binding on the Operator and not subject to any arbitration or appeal. The pipes and fittings shall be striped, with all precautions necessary to avoid warping or shrinking defects. The pipes and fittings shall be free from defects. Any defect in pipes and fittings in the opinion of Engineer shall be rejected and shall be replaced by new one.

In the case of spigot and socket pipes and fittings, the socket shall be without the centre ring. In the case of flanged pipes, the flanges shall be at the right angles to the axis of the pipe and machined on face. The boltholes shall be drilled and located symmetrically off the centreline. The bolthole shall be concentric with the bore and boltholes equally spaced. The flanges shall be integrally cast with the pipes and fittings and the two flanges of the pipe shall be correctly aligned.

Materials

The materials used in the manufacture of pipes and fittings shall comply with requirements specified in IS: 8329 and IS: 9523.

Dimensions and Tolerances

The internal diameter, thickness and length of barrel, dimensions of pipes and fittings shall be as per relevant tables of IS: 8329/IS: 9523 for different class of pipes and fittings. Each pipe shall be of uniform thickness throughout its length.

The tolerances for pipes and fittings regarding dimensions, mass, ovality and deviations from straight line in case of pipes shall be as per IS: 8329/IS: 9523.

Coatings

Unless otherwise specified, DI pipes and fittings shall be coated with Bitumen in accordance with relevant IS Specifications. All buried DI pipes and fittings shall also have factory or site applied polythene sleeving. Coating shall not be applied to pipe and fittings unless its surface is clean, dry and free from rust. Pipe coatings shall be inspected at site and any damage or defective areas shall be made good to the satisfaction of the Engineer.

Bitumen coating shall be of normal thickness of 75 microns unless otherwise specified. It shall be cold applied compound complying with the requirements of relevant Indian standards, suitable for tropical climates, factory applied in accordance with the manufacturer's instructions.

Damaged areas of coating shall be repainted on site after removing any remaining loose coating and wire brushing any rusted areas of pipe.

Polythene Sleeving: Where polythene sleeving is specified to be applied in addition to bitumen coating, it shall comply with ISO 8180. Site applied sleeving shall be stored under cover out of direct sunlight and its exposure to sunlight shall be kept to a minimum. Pipes having a factory applied sleeving must be stored in the same conditions. Joints in the sleeving shall be properly overlapped and taped in accordance with manufacturer's instructions to provide continuous sleeving.

Cement mortar lining: All pipes and fittings shall be internally lined with cement mortar in accordance with relevant IS. The cement used shall be Sulphate Resisting Cement confirming to IS: 12330. No admixtures in the mortar shall be used without the approval of the Engineer.

Pipe linings shall be inspected on site and any damage or defective areas shall be made good to the satisfaction of the Engineer.
Lining shall be uniform in thickness all along the pipe. The minimum thickness of factory applied cement mortar lining shall be as per IS: 11906.

Testing of pipes at manufacturing unit
During manufacture, tests on pipes shall be carried out in accordance with **these technical specification** by the Third party inspecting agency.

Marking
Marking shall be done as per IS: 8329 and IS: 9523 or any other relevant IS codes approved by the Engineer. The following information shall be clearly marked on each pipe,

a) Internal diameter of pipe.
b) Class of pipe.
c) Date of manufacture and
d) Name of manufacture or his registered trade-mark or both.

Carting & Handling
Carting and handling of D.I. pipes and fittings shall be in accordance with the specifications in this section.

Trenching
Trenching includes all excavation which shall be carried out either by hand or by machine and shall be carried out in accordance with all requirements of -Earth work excavations clause. Wherever a socket or collar of pipe or fitting / special occurs, a grip is to be cut in the bottom of the trench or concrete bed to a depth of at least 75 mm below the bed of the pipe so that the pipe may have a fair bearing on its shaft and does not rest upon its socket. Such grip shall be of sufficient size in every respect to admit the hand all round the socket in order to make the joint, and the grip shall be maintained clear, until the joint has been approved by Engineer.

Wherever D.I. pipes are laid over pillar supports for nala crossings etc. the pipes shall be placed as per the construction drawings and as directed by the Engineer In-charge.

Bedding
The type of bedding (granular, concrete cradle, concrete arch etc.) shall be as per approved construction drawings and specifications in this section.

Laying of the pipe

Laying of DI pipes shall conform to the Code of practice of IS: 12288. Pipes shall be laid as per the requirement in the drawing and as directed by the engineer. Laying of pipes shall be as per IS specified in Bill of Quantities and approved construction drawings. All pipes, fittings and material shall be tested and approved by the Engineer before being laid. Any pipes, fittings or material placed before they are tested and approved shall be removed and replaced with tested and approved material. Before laying the pipe, necessary bedding shall be provided wherever required. Polyethylene sleeves wounded pipes shall be used for water logged areas as per specification and as directed by the Engineer.

Jointing of pipes

Jointing of DI pipes and fittings shall be done as per IS: 12288 and manufacturer's recommendations. After jointing, extraneous material, if any, shall be removed from the inside of the pipe. Rubber sealing rings/gaskets used for jointing shall conform to IS: 638, IS: 12820 and IS: 5382.

Spigot and Socket joints: These shall have sockets, which are integral with the pipe and incorporate an electrometric rubber ring gasket conforming to IS: 12820.The gaskets/sealant used for joints shall be suitable for water conveyance. In jointing DI pipes and fittings, the Operator shall take into account the manufacturer's recommendations as to the methods and equipment to be used in assembling the joints. In particular the Operator shall ensure that the spigot end of the pipe to be jointed is smooth and has been properly chamfered, so that the rubber ring as per IS: 12820 and IS: 5382 is correctly positioned in line, before the joint is made. The rubber rings and any recommended lubricant shall be obtained only through the approved supplier and as directed by the Engineer.

Gaskets for Flanges

All gaskets used between flanges of pipes shall be of natural rubber conforming to IS: 638 of thickness 3 mm suitable for waste water conveyance and as specified by manufacturer.

Flanged joints

These shall be of PN 1.0 rating and shall comply with dimensions and drilling details as specified in IS: 8329. These shall have isolation gaskets between the flanges, isolation sleeves around all bolts and isolation washers under all bolt heads and nuts. All material shall be supplied by a reputed manufacturer and shall be approved by the Engineer.

Each bolt should be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively. The recommended bolting torque to be followed for assembling flanges shall be as specified in manufacturer's instructions. The practice of fully tightening the bolts one after another is highly undesirable. The bolts shall be of mild steel unless otherwise specified. They shall be coated with coal tar epoxy coating after tightening.

Measurement of pipes

The length of the sewer pipes shall be measured between the inner surfaces of consecutive manholes or start to end points of laid alignment (at road crossings and Nala Crossings) at the invert level of the pipes along the central line of pipeline to the nearest centimetre.

Testing at work site

After laying and jointing of pipes is completed, the pipe line shall be tested at work site as per all the requirements of technical specifications and as approved by the Engineer.

Backfilling

Backfilling shall be in accordance with requirements specified for backfilling.

29 Corrugated HDPE pipes[86]:

Manufacture, factory testing and laying and jointing of Corrugated HDPE pipes used for this contract shall be conforming to BIS 16908- part 2-2013. Earthwork excavation, backfilling, testing etc. shall conform to relevant clauses applicable for SWG pipes.

30 BEDDING, ENCASING, SUPPORTS & BACKFILLING FOR SEWERS.

30.1 BEDDING FOR THE SEWERS.

Bedding shall be provided all along the stretch of the pipeline as shown on the approved construction drawings or as directed by the Engineer, which differs based on the depth and nature of foundation over which the pipeline is laid. Pipe shall be generally laid on murrum / gravel bedding as per approved construction drawings and specifications. When rock is met with, along the alignment, sewers shall be invariably provided with gravel / murrum bedding.

Wherever the pipeline crosses under the road, Concrete arch bedding shall be provided in such situations. The various types of bedding, according to which the Operator shall execute the work, are specified below.

30.2 Earth Bedding.

The trench excavations where the earth at foundation level of sewers is found to be of good quality, suitable for laying of pipe and does not require any import of murram /gravel etc. for foundation of sewers and as approved by the Engineer. Any extra bedding material need not be provided; the excavation shall be carried out to the exact gradient specified so that no making of the sub-grade by backfilling is required. Filling and removing earth or similar materials beneath the allowable depth as above to adjust with the grade will not be permitted except filling with compacted granular bedding material or murrum as directed by the Engineer.

[86] *Projects using corrugated HDPE pipes should supplement the provisions as required.*

30.3 Gravel Bedding.

Wherever bottom of the trench at sewer foundation level at the specified gradient is met with rock or found to be unsuitable as decided by the Engineer, the rock or earth shall be removed up to minimum 150 mm below the bottom level of the pipe to a minimum width as specified, equal to the width of the trench as per the approved construction drawing and the resulting space shall be filled up with good quality gravel/murrum and compacted to desired density as per approved drawings and item in Bill of quantities. The granular material shall be filled in the trench up to the level of ¼ the outer diameter of the pipeline above the bottom of trench, and well compacted and as in the approved drawing. Unless otherwise directed by the Engineer, rock excavation shall progress at least 20 m in advance of the pipe length proposed to be laid.

The graded granular bed material used in bedding and surround shall consist of durable gravel / murrum. Any imported bed and surround materials shall be as per the approval of the Engineer and shall be supplied with certification, which gives details of its content, source and grading. In all cases the soluble sulphate and chloride content of the granular material shall not exceed 0.5% and 0.06% by weight respectively. All graded material shall pass through test sieves to IS 460 (Part 1) in the following proportions by mass:

Aperture Size	**% Passing**
50 mm	100 %
37.5 mm	90 – 100 %
20 mm	35 – 70 %
14 mm	25 – 55 %
10 mm	10 – 40 %
5 mm	0 – 5 %

30.3.1 The gravel/murrum shall be evenly spread over the full width of the formation and compacted to 95% of maximum dry density to the specified gradient in accordance to IS 2720: Part-7, a level slightly higher than level corresponding to the underside of the pipe barrel to allow for settlement of the pipe to the correct level.

30.3.2 Following, placement and jointing of the pipe, further granular material shall be placed in the trench, special care being taken to fill under the sides of the pipes to ensure full contact with the barrel of the pipe. The granular material shall then be placed and compacted evenly to the specified depth.

30.3.3 Field joints which have not been tested shall be left exposed for a minimum length of 150 mm each side of the joint. Trench supports shall be withdrawn gradually in accordance with the progress of the fill with provision that such withdrawal shall not prejudice the safety of the works. After each section of the pipeline has passed the hydraulic test, the exposed joints shall be backfilled and compacted to the above specification.

30.4 Concrete Arch / Cradle bedding and concrete encasement/surround

Where the pipes are laid on a soft soil or super imposed load over pipe sewer laid exceeds the minimum crushing strength even after providing murrum/gravel bedding or with maximum water table level, lying at the invert level of the pipe, or rising above the invert level of the pipe but below the top of the barrel, or as per the approved construction drawings or as directed by the Engineer, the pipe sewers shall be bedded or surrounded in concrete to the specified gradient in accordance with the specifications in this section and applicable relevant Indian Standard for laying of sewers.

30.4.1 Before laying/placing of the bedding, all types of refuse, organic matter etc. shall be removed to the satisfaction of the engineer and the bottom/sub-grade shall be to the specified gradient, dimension and well compacted to the desired density. The pipes shall be supported near each joint with proper supports to avoid any damage to the joints while concreting. Concrete shall not be placed until the pipes have been jointed, inspected and tested. All water in the trench must be bailed out prior to taking up concreting work & the concrete shall be placed to ensure full contact with the pipe barrel throughout its length. The concrete shall be made discontinuous at all flexible pipe joints by a diaphragm of fibre board or other compressible material of at least 20 mm thickness extending for the full area of the surround.The bottom of the trench may be sloped on the sides or kerbed. The concrete grade shall be of 1:2:4 proportion for concrete cradle bedding and 1:1.5:3 proportion for concrete arch bedding or concrete surround as on approved construction drawings. For concrete arch bedding, the pipe shall be provided with approved gravel bedding to the desired compaction below in layers, and concrete arch above as per drawing.

30.4.2 The materials used in the concreting works shall comply to the relevant Indian standards and specifications in clause of specifications for general civil works. Dry mix shall not be permitted and the slump for concrete for the arching shall not be more than 25 mm. When concrete is to be placed over the pipe for arch portion or surround, it shall be placed carefully so as not to damage or injure the joints or displace the pipe. Back filling shall be done in a careful manner and at such time after the concrete is set, so as not to damage the concrete. Joints shall be avoided as far as possible under the roads.

Where pipes are laid below storm water drains, at road crossings and where the depth of cover is less than 1.0m, and GSW pipes laid in 4.50m and below depths, the pipeline shall be encased / bedded. The concrete encasement shall be of RCC/PCC as specified.

30.5 Special bedding in poor sub grades

During the progress of work, if the sub grade is observed to be of poor quality which is unsuitable for laying the pipe line and which is not the result of the Operator's negligence, the Engineer may direct the Operator to strengthen the sub grade as per, Specifications in Bill of Quantities and in the approved drawings. The strengthening shall be done either by approved gravel, with depth not exceeding 300 mm and/or by plain concrete of mix 1:2:4 complying to the specifications in this document or as directed by the engineer .

30.6 Measurements for Bedding.

For providing Gravel and Concrete cradle/arch/surround bedding in accordance with above Clauses of this Section, the measurement for bedding actually used based on the neat line dimensions of the trench and deducting the volume occupied by the pipe will be considered.

30.7 PIPE SUPPORT STRUCTURES.

30.7.1 Anchor, Thrust Blocks.

Anchor blocks shall be provided wherever required in the sewers and for gradients steeper than 16% as per approved construction drawings or as directed by the Engineer and thrust blocks shall be provided for both horizontal and vertical bends wherever required in the rising main pipeline or gravity sewer works (In case of bends in house service connections) wherever necessary to effectively transfer the hydrostatic thrust developed to the surrounding ground. They shall be constructed at the locations shown in the construction drawings and are of the respective dimensions shown therein depending on the angle of the bends, and the pressures developed in the rising main/gravity main. All the anchor/thrust blocks shall be of 1:1.5:3 proportion plain or reinforced cement concrete. The surrounding virgin land of the anchor/thrust blocks shall not be disturbed, to effectively transfer the load/thrust developed by/in the main. The Operator should make his own arrangement for any dewatering or bailing out of water.

30.7.2 Pedestals

Pedestals shall be constructed as per, specifications and construction drawings, wherever needed, and as per the directions of the Engineer. Pedestals shall also be provided for the stretches of the pipe, where the pipe is to be gradually brought above the ground for crossing any obstructions as shown in the drawings. The concrete used for pedestals shall be of 1:1.5:3 proportion RCC with materials and work complying to specifications mentioned in clauses for standard specifications for civil works.

Pipe supports shall be placed at a distance of 2.5/5.0 m centre-to-centre depending upon the pipe material and length of pipe available. The dimensions of pipe supports for pipelines of various diameters shall be as shown in the concerned drawing and shall have sufficient height above ground to be able to support the pipe and surround up to a height of 200mm above the crown of sewer and minimum 150mm both the sides of the sewer.

There shall be no joints at the location of the pipe supports. The joints shall be located on any one side of the support, at a minimum distance from the face of the support as given on drawings.

30.8 Measurements for Anchor, Thrust blocks and pipe supports

For providing Anchor, Thrust blocks and pipe supports in accordance with above Clauses of this Section, the measurement shall be based on the neat line dimensions of the structure and deducting the volume occupied by the pipe will be considered.

30.9 BACKFILLING OF TRENCHES AND AROUND FOUNDATIONS OF STRUCTURES

30.9.1 General

Filling of the trenches for sewers shall not be commenced until the sewers are tested and passed. The Operator shall use approved selected surplus soils from excavated materials for backfilling in accordance with the requirements in relevant Clauses in IS: 4127 and IS: 783 or with quarry dust as specified hereafter and as shown on drawings. The excavated materials suitable for backfilling shall be stored not closer than 600 mm from the edge of the trench and shall not obstruct any public utilities or interfere with

travel by local inhabitants or general public. Handling and storage of excavated materials must meet with the regulations of the Local Government Authorities.

30.9.2 The materials for backfilling are:

a) Excavated earth.

Backfilling for locations of trenches along roads of lesser traffic and interior roads and valley portions, as decided and directed by the Engineer In-charge shall be done by with the available earth obtained from excavation including watering and consolidation to 95% proctor density by mechanical and manual means., complete with all lead and lifts.

b) Quarry dust filling.

Backfilling for locations of trenches along main roads and all road crossings, as decided and directed by the Engineer In-charge shall be done by with the Quarry dust of size not exceeding 5.6mm including watering and consolidation to 95% proctor density by mechanical and manual means., complete with all lead and lifts.

30.10 Method of Backfilling

On completion of the pipe laying operations in any section, for a length of about 100 m and while further work is still in progress, refilling of trenches shall be started by the Operator with a view of restricting the length of open trenches. Pipe laying shall closely follow the progress of trench excavation and the Operator shall not permit unreasonably excessive lengths of trench excavation to remain open while awaiting testing of the pipeline. If Engineer considers that the Operator is not complying with any of the foregoing requirements, he may prohibit further trench excavation until he is satisfied with the progress of laying, testing of sewers and refilling of trenches.

Trenches and excavated pits for structures shall be backfilled to original ground level or to such other levels, as the Engineer may direct. All backfilling shall be carried out in orderly manner expeditiously and consistent with good workmanship. Mechanical vibrators/equipments shall be used for compaction only after the back fill has reached its final level as required by the Engineer as the backfill top shall form the base for restoration road works. Backfill material put into the trenches/pits for backfilling, shall unless otherwise specified be compacted and built up as to minimize future settlement. For this, care shall be exercised in selecting backfill material free from large hard clay lumps, especially in cramped areas directly adjoining the walls of structures.

Care shall be taken not to injure or disturb the pipes, joints and coatings, after the pipe is properly bedded, jointed and inspected and all measurements for the location of Junctions are properly recorded by the Engineer and sufficient time is allowed for the joint materials or cement concrete or mortar to set. Backfilling around and over the pipe, conduit, or structure shall be taken up uniformly on all sides and in the sequence and manner specified hereinafter, with care to avoid the displacement or damage to the pipe, conduit or structure. Trenches and pits should be carefully guarded till backfilling.

For the purpose of backfilling, the depth of trench shall be divided into the following three zones measured from bottom to top of trench, as follows:

Zone A: From bottom of trench or top of the concrete, when concrete bedding is provided, to the level of the centre line of the pipe.

Zone B: From the level of the centre line of the pipe to a level 300 mm above the top of the pipe.

Zone C: From a level 300 mm above the top of the pipe to the top of the trench.

Backfilling in Zone A shall be done by hand with fine earth from excavated material as approved by the Engineer placed in layers of 80 mm and compacted by tamping. The backfilling material shall be deposited in the trench for its full width of each side of the pipe, fittings and appurtenance simultaneously.

Backfilling in Zone B shall be done by hand or approved mechanical methods, special care being taken to avoid injuring or moving the pipe. The type of backfill material to be used and the method of placing and consolidating shall be as approved by Engineer to suit individual locations.

Backfilling in Zone C shall be done by hand or approved mechanical methods. Unless other wise specified backfilling by hand shall be done in layers of 300mm, each layer well compacted before laying the next layer.

As necessary to attain compaction to 95% of the maximum dry density as per part-7, of IS: 2720, the backfill material shall be moistened by sprinkling with water to optimum moisture content. After placing each layer of backfill material, the layer shall be thoroughly and uniformly compacted by means of mechanical or hand tampers. The compacting equipment and the manner of its use shall be subject to the approval of the Engineer. After the backfill material is placed in Zone A and Zone B as specified above, the remaining portion i.e., Zone C of the trench may be machine backfilled. Small pebbles of size less than 50 mm, if any, shall be so distributed throughout the mass, that all interstices are solidly filled with fine material. Machine backfill shall be so conducted that the material deposited in the trench shall not fall directly on top of the pipe from such a height as might result in damage to the pipe joints or alignment. If the trench is subjected to conditions, which might cause flotation of the pipe before sufficient backfill has been placed; the Operator shall take the necessary precautions to prevent floatation of the pipe, conduit or structure. Before final acceptance of the work, additional tamped earth shall be added to restore the settled trench surface to the required level of the adjacent earth surface or to the base of crushed rock wearing surface or to the finished earth base.

As per the applicable clauses in this Specifications, if from the excavated soil, enough backfill material is not available, imported, selected and approved backfill material from the borrow pits shall be placed for backfill. The Operator shall include the above under backfilling rates. Also for backfilling of trenches, where the excavation is in the rock, refilling shall be made with the surplus soft soil with all lead and lifts. Accordingly, the same shall be taken into account by the Operator while quoting the rates for backfill.

Should any subsidence take place either in the filling of the trenches or near about it during the works, the Operator shall make good the same at his own cost.

30.11 Disposal of Surplus Excavated Material

The excavated material, which is in surplus to the requirements after backfilling shall be removed/disposed off as directed by the Engineer with all lifts to a lead distance detailed in bill of quantities, from the site. For this, payment will be made as per the item in BOQ. The landfill site is to be identified by the Operator and got approved by the Engineer in charge of Execution. No surplus or excess material shall be disposed in a stream / channel nor in any place where the pre-construction surface drainage may have to be provided, without written permission of the Engineer.

30.12 Measurements

Backfilling complied to the specifications in this section and in bill of quantities will be measured net in cubic meters, limiting to the dimensions of excavation and deducting the volume occupied by the sewers, bedding, encasement etc as applicable. The payment for backfilling will be made only after the Operator has cleared the road / pathway, of the soil and construction material debris, etc., due to the trench excavations and sewer line works to the satisfaction of the Engineer Incharge.

31 Ancillary STRUCTURES – MANHOLES, DROP MANHOLES AND VENTILATING SHAFTS

The Operator shall construct Wire cut brick, RCC-Manholes, Drop arrangements with HDPE pipes, Cast iron Ventilating shafts, Valve Chambers, at the locations shown on approved construction drawings, as directed by the Engineer as per the specification in the applicable Indian standards mentioned and as mentioned hereafter. The materials used and construction procedure adopted for the ancillary structures shall comply to the specifications as mentioned below and clause in standard specifications for civil works.

31.1.1 Excavation

Earth work excavations for the Manholes, Drop arrangements and C.I. Ventilating shaft arrangements etc. shall be carried complying to specifications in this section and specifications in bill of quantities.

31.1.2 Backfilling

Backfilling for sewer ancillary structures shall be in accordance with requirements specified for Backfilling.

31.2 Manholes

Manholes shall be built at every change of alignment, gradient or diameter, at the head of all sewers and branches, at every junction of two or more sewers as shown on the drawings complying to IS: 4111 Part1-1967 and latest revisions and as per specifications in this section or as directed by Engineer. Sulphate resisting cement confirming to IS: 12330 shall be used for all the items of works for manholes. The shape of the manholes generally is circular with conical shape at top for Brick manholes, unless specifically stated as on drawings.

The Operator shall be wholly responsible for giving suitable connections at the junctions of sewer lines with the manholes. The minimum depth of manhole shall be one meter or as in construction drawings or as directed by Engineer.

For House service connections directly to manholes, 110/160mm PVC pipes shall be placed during construction of manholes as per specifications in this section and items in BOQ, if the provisional pipes for House service connections are not placed due to the negligence of the Operator, the Operator has to redo the total work of dismantling of manhole shaft and placing of the pipes etc. at his own cost.

The Manholes have been divided into different categories based on depth, diameter and material of construction. Any manholes required to be provided extra, at the locations shown by the Engineer, shall be provided by the Operator, for which payment shall be made at the quoted rates.

31.2.1 Wire cut Brick Manholes

31.2.2 Construction

The work shall be executed in accordance with the approved construction drawings and specifications involving,

a). Providing and constructing of 1:3:6 Cement Concrete foundation using approved quality aggregates of 40mm and downsize with an offset of 150mm all round the chamber.

b). Providing and constructing wire cut brick masonry in C.M 1:4 proportion using modular wire cut bricks of class designation 75 of approved quality and confirming to IS : 1077 with a tapering top portion as per approved construction drawings and providing cement mortar plaster in CM 1:3 proportion, 12mm thick inside and outside except for the conical surface outside, where the thickness of plaster shall be 20mm thick. Samples of bricks shall be tested as per IS : 3495 by the Operator. Bricks rejected by the Engineer shall be removed from the site within 24 hours.Construction of Brick works shall be in accordance with IS 2212:1962 and latest revisions.

c). Providing and constructing benching with Cement Concrete 1:2:4 to the dimensions as on drawings with 1:6 slope in the concrete towards the central drain, plastered with CM 1:3 proportion, 20mm thick and finished with smooth coat of neat cement and fixing of inlet and outlet sewers in the walls with the internal periphery protected with an arch of 1:2:4 Cement Concrete with graded metal of 10mm to 20mm size.

d). Supplying and fixing of, 3 mm thick plastic (as per IS: 10910) encapsulated over 12mm dia. Fe-415 steel (as per IS: 1786) bar footsteps staggered at 300mm apart and providing and fixing of heavy duty circular steel fibre reinforced concrete (SFRC) manhole frame and covers of 560 mm diameter conforming to IS 12592 and the payment for providing of SFRC heavy duty manhole frame and covers shall be paid separately as per quoted rate for the item in bill of quantities.

e). The channel for the manhole shall be constructed in cement concrete of M15 grade. Both sides of the channel shall be taken up to the level of the crown of the outgoing sewer. They shall be benched up in concrete and rendered in cement mortar (1:1) of 20 mm thickness and formed to a slope of 1 in 12 towards the channel.

f). The manhole construction work includes curing, pouring tar over MH frame and cover, cost of tar, engraving manhole number and flow direction on the inner surfaces etc., with all lead and lifts, finishing etc complete. The cement used for the construction of masonry works and internal & external plastering works of manholes shall be of sulphate resisting cement only confirming to IS:12330.

31.2.3 Testing

All Brick Manholes shall be tested as per relevant provisions in CPHEEO Manual & relevant IS with latest revisions & amendments and specifications in this section for Testing and commissioning.

31.2.4 Measurement & payment

The depth of manhole shall be measured from the top of cover to the invert level of the deepest outgoing sewer from the manhole.The quoted rate for the Manholes for various depths as per the specifications and drawings shall include the cost of sulphate resisting cement, bedding concrete, benching concrete, wire cut brick masonry, plastering, foot steps, fixing SFRC manhole frame with cover, dewatering to keep the manhole dry until final testing etc complete.

The Rates for any fractional variation (**increase or decrease)** in the depth of the manhole on decimetre basis, shall be **paid as per actuals,** by adding the difference in rates between the immediately preceding and succeeding depths of such fractional depth of manhole on linear basis.

For Example: To pay 1.22M depth manhole:

Rate for 1M depth Manhole excluding manhole frame & cover and **including** encapsulated foot steps rate Rs. X.

Rate for 2 M depths Manhole excluding manhole frame & cover and **including** encapsulated foot steps rate Rs. Y.

Therefore rate for 1.22M depth Manhole

= Rs. X + (Y-X)/1.00 x 0.22.

Note: For the depths of manholes less than the lowest depths of Bill of Quantities item, the preceding manhole depth shall be taken as zero with zero value **to arrive at the rate**

31.3 RCC Manholes

31.3.1 Construction

The construction of RCC manholes shall be by Cast In-situ of Circular in shape or approved type Pre-Cast RCC, constructed using form vibrators of standard type, using SRC Cement confirming to IS: 12330. The type of manhole to be constructed shall be as approved by OWNER, Operator shall take prior approval for the Design and Process of manufacture of the Pre-cast RCC manholes, the type of vibration for compaction of concrete for pre-cast manholes shall be invariably of form or table vibrator type.

The work of Cast In-situ **RCC manholes** includes,

a). Providing and constructing of 1:3:6 Cement Concrete foundation using approved quality aggregates of 40mm and downsize with an offset as given in the drawings.

b). Providing and laying granite jelly cement concrete 1:1.5:3 for beds of manholes etc., using 20mm and down size jelly including laying, tamping, etc. for a depth, as per drawings, with water proof compound for top plaster in CM 1:3 curing and smooth finishing for exposed faces with necessary centering and form work etc., complete as per specification, drawing and as directed by the Engineer.

c). Providing and laying cement concrete of 1:1.5:3 proportion for vertical walls using 20mm and down size jelly including laying, tamping, mixing of required quantity of water proof compound for every one bag of cement for plastering in CM 1:3 curing and smooth finishing for exposed faces with necessary centering and form work etc., complete as per specification, drawing and as directed by the Engineer.

d). Providing and constructing benching with Cement Concrete 1:1.5:3 to the dimensions as on drawings with 1:6 slope in the concrete towards the central drain, plastered with CM 1:3 proportion, 20mm thick and finished with smooth coat of neat cement and fixing of inlet and outlet sewers in the walls with the internal periphery protected with an arch of 1:1.5:3 Cement Concrete with graded metal of 10mm to 20mm size.

e). Providing and laying cement concrete of grade 1:1.50:3 proportion with 12mm to 20mm I.S.I gauge of approved gradation hard broken granite/aggregate including cost and conveyance of all materials with wood or steel shuttering form work including machine mixing , centering form work, scaffolding, tamping , vibrating , curing and smooth finish with CM 1:3, 12mm thick for inside surface for RCC Covering Flat Slab with all lead and lifts, etc. complete as per drawing, specification and as directed by the Engineer.

f). Providing, Supplying and fabricating of TMT (Fe-500) reinforcement steel of all sizes, including straightening, cutting, bending, hooking, lapping and/or welding wherever required, placing in position, tieing with binding wire of approved quality and gauge including the cost of binding wire and anchoring to adjoining members wherever necessary including all laps and wastages etc., with all lead and lifts, complete as per design, specification and directed by Engineer.

g). Supplying and fixing of, 3 mm thick plastic (as per IS: 10910) encapsulated over 12mm dia. Fe-415 steel (as per IS: 1786) bar footsteps staggered at 300mm apart and providing and fixing of heavy duty circular steel fibre reinforced concrete (SFRC) manhole frame and covers of 560 mm diameter conforming to IS 12592 and the payment for providing of SFRC heavy duty manhole frame and covers shall be paid separately as per quoted rate for the item in bill of quantities.

h). The RCC Manhole cost includes all materials, steel, curing, pouring tar over MH frame and cover, cost of tar, engraving manhole number and flow direction on the inner surfaces etc., with all lead and lifts, finishing etc complete. The cement used for the construction of RCC manhole and internal & external plastering works of manholes shall be of sulphate resisting cement only, confirming to IS:12330.

The work of construction of **Pre-cast RCC manhole** includes,

a). Providing & laying mechanically mixed cement concrete of M-15 grade with stone aggregate (with 20 mm nominal size graded stone aggregate) in benching, Neat cement punning over PCC benching, as given in the drawings.

b). Construction of approved type vibrated Pre-Cast RCC Manhole Chambers constructed using Sulphate resistant Cement & form vibrator of standard type for Circular Manhole Chambers of various internal dia (as indicated in BOQ) at bottom and 0.50 dia at top made up of pre-cast monolithic base, modular riser and top cone in M- 30 grade concrete placed & aligned to provide vertical sides, with O ring rubber gasket at each joint, water tight & adjustment rings over top cone, complete and all connections shall have, a water tight seal between the pipe and the manhole complete as per standard design & drawing.

c). Making connection of drain or sewer line with existing manhole including breaking in to and making good the walls, floors etc. with CC 1:1:5:3. Finishing with CM 1:3 with a floating coat of neat cement and making necessary channels for drain etc. as per specification, drawing and as directed by the Engineer.

d). Providing, Supplying and fabricating of TMT (Fe-500) reinforcement steel of all sizes, including straightening, cutting, bending, hooking, lapping and/or welding wherever required, placing in position, tieing with binding wire of approved quality and gauge including the cost of binding wire and anchoring to adjoining members wherever necessary including all laps and wastages etc., with all lead and lifts, complete as per design, specification and directed by Engineer.

e). providing MS Foot rests (PVC encapsulated) and fixing in manhole with CC Block of 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate of 20 mm nominal size) of size 20x20x10 cm with 20mm square bar foot rest, and providing and fixing of heavy duty circular steel fibre reinforced concrete (SFRC) manhole frame and covers of 560 mm diameter conforming to IS 12592 and the payment for providing of SFRC heavy duty manhole frame and covers shall be paid separately as per quoted rate for the item in bill of quantities.

f). The RCC Manhole cost includes providing danger lighting & use of sight rails & boning roads shoring & strutting wherever required, including sand bedding, watering, curing, cost of all materials, labour, supply & fabrication of steel, pouring tar over MH frame and cover, cost of tar, engraving manhole number and flow direction on the inner surfaces etc., with all lead and lifts, finishing etc complete. The cement used for the construction of RCC manhole and internal & external plastering works of manholes shall be of sulphate resisting cement only, confirming to IS:12330.

31.3.2 Testing

All RCC Manholes shall be tested as in specifications for Testing and commissioning .

31.3.3 Measurement & payment

The depth of manhole both for Cast In-Situ / Pre-Cast RCC manholes shall be measured from the top of cover to the invert level of the deepest outgoing sewer from the manhole. The quoted rate for the Manholes for various depths as per the specifications and drawings shall include the cost of sulphate resisting cement, bedding concrete, benching concrete, RCC floor & roof slab, shaft walls, plastering, footsteps, fixing SFRC manhole frame with cover, dewatering to keep the manhole dry until final testing etc complete.

The Rates for any fractional variation (**increase or decrease)** in the depth of the manhole on decimetre basis, shall be **paid as per actuals,** by adding the difference in rates between the immediately preceding and succeeding depths of such fractional depth of manhole on linear basis.

For Example: To pay 1.22M depth manhole:
Rate for 1M depth Manhole excluding manhole frame & cover and **including** encapsulated foot steps rate Rs. X.
Rate for 2 M depths Manhole excluding manhole frame & cover and **including** encapsulated foot steps rate Rs. Y.
Therefore rate for 1.22M depth Manhole
= Rs. X + (Y-X)/1.00 x 0.22.

Note: For the depths of manholes less than the lowest depths of Bill of Quantities item, the preceding manhole depth shall be taken as zero with zero value **to arrive at the rate.**

31.4 Drop Manholes

In a manhole, wherever the difference between the invert level of downstream sewer and the invert level of the upstream sewer is greater than 60 cm, a drop manhole shall be provided at that position. The locations and construction of the drop manholes shall be provided as on drawings.
HDPE Grade PE-100 pipes confirming to PN 6 as per IS:4984 with latest revisions and amendments suitably supported with MS fasteners at 300 mm c/c. for diameters pipe line as per Bill of Quantities, construction drawings and as directed by Engineer, specials conforming to IS: 1729 shall be used for providing the drop in the manhole & a suitable expander/reducer T-Joint at the top with incoming sewer and 45 degree bend at the bottom with HDPE specials to the direction of flow in the receiving sewer, encasing the pipe with cement concrete of 1:2:4 proportion including necessary centering and form work, vibrating, curing, including cost and conveyance of all materials, labour with all lead and lifts, etc., complete as per specification and as in construction drawing. The benching concrete in the manhole should surround the joint of the terminating bend and a neat channel shall be made in the benching concrete to direct the flow to the receiving sewer. A continuation of the incoming sewer should be built through the shaft wall to form a rodding and inspection eye, which should be provided with half blank flange as on drawing.
The drop manhole arrangements shall be tested along with sewer lines.

31.5 Vent shafts

CI Vent shafts shall be erected at places as on construction drawings or as directed by Engineer and as per Bill of Quantities. The work includes providing and fixing 150mm diameter, Cast Iron pipe for ventilating shaft of 5 meters high with specials and cowl and with suitable grips in C.C. 1:2:4 pillar using 10mm to 20mm graded hard granite/trap/basalt or any other approved metal with 15 cms thick C.C. around up to 1.22 mtrs above the GL and with a foundation base of 90x90x90 cms plastered with 12 mm thick CM 1:3 to all exposed faces and linking the shaft to the manhole by means of 15 cm dia GSW pipes and specials, jointing with tar dipped hemp 1:1 1/2 CM caulking, curing with all lead and lifts etc., complete for all materials earth work excavation and refilling in all strata, and disposal of surplus earth as directed with all lead and lifts etc. complete.(Sulphate resistant cement shall be used).

32 HOUSE SERVICE CONNECTIONS (HSC) AND EXISTING SEWERAGE SYSTEM SURVEY

32.1 House Service Connections

House service connections shall be provided to collect sewage from individual houses as per approved drawings, specifications and items in Bill of Quantities.

For connecting sewers directly to Manholes PVC pipes shall be used and for connecting sewers directly to the Sewer (i.e. online connection) GSW pipes and specials shall be used as on drawings and as decided upon by the Engineer in-charge.

The survey for house service connections from the Nearest Manhole or sewer line as decided by the Engineer, to the property boundary shall be finalized before taking up the work. All the property connections/ House Service Connections (HSC) shall be done simultaneously while sewers are laid in a particular road/ area/ zone.

32.1.1 House Service Connection to Manholes

The Location of House service connections directly to manholes shall be as decided by the Engineer In-charge. The work involves placing of required number of 110/160mm PVC Pipes, of length 200mm more than the shaft wall thickness on both sides, at time of construction of manholes, at a depth of about 1m below ground level or as directed by the Engineer In-charge including providing and laying granite or basalt or trap jelly cement concrete of proportion 1:2:4 for bed and surround of PVC pipe in wall shaft and making the joint water tight.

After completion of the manhole construction, and for providing House service connection up to the property boundary 110mm dia 6 ksc PVC pipes or 160mm dia 6 ksc PVC pipes are to be laid and jointed with required slope, after excavation from property boundary to outside of manhole, and a 90^0 Bend with cleaning eye and cap is fixed for the pipe, inside the manhole as per specifications and drawings. The items shall include all labour, lead and lifts and handling charges as per Bill of Quantities PVC pipe joints are to be made with suitable solvents as per relevant IS Code.

32.1.2 House Service Connection to Sewers (Online connections)

For House service connections directly to lateral sewers, the connections are divided into shallow depth and deeper depths as shown on drawings. The work shall be executed as per details on drawings and items in bill of quantities, and it involves earthwork excavations as per BOQ specifications, providing, laying and jointing of GSW Junctions, GSW pipes, of specified sizes. The pipes, specials and laying shall confirm to IS 651:1992, IS 4127 with latest amendments and specifications in BOQ.

The cement used for jointing shall be of Sulphate Resisting Cement confirming to IS 12330-1988 with latest amendments.

32.2 Location and Protection of Existing Public and Private Utilities

Prior to excavation, the Operator shall contact all **concerned authorities such as Power distribution companies, ULB, police, telecommunications, forest department,** etc and householders in roads where work is to take place and inform them of the nature of the work and its likely duration. Information should be obtained from utilities companies about the location of their utilities, preferably in the form of record drawings, and the Operator should carry out utilities tracing using electronic equipment to verify the positions of utilities. Trial excavations should also be carried by hand to further confirm locations of utilities. The Engineer will only permit trench excavation to proceed when he is satisfied that adequate efforts have been made to establish the alignments and depths of existing utilities

Any damage to water supply utility connections which may occur during execution of House service connections, even after taking all necessary precautions by the Operator shall be paid as per rates quoted for the specified item indicated in Bill of Quantities.

The damaged water supply house connections shall be restored with MDPE pipes including Encasing the MDPE Pipe with 40mm dia., MDPE Pipe at sewer crossings etc, The cost includes encasing the MDPE Pipe with 40mm dia. MDPE Pipe with all works complete as directed by the Engineer In-charge for items under heading "Miscellaneous works" in bill of quantities. The decision in this matter made by the Engineer in charge of work / concerned Engineer of OWNER shall be final and binding upon the Operator. For damaged soak pits and not to cause inconvenience to the public, the soak pits damaged during excavation shall be restored as per items in bill of quantities. However for any damage to other service utilities, the Operator shall make good the same at his own cost. No extra payment towards this will be made.

32.3 Existing sewerage system Survey

It is anticipated that in the existing sewerage system, leaving the portion executed by OWNER, the system is not maintained properly and the system may not be functioning properly at certain locations. Hence the level survey of the existing sewerage system executed by the agencies other than OWNER has been included in this tender. It is the intended to retain portion of existing system which is properly functioning and suitable to be included into proposed network.

The contract covers, Conducting Level Survey of Existing UGD system by Collecting ground levels, invert level of sewers, Size and type(MOC) of Sewers and at every manhole, including depth of manhole and measuring length in between manholes and safely closing the manhole cover, preparation and

submission of Drawings in AutoCAD with all particulars in complete manner as per specification and as directed by the Engineer in charge.(The Manholes and sewers will be de-silted and cleared using sewer cleaning machine by OWNER, Levels shall be carried by the Operator, from the nearest Bench mark given by OWNER).

OWNER will cross verify the adaptability of existing sewer network with the proposed network, and decision will be given to retain or reject the part or whole of the existing sewer network and the Operator shall carry out the same in accordance with the items in the Bill of quantities and as directed by Engineer. For laying of new sewers in place of damaged and unserviceable existing sewers, the earthwork excavation shall be measured including existing damaged sewers under all soils classification, the new sewer lines in place of damaged one's, dismantling of existing damaged manholes and reconstruction of the same shall be done as per items in BOQ. The diversion of sewage for in service sewer lines and manholes, if required during this work will be done by the OWNER.

The Operator shall collect all necessary specified details required for developing sewer network plan for providing the existing system network plan in Auto Cad. And also incorporate the same in the "AS BUILT DRAWINGS" of executed new works.

Payment: - payment to Operator on completion of this item of work complying to the specifications above will be paid as per quoted rate and unit of measurement is meters.

33 TESTING AND COMMISSIONING

33.1 Testing at site

All sewers and appurtenances shall be tested before commissioning and trial run as per the specifications in this section. After laying and jointing of sewer pipes and before backfilling the trenches, the complete length of the sewer is to be checked for water tightness and the sole responsibility of arranging the necessary equipments and apparatus lies with the Operator at his own cost. Any damage during testing shall be Operator's responsibility and shall be rectified by him free of cost. Water for testing shall be arranged by the Operator at his own cost.

33.2 Water Test for Sewers

After laying and jointing of sewer pipes and before backfilling the trenches, the complete length of the sewer is to be checked for water tightness. Owner may exempt water test for lateral sewers, where house service connections are to be connected immediately.

The procedure for testing is as detailed below,

a) Each section of sewer shall be tested for water tightness from manhole to manhole To prevent change in alignment and disturbance after the pipes have been laid, it is desirable to backfill the pipes up to the top keeping at least 90cm length of the pipe open at the joints in case of longer length pipes.

b) In case of concrete and stoneware pipes with cement mortar joints, pipes shall be tested three days after cement mortar joints have been made. It is necessary that the pipelines are filled with water for about a week before commencing the application of pressure to allow for the absorption by pipe wall.

c) The sewers are tested by plugging the upper end with a provision for an air outlet pipe with stop cock.. The water is filled through a funnel connected at the lower end provided with a plug. After the air has been expelled through the air outlet, the stop cock is closed and the water level in the funnel is raised to 2.50m above the invert at the upper end. Water level in the funnel is noted after 30 minutes and quantity of water required to restore the original water level in the funnel is determined. The pipeline under pressure is then inspected while the funnel is still in position. There shall not be any leaks in the pipe or the joints (small sweating on the pipe surface is permitted). Any sewer or part there of that does not meet the test shall be emptied and repaired or re-laid as required and tested again.

d) The leakage or quantity of water to be supplied to maintain the test pressure during the period of 10 minutes shall not exceed 0.2 lit/mm dia. of pipe per kilometer length per day.

e) Ex filtration test for detection of leakage shall be carried out at a time when the ground water table is low.

f) For concrete, R.C.C. pipes of more than 600mm dia. the quantity of water inflow can be increased by 10% for each additional 100mm of pipe dia.

g) After completion of the test all temporary seals shall be removed, the test water shall be drained out / pumped out and the line cleaned properly.

33.3 Test for Straightness and obstruction

As soon as a stretch of sewer is laid and tested, before commissioning the cleanliness of the pipeline is to be checked by the following tests as applicable and as decided by the Engineer.

33.3.1 Torch & Mirror Test

In this method of testing, a torch will be held one end of the pipeline inside a manhole and its image through the pipeline will be reflected and seen on a mirror held at the opposite end of the pipeline, inside the next manhole. Any obstruction / debris / major mis-alignment will not give a clear image in which case the pipeline will again be cleaned / rectified and the tests re-done.

33.3.2 Ring Test

In this method of testing two steel/ wooden rings of suitable thickness and design shall be fixed facing each other at a distance of 2 feet or more. The block of rings shall be inserted from one end of the pipeline, inside manhole and pulled by a rope fixed to the block from the other end of the pipeline, inside the next manhole. The rings shall be of dia 75 mm less than the inside diameter of pipe under testing. The rope used for pulling the ring block may be inserted in the pipeline by suitable means. Any construction /

debris / major misalignment will prevent the ring to pass through the pipeline in which case the pipeline will again be cleaned / rectified and the test redone, and no extra payment will be made. Alternately upon the approval of the Engineer, the sewer may be tested by inserting at the high end of the sewer, a smooth ball of a diameter 13 mm less than the pipe bore. In the absence of obstruction, such as yarn or mortar projecting through the joints, the ball should roll down the invert of the pipe and emerge at the lower end. Any construction / debris / major misalignment that prevents the ball to pass through the pipeline in which case, the pipeline shall be again cleaned / rectified and the tests redone, and no extra payment will be made.

33.3.3 Water Test for Manholes

The entire height of Brick and RCC manhole shall be tested for water-tightness by closing both the incoming and outgoing ends of the sewers and filling the manhole with water. A drop in water level not more than 50mm per 24 hours shall be permitted. In case of high subsoil water it should be ensured that there is no leakage of ground water into the manhole by observing the manhole for 24 hours after emptying it.

33.3.4 Test Records

Complete test records shall be maintained for all tests carried out for sewers both during construction and after being in service. The tests carried out as in specifications, approved QAP shall be documented in the formats as approved by the Engineer and shall be carried out in the presence of the Engineer or his representative and shall be certified by the Engineer or his representative and the Operator. All completed Test records/documents shall be submitted to the Engineer before submission of bills.

33.4 Commissioning

After satisfactory completion of works and Testing of the sewer lines and appurtenances as per specifications in above clauses, the system shall be commissioned for trial run and operation.

34 Final Finishing

The Operator will ensure that the entire structure along with all its installations is in finished and in new and fully operative condition when handed over. He shall have repaired and removed all signs of damage that might have been done during the course of construction of manholes and laying of sewers. He shall also see that the entire exterior has been finished properly and the entire site is cleared of all extra construction material, debris, and excavated soil. This shall have to be done to the satisfaction of the Engineer.

35 As Built Drawings

The Operator shall submit to the Engineer within two months of actual completion of the work, "As Built" Drawings as specified below and operation and maintenance instructions for the whole of the Works. These Drawings shall be accurate and correct in all respects, including the existing sewer network for which the Operator has done the condition assessment survey, shall be submitted to, and approved by the Engineer. Completion Drawings as below on two prints and one polyester film shall be supplied by

the Operator, along with a soft copy in CD. These drawings shall be developed in Auto CAD. Drawing shall be of standard size as below,

i). Strip Plans and L-sections of Under Ground Drainage system showing pipe work in package area on scale as per standard practices to the satisfaction of the Engineer, showing sewer alignments, levels, appurtenances, sizes and material of pipe etc. complete.

ii). Structural Drawings showing reinforcement details of all the components covered under this contract as per standard practices.

36 Sewer crossings By Trench-less Method across National Highways / State Highways / Railway crossings / at any other Specified Locations

All works for Road and Railway crossings by Trench less method i.e. by Pipe Ramming /Manual pipe jacking shall be carried out as per specifications in this section mentioned below and for details and specifications not included in this section shall be carried out as per "Standard contract clauses for Trench less Contracts" and "Standard Guidelines for Trench less contracts", 2008.

37 Design & Submittals

37.1.1 Design

The Operator shall be responsible for the design of the pipes used for the trenchless method including all joints, for the design of the thrust and reception pits including support and thrust wall and for the design of the jacking system in general. His design will be reviewed by the Engineer but this will not relieve him of his responsibility for the adequacy of the design.

37.1.2 Submittals

In addition to the applicable requirement of this Specification, the following shall be submitted by the Operator and approved by the Engineer prior to commencement of any works;

1) Programme or work with resource and equipment allocation.
2) Design Calculations:

a) Pipes including jacking and frictional forces in the axial direction and earth, traffic and surcharge loading in the vertical direction and the pipes resistance to these loads. Also allowable deflections at joints to limit damage to the joint from eccentric loading under thrust and sealing limits,

b) Thrust and reception pits to resist external soil and water pressures and stresses resulting from jacking machine. Drawings showing on plan and sections, the method of supporting excavations and equipment layout shall be included. All calculation shall be certified/ signed by a qualified Engineer.

37.1.3 Method Statement which shall include:

a) List of equipment and resources.
b) Detailed step by step procedure describing how work will be carried out including clear definition of responsibilities and authority.
c) Support of existing services and adjacent structures.
d) Safety arrangement for compliance with safety requirements.
e) Locking pipe in position during insertion of next pipe.
f) Sealing thrust and reception pits during exiting and entering of pipe.

38 Railway Crossings

For Railway Crossings, The Operator has to decide the following issues. Check the profile of track and the strength of the bridge, longitudinally and laterally, the type strata and evolve a complete system from starting and completion with due interaction with owners, Southern Railway (SR) Authorities. The system shall be so evolved that there shall not be any hindrance to any day-to-day activities taking place in the area. He shall spell out likely danger, difficulty, and hindrance and suggest & provide suitable remedial measures to obviate them, keeping authorities in confidence. Suitable sign boards shall be designed and exhibited at proper places in local and English language to keep users informed of the guidance, notice etc.,

39 Site Investigation

After award of the Contract, the Operator shall be responsible for all necessary geotechnical site investigations, including ground water level monitoring, which he considers necessary but as a minimum at the proposed access pit locations, and central median. The Operator's site investigation programme shall be submitted to the Engineer for review. The results of such investigations shall be submitted to the Engineer and shall include recommendation for pipe laying, excavation support and soil stabilization if required.

The Operator shall be responsible for obtaining existing utility structures information after Conducting Ground Penetrating Radar Survey in a corridor of 4-6 meter width to detect buried utilities like pipes, cables etc. in such corridor, Marking of the detected utilities on the map of corridor with information of locations and depths to the top of various utilities detected. Work to be conducted using 500MHz and 300MHz antenna for best possible resolution and penetration.

39.1 Utility Service structures

The Operator shall replace at his own cost towards damage of any utility service structures during the excavation and rehabilitate if necessary at his own cost.

40 SPECIAL CONDITIONS FOR PIPE RAMMING (PR)

40.1 Description

This method involves the forming of a bore from a drive pit, by driving a steel casing with an open end using a percussive hammer or pushing device that serves as a casing for carrier (sewer pipes). In this process of horizontal ramming of steel pipe involves an open steel pipe string being jacked dynamically with the aid of modified displacement hammer or a horizontal ram from the starting shaft though the subsoil to the target shaft. The soil core entering the pipe is removed continuously, at suitable intervals or after completion of jacking.

40.2 Materials

a**). Pipe**

Pipe used in this method includes an external casing pipe (also called jacking pipe) and may include an interior carrier pipe.

b). Allowable Forces

Considerable ramming / jacking forces may be required to install pipe using this method.

i) Casing pipe shall be obtained from one manufacturer. Pipe shall be specifically designedand certified for Horizontal auger boring by the pipe manufacturer.

ii) The allowable jacking strength capacity of casing pipe shall be capable of withstanding the maximum jacking forces imposed by the operation. The specified allowable jacking capacity of the casing pipe shall be 3 times greater than the maximum jacking forces imposed by jacking operations as identified by theoretical calculations.

iii) Steel casing pipe shall have minimum yield strength of 35,000 psi.

40.3 Casing Pipe

a). Casing pipe shall be used within the entire roadbed influence area. The roadbed influence area is defined as the subsurface area located under the road and shoulder surface, between each shoulder point or back of curb; and continues transversely outward and downward from each shoulder point or back of curb on a 1 on 1 slope

b). Casing pipe materials shall be steel.

c). Only new casing pipe shall be used.

d). Casing pipe shall normally be constructed without any longitudinal seams. However, longitudinally welded casing pipe is allowed for 1.2 m or larger diameter pipes when a certified welder performs all the welding.

e). Casing pipe shall have smooth interior and exterior walls to reduce jacking force and prevent casing rotation.

f). The inside diameter (ID) of the casing pipe shall be at least 150 mm larger than the largest out side diameter (OD) of the carrier pipe to allow the carrier pipe to be inserted or removed subsequently without disturbing the casing or the roadbed.

g). Casing pipe shall be round. Steel casing pipe shall have roundness tolerance, so that the difference between the major and minor outside diameters shall not exceed 1% of the specified nominal outside diameter, or 6 mm, whichever is less.

h). Casing pipe shall have square and machine beveled ends. The pipe end maximum out –of –square tolerance shall be 1 mm, (measured across the diameter).

i). Casing pipe shall be straight. The maximum allowable straightness deviation over any 3m length of steel casing pipe is 3 mm.

j). Pipe shall be without any significant dimensional or surface deformities. All pipes shall be free of visible cracks, holes, foreign material, foreign inclusions, blisters, or other deleterious or injurious faults or defects. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and shall be immediately removed from the site.

k). Any of the following defects warrants pipe rejection:

i). Concentrated ridges, discoloration, excessive spot roughness, and pitting

ii) Insufficient or variable wall thickness

iii). Pipe damage from bending Crushing, stretching or other stress

iv). Pipe damage that impacts the pipe strength, the intended use, the internal diameter of the pipe and internal roughness characteristics

v). Any other defect of manufacturing or handling.

l). Casing pipe shall be provided with inside two coats of food grade epoxy painting over one coat of epoxy primer and outside two coats of anti-corrosive red oxide primer of approved quality.

m) The casing pipe shall be tested for seepage test after completion.

40.4 Carrier Pipe

Carrier Pipe material is of either Ductile iron or RCC NP-3. The carrier pipe shall be inserted into the casing pipe in conjunction with the casing spacers.

The work includes, Supplying & Conveying of different diameters k-7 Class, Ductile Iron carrier Pipes detailed in bill of quantities, confirming to IS 8329 with latest amendments and conveying to work site lowering and placing horizontally into casing pipe with all necessary arrangements, true to line and level and perfect linking at joints, testing and commissioning, including cement mortar lining of thickness as per IS using sulphate resisting cement confirming to IS 12330, loading and unloading at both destinations and cuts of pipes wherever necessary including jointing of DI pipes and specials with rubber gaskets including cleaning the socket and spigot ends with soap solution and applying soft soap to the spigot and socket ends before insertion of rubber gaskets, jacking and fixing in perfect conditions including cost of soap solution, soft soap, waste etc. and giving necessary hydraulic test to the required pressure as per ISS with all lead and lifts including cost of jointing materials etc., complete (Operator will make his own arrangements for procuring water for testing)

Supplying of different diameters S&S RCC SPUN / VIBRATED CAST PIPES (REINFORCED) of NP-3 class detailed in bill of quantities, conforming to IS 458:1988 with latest amendments using Sulphate resistant cement, and conveying to worksite, rolling and lowering into trenches, laying true to line and level including loading and unloading at both destinations and jointing of pipes & specials including cost of specials including perfect linking of joints with jack to correct position including cost of jointing materials ie., rubber rings confirming to IS : 5382 for S&S RCC pipes with all lead and lifts as directed and giving necessary hydraulic test as per ISS and testing & commissioning etc., complete. (Operator will make his own arrangements for procuring water for testing)

40.5 Construction

40.5.1 Minimum Allowable Depth

The minimum allowable depth of PR installed pipe under the road and shoulder surface should be usually twice the nominal diameter (OD) or 1 m or the minimum allowable depth as per the project requirement, whichever is higher.

In location where the road surface is super elevated, the minimum depth of the bore shall be measured from the lowest side of the pavement surface.

40.5.2 Equipment

Equipment used for this method shall have the basic operations of boring, removing tailings, and jacking pipe.

40.5.3 Method

The starting shaft shall be excavated to accommodate the steel pipe sections to be jacked and the ram. Steel support profiles shall be placed to direct the movement. If a long jacking is necessary string fabrication shall be done at site.

40.5.4 Access Pits

a) Location

A minimum distance of 6 m, from the edge of the paved shoulder or curb to the face of any access pit, equipment, and supplies, shall be maintained in areas posted at 50 kmph or less; otherwise, a minimum distance of 9 m shall be maintained.

b). Sheeting and Bracing

Sheeting and bracing shall be required whenever any part of the access pit excavation is located within the roadbed influence area. Steel sheet pilling shall be furnished and installed. An additional earth retention structure shall be required above and below the bore hole on the drilling face of all access pits to prevent loss of material during construction.

c) Protection

i). At the discretion of Engineer, and depending on the pit distance from the road embankment, traffic barriers may be required to be installed adjacent to access pit locations according to the owner's plans. If instructed, temporary beam guardrail shall also be installed according to the current owner's specifications.

ii). Fencing barriers shall be installed adjacent to access pits, open excavations, equipment and supplies with suitable fencing and plastic drums to prohibit pedestrian access to the work site. Equipment shall not be used as fencing to protect access pits.

iii). The Operator shall construct and operate safe access pits according to all applicable regulatory requirements.

40.5.5 Overcut Allowance

Overcut is the annular space between the excavated hole and the outside diameter of the casing pipe. No overcut shall be allowed in case of pipe Ramming.

40.5.6 Water tight Joints

Water tight pipe joints are required to ensure the integrity of the roadbed. Pipe shall be constructed to prevent water leakage or earth infiltration throughout its entire length.

A watertight specification for each type of pipe material can be obtained through each pipe material industry. Necessary reference must be made to the appropriate industry specification for more detailed information.

40.6 SPECIAL CONDITIONS FOR MANUAL PIPE JACKING

Manual pipe jacking involves forming entry and exit pits, lowering of pipe segment aligning, laying, jointing of product pipe line through jacking process from the jacking pit.

40.6.1 Scope of Work

The scope of work includes all labour, materials and equipments and to perform all the work necessary to design and construct pipe lines crossing under paved roads, railway crossing using Manual pipe jacking. Construction shall be by using appropriate equipment and Operator shall propose the location of all working shafts having due regard to existing services, minimizing disruption to traffic and pedestrian movement. Locations shall be approved by the engineer prior to the commencement of construction. The Operator shall obtain approval of his method statement from the Engineer before commencement of the work.

40.6.2 Design

The Operator shall be responsible for the design of the pipes used for the trenchless method including all joints for the design of thrust and reception pits including support and thrust wall for the design of the jacking system in general. His design will be reviewed by the Engineer but this will not relieve him of his responsibility for the adequacy of the design.

40.6.3 Submittals

In addition to the applicable requirements of this specification, the following shall be submitted by the Operator and approved by the Engineer prior to commencement of any works;

1) Programme of work with resource and equipment allocations.
2) Additional soil investigations
3) Design calculations for the non disruptive method

    a) Pipes including jacking and friction forces in the axial direction and earth, traffic and surcharge loading in the vertical direction and pipes resistance to these loads. Also allowable deflections at joints to limit damage to the joint from eccentric loading under thrust and sealing limits.

    b) Thrust and reception pits to resist external soil and water pressures and stresses resulting from jacking machine. Drawing showing on plan and sections the method of supporting excavations and equipment layout shall be included. All calculations shall be certified / signed by a qualified Engineer.

4) Materials specifications and product data.

5) Method statement shall include

a) List of equipment and resources
b) Detailed step by step procedure describing how work will be carried out including clear definition of responsibilities and authority
c) Support of existing services and adjacent structures
d) Safety arrangement for compliance with safety requirements.
e) Arrangements for dealing with ground water taking due regard to controlling the loss of materials and preventing settlement around pits pit pipe interface and tunnel face
f) Dealing with different ground conditions
g) Locking pipe in position during insertion of next pipe
h) Sealing thrust and reception pits during exiting and entering of pipe
i) Control of overbreak
j) grout mix design and method of grouting

40.6.4 Casing Pipe

a). Casing pipe shall be used within the entire roadbed influence area. The roadbed influence area is defined as the subsurface area located under the road and shoulder surface, between each shoulder point or back of curb; and continues transversely outward and downward from each shoulder point or back of curb on a 1 on 1 slope

b). Casing pipe materials shall be steel.

c). Only new casing pipe shall be used.

d). Casing pipe shall normally be constructed without any longitudinal seams. However, longitudinally welded casing pipe is allowed for 1.2 m or larger diameter pipes when a certified welder performs all the welding.

e). Casing pipe shall have smooth interior and exterior walls to reduced jacking force and prevent casing rotation.

f). The inside diameter (ID) of the casing pipe shall be at least 150 mm larger than the largest out side diameter (OD) of the carrier pipe to allow the carrier pipe to be inserted or removed subsequently without disturbing the casing or the roadbed.

g). Casing pipe shall be round. Steel casing pipe shall have roundness tolerance, so that the difference between the major and minor outside diameters shall not exceed 1% of the specified nominal outside diameter, or 6 mm, whichever is less.

h). Casing pipe shall have square and machine beveled ends. The pipe end maximum out –of –square tolerance shall be 1 mm, (measured across the diameter).

i). Casing pipe shall be straight. The maximum allowable straightness deviation over any 3m length of steel casing pipe is 3 mm.

j). Pipe shall be without any significant dimensional or surface deformities. All pipes shall be free of visible cracks, holes, foreign material, foreign inclusions, blisters, or other deleterious or injurious faults or defects. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and shall be immediately removed from the site.

k). Any of the following defects warrants pipe rejection:

i). Concentrated ridges, discoloration, excessive spot roughness, and pitting

ii) Insufficient or variable wall thickness

iii). Pipe damage from bending Crushing, stretching or other stress

iv). Pipe damage that impacts the pipe strength, the intended use, the internal diameter of the pipe and internal roughness characteristics

v). Any other defect of manufacturing or handling.

l). Casing pipe shall be provided with inside two coats of food grade epoxy painting over one coat of epoxy primer and outside two coats of anti-corrosive red oxide primer of approved quality.

m). The casing pipe shall be tested for seepage test after completion.

40.6.5 Carrier Pipe

Carrier Pipe material is of either Ductile iron or RCC NP-3. The carrier pipe shall be inserted into the casing pipe in conjunction with the casing spacers.

The work includes, Supplying & Conveying of different diameters k-7 Class, Ductile Iron carrier Pipes detailed in bill of quantities, confirming to IS 8329 with latest amendments and conveying to work site lowering and placing horizontally into casing pipe with all necessary arrangements, true to line and level and perfect linking at joints, testing and commissioning, including cement mortar lining of thickness as per IS using sulphate resisting cement confirming to IS 12330, loading and unloading at both destinations and cuts of pipes wherever necessary including jointing of DI pipes and specials with rubber gaskets including cleaning the socket and spigot ends with soap solution and applying soft soap to the spigot and socket ends before insertion of rubber gaskets, jacking and fixing in perfect conditions including cost of

soap solution, soft soap, waste etc. and giving necessary hydraulic test to the required pressure as per ISS with all lead and lifts including cost of jointing materials etc., complete (Operator will make his own arrangements for procuring water for testing)

Or Supplying of different diameters S&S RCC SPUN / VIBRATED CAST PIPES (REINFORCED) of NP-3 class detailed in bill of quantities, conforming to IS 458:1988 with latest amendments using Sulphate resistant cement, and conveying to worksite, rolling and lowering into trenches, laying true to line and level including loading and unloading at both destinations and jointing of pipes & specials including cost of specials including perfect linking of joints with jack to correct position including cost of jointing materials ie., rubber rings confirming to IS : 5382 for S&S RCC pipes with all lead and lifts as directed and giving necessary hydraulic test as per ISS and testing & commissioning etc., complete. (Operator will make his own arrangements for procuring water for testing)

40.6.6 Quality Assurance

The pipe line installation by manual pipe jacking shall be executed by firms having a record of at least three years of successful trouble free execution of similar works

40.6.7 Delivery Storage and Handling

All materials shall be properly protected so that no damage or deterioration shall occur during a prolonged delay

40.6.8 Site Investigation

Soil conditions and ground conditions shall constitute the Operator's risk. After award of the contract the Operator shall be responsible for carrying out all geotechnical site investigation including ground water level monitoring which he considers necessary but as a minimum at the proposed access pit locations and central median. The Operator's site investigation programme shall be submitted to the engineer for review. The results of such investigation shall be submitted to the engineer and shall include recommendations for pipe laying, excavation support and soil stabilization if required.

40.6.9 Health and Safety

The Operator shall adopt safe working practices for pipe jacking in accordance with appropriate standards. Only authorized persons shall be allowed access to the site. The Operator shall provide a safety officer suitably experienced in tunneling operations and with adequate authority to control and implement safe working practices.

The Operator shall make suitable arrangements for accommodating his personnel at the site including the following as a minimum:

1) Telephone service.
2) Approved gas detectors.
3) First aid kit.

4) One vehicle.

The excavated pits shall have a separate cage type ladder bay complete with ladder in addition to any other bay or bays required for the construction of the works.

The pits shall be fenced off on all sides with close steel panels at least 1.8m in height and equipped with safety warning lights. The panels (maximum space between 100mm) shall be joined by steel rods supported on concrete blocks.

Adequate lighting and ventilation shall be provided to the pits and electricity shall be supplied at no greater than 110/220 volts.

40.6.10 Skilled Operators and Supervision

All operators in the employment of the Operator shall be skilled and experienced in their respective trades and in particular shall be fully skilled in shaft sinking and manual pipe jacking.

The pipe manufacturer has to guarantee that this pipe and its material are suitable for its intended use.

Standard pipes shall be a minimum in length subject to the installation method used. Where required, pipes shall incorporate lubricant injection holes spaced equally around the circumference. Concrete pipes with a liner shall only be permitted to have lubricant injection holes in the concrete. Lubrication holes shall be clear of joints and shall be plugged on completion of the work. The liner shall be made good and continuous. Pipes may incorporate lifting holes and fixing holes for securing temporary apparatus. All such holes shall be threaded to enable plugs to be screwed into the sockets to withstand any external water pressures.

Joints which shall be used in conjunction with a resilient packing, shall be capable of accepting repeated annular deflections of up to 10 without.

i) damage to pipe or loss of structural strength.

ii) The ingress or egress of water or lubricant under the maximum operational or test pressures.

iii) The ingress of soil / groundwater on to the bearing surfaces.

The joint design for concrete pipes shall be such that the areas available for transmitting the maximum permitted thrust force will be sufficient to ensure that with an annular deflection of 10 and with resilient

packing material in place the maximum pressure applied to the joint bearing surface will not exceed 23.5 N/mm2 for drives in excess of 100 metres and up to 150 metres in length.

Unless independently authenticated test results acceptable to the Engineer are available, two consecutive axial loading tests incorporating a 10 angular deflection with the application of double the maximum permissible thrust force (or, if greater, of the greatest thrust force that the proposed thrust equipment can apply) shall have been successfully conducted without any visible crushing, cracking or spalling of the pipe being evident, before any pipes will be accepted for use. The test shall be extended to record the loading at which any visible signs of failure become evident, and shall be carried out in an approved manner to simulate actual working conditions. Pipes which have been submitted to the proof load test will not be permitted in the Works.

Where the Operator elects to construct certain sections within larger diameter pipes and grout the annular space, the external pipe may be of steel with full circumferential weld. The steel pipe and the grout shall be regarded as sacrificial and the inner pipe shall be designed as a stand alone pipe, capable of withstanding installation and grouting forces and soil, traffic and groundwater loads subject to the method.

40.7 Grout

40.7.1 As Slurry replacement:

The grout shall consist of Portland cement and water as determined by geotechnical data and directed by the Engineer. It's normal strength shall be at least 20 N/mm2. admixtures shall be used only if tests have shown to the satisfaction of the Engineer that their use improves the properties of the grout, e.g. by increasing workability or slightly expanding the grout.

40.7.2 As Annular Space Filling

A low strength, non shrink grout or foam concrete shall be used and placed at low pressures. The density of the mix shall be in the range 900 – 1200 kg/m3 and the free water / cement ratio not greater than 0.6.

The carrier pipe and joints shall be protected from the possible adverse physical or chemical – effect of grout. Compressible material shall be wrapped around pipe.

The internal pipe shall be filled with water to avoid floatation forces, hydration temperatures and to resist forces during grouting. A 5m high free vented standpipe should be used.

A free venting standpipe of not less than 100mm dia. Shall be installed on the grout injection feed to restrict grouting pressures to a maximum of 1 bar.

40.8 Thrust and Reception Pits

The dimensions of thrust and reception pits shall be limited to the minimum required to construct the Works.

Thrust and reception pits shall be constructed within a sheet pile cofferdam or caisson if the ground conditions dictate. The pit bottom shall be sealed with concrete. Entry and exit sealing rings shall be provided.

The Operator shall determine the excavated dimensions of the drive and reception shafts as required to suit the site conditions. Minimum shaft dimensions shall be used at all locations where utilities, roads or trees exist adjacent to the required shaft locations.

Excavations shall be supported according to type of pit as specified below:

Type 'A" Thrust and reception pit in all types of soils except rock, with high groundwater able and with the excavation secured by precast reinforced concrete caisson.

The caisson bottom shall be sealed with a concrete plug which shall be placed underwater and designed to resist water uplift as well as forces from the jacking equipment to be installed in the pit. All the joints between caisson rings shall be sealed with the joint sealant and the caisson grouted from outside in order to make in water tight. A reinforced concrete wall shall be provided in the thrust pit to resist the jacking force. A properly braced concrete wall shall be provided in the thrust and reception pits in order to install the entry and the exit rings.

Type 'B' Same as Type 'A' but the excavation is secured by inter – locked steel sheet piles. The sheet piles shall be braced by suitable steel framing welded to the sheet piles. No struts shall be used for bracing. The first set of bracing shall be at 0.5m from the ground surface.

Type 'C' Same as Type 'A' but in dry conditions.

Type 'D' Same as Type 'B' but in dry conditions.

Type 'E' Same as Type 'A' except that the pit is partially in soil and partially in rock. The portion in soil is secured by caisson as in Type 'A' where as the portion in the rock can be unsupported. Special precautions shall be taken to seal the interface between the caisson and the rock so that it is water and soil tight.

Type 'F' Same as Type 'E' except that excavation in soil is secured by sheet piles instead of a caisson.

Type 'G' Same as Type 'E' but in dry conditions.

Type 'H' Same as Type 'F' but in dry conditions.

Type 'I' The thrust and reception pits are in rock in an area of high groundwater table. The excavation can be unsupported. A reinforced concrete wall shall be provided in the thrust pit to resist the jacking force. Properly braced concrete walls shall be provided in the thrust and reception pits in order to install the entry and exit rings.

Type 'J' Same as Type 'I' except in dry conditions.

The pits shall be completely dry prior to commencing and throughout Jacking works. Dealing with groundwater where required shall be conducted in a slow manner. Standby facilities shall be provided.

The thrust wall shall be perpendicular to the proposed line of thrust. The thrust wall shall be sufficient to accept repeatedly the maximum permitted thrust force without undue movement. It will not be permissible to thrust directly off any permanent part of any shaft, chamber or pumping station unless this is specifically designed to withstand the thrust reaction.

Thrust wall shall not be joined to the jacking rig base concrete.
The maximum permissible thrust force.

i) 50% of the sum of the maximum forces recorded at the rigs used to construct the tail tunnel, or

ii) If the over break to the tail tunnel has been grouted up, 100% of the sum of the maximum forces recorded at the rigs used to construct the tail tunnel.

Any tail tunnel which has been used as a reaction surface shall pass the specified water tightness test at a time not less than 14 days after the load has been removed.

The design of thrust wall and any other associated Temporary Works shall be such as to prevent damage to any part of the Permanent Works or any immediately adjacent service or structure.

Any void between the soil face used to provide a reaction to the thrust force and the thrust wall shall be filled completely with grout.

The Operator shall take any measures necessary to prevent damage or deterioration of the soil reaction face during the construction of the Temporary and Permanent Works from whatever possible cause, such ingress of water, softening, corrosive soil or loss of fines from a granular soil.

40.9 Pipe Installation within Sleeves

Pipe sections shall be placed and joined individually within the sleeve or mounted on guide rails or trolleys in such a manner as to transmit the pulling / pushing forces through the carriage and not through pipe.

40.10 Thrust System

The rig shall distribute the thrust to the pipes via a thrust ring and packing. The jacks shall apply the thrust to the thrust ring by means of a symmetrical distribution. Inter – jack stations shall be used where frictional resistance or other causes would otherwise result in unacceptable thrust forces.

If used, spacer blocks shall be true and free form any distortions.

All thrust rings shall be true and free from any distortions and sufficiently stiff so as to transfer the load from the jacks uniformly to the packing.

Other than at the shield, each group of jacks shall be interconnected to ensure that an evenly distributed load is applied to the thrust ring. Each jack shall incorporate a load cell.

At the rig and at intermediate stations automatic thrust recording equipment monitoring load cells incorporated in each jack is to be provided together with a pressure metering device. Other continuous records including cutter torque, rate of progress, slurry progress, pitch, roll, slurry slow, earth face pressure, etc. shall be provided.

Copies of these records clearly stating the units measured shall be submitted daily to the Engineer.

The thrust force shall not exceed the maximum permissible thrust force as determined by the Operator, based on calculations submitted by the Operator and approved by Engineer and on consideration of the behavior of the pipe joint at the maximum permitted angular deflection of 0.5 with the maximum permissible bearing stress in conjunction with the stress / strain relationship obtained form the packing compression tests.

40.11 Lubrication Holes

Where lubrication holes are required, these shall be threaded to enable plugs to be screwed into the socket and withstand the external pressure. Non – return valves shall be fitted where opening a hole would permit ground loss. Lubrication holes shall be plugged watertight on completion, lining or coating shall be made good. The pressure of the lubricant shall be maintained until it is replaced by grout.

40.12 Grouting

Upon completion of a section, if grouting is required or specified, the grout shall be pumped through all lubrication holes. The pressure and quantity of grout injected shall be calculated b the Operator and approved by the Engineer. Grouting shall commence at the lower holes and shall be carried out

systematically working from one end of pipe jack to the other. Where injection holes can be opened without loss of ground, grout shall be pumped through the lower injection holes until it emerges from the upper holes.

Grouting progress shall be continuously monitored to ensure no over pressurization.

Upon completion of the pipeline, the Operator shall continue to monitor the settlement point elevations regularly during the maintenance period and report to the Engineer on a monthly basis. If the specified limits are exceeded then the Operator should report immediately and submit a proposal to rectify the road surface and prevent further settlement.

41 INSPECTION

a). PRE – INSPECTION PLAN REVIEW

a). Review geotechnical and soil reports.

b). Ensure MDOT facilities and nearby utility information are shown on the plans and profile and that the proposed alignment does not interfere with them.

c). Note the minimum cover above the top of the pipe and below the pavement surface, or ground elevation (for longitudinal installation outside the influence of the roadway) is ____ m.

d). Note proposed pipe characteristics:

Pipe material _____
Pipe Diameter_____mm,
Pipe wall thickness _____mm,
Over – cut diameter _____mm,
Back ream dia. Increase _____mm,

e). Ensure that the appropriate penetration angle and curvature rate are identified.

f). Review contingency plan.

g). Review job site layout including: distance from access pits to roadbed, proposed sheeting and bracing, materials storage and fabrication area, safety devices (barrels, guardrail etc.) and dewatering pit locations.

h). Review steel pipe coating requirements.

i). Note unique or special items / circumstances: _____

b) CONSTRUCTION INSPECTION

a). Verify traffic control is consistent with the permit requirements, and the permits are available on-site.

b). Verify job site layout is consistent with the approved plans, especially the alignment of the pipe and machine.

c). Verify continuous monitoring records indicate bearing and grade of the leading edge of the pipe is consistent with the approved plans, dewatering effort is satisfactory, soil volume removed is consistent with projection, and that workers understand the contingency plan.

d) Verify pipe characteristics are consistent with permit requirements.

e) Verify steel pipe is new with smooth interior and exterior surfaces, is used within the entire influence area of the roadbed, has clean and square ends, joints are watertight, defective pipe is not used, and damaged pipe is removed.
Verify each end of the pipe is sealed with a cap, restoration is completed, and attach Inspector's Daily Report (IDR).

Permit No. _____
Inspector: _____
Date: _____

42 Other Related works

42.1 Settlement/Heaving Monitoring

The trench less method of pipe laying shall be performed in a manner that will minimize the movement of the ground in front of, above, and surrounding the ramming/jacking operation: and will minimize subsidence of the surface above and in the vicinity of the ramming. The ground shall be supported in a manner to prevent loss of ground and keep the perimeter and face of the boring stable at all times, including during shutdown periods.

Potential settlement shall be monitored at each edge of right of way, each shoulder point, each edge of pavement, the each edge of each lane (or centerline for two lane roads), and otherwise at 15m intervals along the pipe centerline.

A survey shall be performed one day prior to initiating this operation at each required monitoring location. A similar survey shall then be performed at each location, on a daily basis, until the permitted activity has received a final inspection. This survey establishes the pre-existing and post construction

conditions, and the amount of settlement. All survey readings shall be recorded to the nearest one-hundredth (0.01) of a meter. Whenever possible, trench less pipe installations shall not be installed directly under a pavement crack. Digital photograph of a pavement condition shall also be taken prior and after the pipe installation.

All operations shall stop immediately whenever monitored points indicate a vertical change in elevation of 12mm or more, or any surface disruption is observed. The Operator shall then immediately report the amount of settlement to the Engineer with all records.

42.2 Ground Water Control

Dewatering shall be conducted wherever there is high ground water table level to prevent flooding and facilitate the operation. The water table elevation shall be maintained at least 600mm below the bottom of the casing at all times. When needed, dewatering may be initiated prior to any excavation and will be paid as per the item in bill of quantities.

Minor water seepage or pockets of saturated soil may be effectively controlled through bailing or pumping. This control shall be accomplished without removing any adjacent soil that could weaken or undermine any access pit, its supports, or other nearby structure.

Larger volume of ground water shall be controlled with one or more well points or with staged deep wells. Well points and staged deep well pumping system shall be installed and operated without damaged to property or structures, and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other Operator's. Any pumping methods of de-watering and control of ground water and seepage shall have properly designated filters to ensure that the adjacent soil is not pumped along with the water. Well diameter, well spacing and the pump's pumping rate, shall provide adequate draw down of the water level. Wells shall be located to intercept ground water that otherwise would enter the access pit excavation and interfere with the work. Upon removal of a well, the hole shall be filled and grouted.

Existing storm sewer shall only be used to discharge water from the dewatering operation in accordance with a permit obtained from the appropriate storm sewer owner. Filters of sediment control devices shall be required to ensure that the existing system is not adversely affected by construction debris or sediment.

If grouting is used to prevent ground water from entering the area of the access from pit, the grouting shall be installed without damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other Operator.

Whenever a significant amount of unexpected groundwater enters an access pit, and a catastrophic pit failure is imminent, the pit shall be backfilled immediately, until the groundwater level is at least 600 mm below the bottom of the casing.

42.3 Boring failure

Should anything prevent complete of this operation, the reminders of the pipe shall be constructed by the methods approved by the Engineer. Abandonment of any component of the installation shall be allowed as approved by the Engineer. If obstruction is encountered which prevents completion of installation of pipes, pipe remain shall be taken out of service and immediately filled with flowable fill.

42.4 Contamination

When an area of contaminated ground is encountered, all operations shall stop immediately, and shall not proceed until approved by the Engineers. Any slurry shall be tested for contamination and disposed off, in a manner, which meets local, State and/ of federal requirements.

42.5 Bulk head

Casing ends shall be enclosed or bulk headed with a 1:.1.5.:3 proportion concrete, or approved alternate to seal the ends to prevent water leakage or earth infiltration. The concrete shall extend longitudinally into the pipe end opening to create a minimum 300 mm thick bulk head barrier, or as required by permit. Engineers may allow rubber bulkheads in special situations.

42.6 Work site Restoration

a). Access pits and excavation shall be backfilled with suitable material, and in a method approved by Engineer.

b). The disturbed grass surface area shall be top soiled, seeded, fertilized, mulched, and anchored according to the current owners specifications. If a final site restoration is not completed within 5 days after completion of the operation, the installation of temporary soil erosion and sedimentation control measures shall be provided.

c). upon completion of the work, the Operator shall remove and properly dispose off all access materials and equipments from the work site.

d). The permit, including the surety requirements, shall remain in effect for a minimum of one year after completing the work to monitor for settlements of the pavement and /or slope.

42.7 Payments

The payment for the works under Trench less method of pipe laying by Pipe Ramming/Manual pipe Jacking method will be made after executing according to the above specifications as per the relevant items in BOQ. All costs for works executed under the above specifications that are apart from the items in bill of quantities, shall be included in the item for installation of Casing Pipe by ramming / Manual pipe jacking method, No extra claim in this regard is entertained.

42.8 Interface between contracts

The Operator shall under take the end connections at the interface points only after the pipe line as passed the Hydraulic tests on completion. After completing the end connections the Operator shall lay the bed and surround and backfill the trench in the normal manner.

43 Reinstatement of roads

The road restoration / reinstatement shall be carried out after completion and necessary testing of all the

Works and only after approval of the Engineer.

Operator shall make good of the road surface to the original grade, level and specifications as per Bill of Quantities. Trenches shall be backfilled in layers as per clause mentioned in this section, well watered and well compacted before road restoration to avoid settlement of restored strip. In case any settlement of the road restoration strip, the Operator has to rectify the surface by redoing the restoration work at no extra cost to the owner as per Bill of Quantities. Road restoration shall be done as per the requirements of the concerned local authorities, requirements specified in this section of Technical specifications, applicable IRC guidelines and as directed by the Engineer. The replacement of road structures shall be carried out as soon as practicable and in conformity with IRC guidelines after backfilling has been completed. Suitable excavated road pavement which complies with the requirements of the Engineer may be used at the sub-base levels. Compaction shall be carried out with approved mechanical compacting equipments.

The edges of the trench shall be cut to form a straight line consistent with fixed width of trench. A vertical joint shall be formed between the new work and the existing road surface and shall be painted with hot bitumen or rich cement slurry as the case may be, as approved by the Engineer. The joint between the base course and wearing course shall be stepped 75 mm.
The finished levels of the completed reinstatement shall conform with the adjoining carriageway surface. Reinstatement of the wearing courses shall match as nearly as practicable the colour or other characteristics of the existing surface.

43.1 WATER BOUND MACADAM SUB – BASE / BASE.

43.1.1 Scope

This work shall consist of clean, crushed aggregates mechanically interlocked by rolling and bonding together with screening, binding material where necessary and water laid on properly backfilled pipeline and manhole trenches and finished in accordance with the requirements of these specifications and as directed by the Engineer.
The scope involves Providing, laying , spreading and compacting stone aggregates of specific sizes to Water Bound Macadam specification including spreading in uniform thickness, hand packing, rolling with 3 wheeled steel/vibratory roller 8-10 tones in stages to proper grade and camber, applying and brooming requisite type of screening/binding materials to fill up the interstices of coarse aggregates ,watering and compacting to the required density with all lead & lifts etc complete with the following two layers of materials each compacted to 75 mm thick,

(i). Materials (Refer table 400 - 7, 8 & 9) Using Screening Crushable type such as Moorum or Gravel Grading-II (Clause: 404 of MORT & H).
(ii).Material (Refer table 400 - 7, 8 & 9) Using Screening Crushable type such as Moorum or Gravel Grading-III (Clause: 404 of MORT & H).

43.1.2 Materials

(a) Coarse aggregates - Coarse aggregates shall be either crushed or broken stone, crushed slag, over burnt (Jhama) brick aggregates or any other naturally occurring aggregates such as kankar and laterite of suitable quality. Materials other than crushed or broken stone and crushed slag shall be used in sub-base courses only. If crushed gravel / shingle is used, not less than 90 per cent by weight of the gravel/shingle pieces retained on 4.75 mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements set forth in Table 400-6. The type and size range of the aggregate shall be specified in the contract or shall be as specified by the engineer. If the water absorption value of the coarse aggregate is greater than 2 per cent, the soundness test shall be carried out on the material delivered to site as per IS: 2386 (Part 5).

(b) Crushed or broken stone - The crushed or broken stone shall be hard, durable and free from excess flat, elongated, soft and distinguished particles, dirt and other deleterious material.

Table 400-6, Physical requirements of coarse aggregates for water bound macadam for sub– base courses.

	Test	Test Method	Requirements
1	* Los Angeles Abrasion value Or *Aggregate impact value	IS:2386 IS:2386 (Part-4) or IS;5640**	40 percent (Maxi.) 30 percent (Maxi.)
2	Combined Flakiness and Elongation indices (Total)***	IS:2386 (Part - 1)	30 percent (Maxi.)

* Aggregate may satisfy requirements of either of the two sets.

** Aggregates like brick metal, kankar, laterite etc. which get softened in presence of water shall be tested for Impact value under wet condition in accordance with IS : 5640.

*** The requirement of flakiness index and elongation index shall be enforced only in the case of crushed broken stone and crushed slag.

(c) Crushed slag - Crushed slag shall be made from air-cooled blast furnace slag. It shall be of angular shape, reasonably uniform in quality and density and generally free from thin, elongated and soft pieces, dirt or other deleterious materials. The weight of crushed slag shall not be less than 11.2 KN per m3 and the percentage of glossy material shall not be more than 20. It should also comply with the following requirements:

(i)	Chemical stability	To comply with requirements of appendix of BS : 1047
(ii)	Sulphur content	Maximum 2 per cent
(iii)	Water absorption	Maximum 10 per cent

(d) Over-burnt brick aggregates - Brick aggregates shall be made from over burnt bricks or brick bats and be free from dust and other objectionable and deleterious materials.

(e) Grading requirement of coarse aggregates - The coarse aggregates shall conform to one of the Grading given in Table 400 – 7 as specified, provided; however, the use of Grading No. 1 shall be restricted to sub-base courses only.

Table 400 – 7, Grading requirements of coarse aggregates

Gradation	Size range	I.S. Sieve designation	Percent by weight passing
1	90 mm to 45 mm	125 mm	100
		90 mm	90-100
		63 mm	25-60
		45 mm	0-15
		22.4 mm	0-5
2	63 to 45 mm	90 mm	100
		63 mm	90-100
		53 mm	25-75
		45 mm	0-15
		22.4 mm	0-5
3	53 to 22.4 mm	63 mm	100
		53 mm	95-100
		45 mm	65-90
		22.4 mm	0-10
		11.2 mm	0-5

Note: The compacted thickness for a layer with Grading 1 shall be 100 mm while for layer with other grading i.e., 2 & 3, it shall be 75 mm.

(f) Screenings - Screenings to fill voids in the coarse aggregate shall generally consist of the screen material as the coarse aggregate. However, where permitted, predominantly non-plastic material such as murrum or gravel (other than rounded river borne material) may be used for this purpose provided liquid limit and plasticity index of such material are below 20 and 6 respectively and fraction passing 75 micron sieve does not exceed 10 per cent.

Screenings shall conform to the grading set forth in Table 400-8. The consolidated details of quantity of screenings required for various grades of stone aggregates are given in Table 400 – 9. The table also gives the quantities of materials (loose) required for 10 m2 for sub-base base compacted thickness of 100/75 mm. The use of screenings shall be omitted in the case of soft aggregates such as brick metal, kankar, laterites, etc. as they are likely to get crushed to a certain extent under rollers.

Table 400 – 8, Grading for screenings

Grading classification	Size of Screenings	IS Sieve designation	Per cent by weight passing the IS sieve
A	13.2 mm	13.2 mm	100
		11.2 mm	95-100
		5.6 mm	15-35
		180 mm	0-10
B	11.2 mm	11.2 mm	100
		5.6 mm	90-100
		180 mm	15-35

Table 400 – 9, Approximate quantities of coarse aggregates and screenings required for 100 / 75 mm compacted thickness of water bound macadam (wbm) sub-base / base course for 10 m2 area

Classification	Size Range	Compact thickness Loose Qty.	Screenings			
			Stone screening		Crushable type such as murram or gravel	
			Grading classification and size	For WBM sub-base/ base course (loose Qty)	Grading classification and size	Loose Qty.
Grading-1	90mm to 45mm	100 mm 1.21 to 1.43 m3	Type A13.2 mm	0.27 to 0.30 m3	Not Uniform	0.30 to 0.2 m3
Grading - 2	63mm to 45 mm	75 mm 0.91 to .7m3	Type A 13.2 mm	0.12 to 0.15 m3	- do -	0.22 to 0.24 m3
- do -	- do -	- do -	Type B 11.2 mm	0.20 to 0.22 m3	- do -	- do -
Grading-3	53mm to 22.4 mm	- do -	- do -	0.18 to 0.21 m3	- do -	- do -

(g) Binding material - Binding material to be used for water bound macadam as a filter material meant for preventing gravelling, shall comprise of a suitable material approved by the engineer having a Plasticity Index (PI) value of less than 6 as determined in accordance with IS : 2720 (Part 5).

The quantity of binding material where it is to be used will depend on the type of screenings. Generally, the quantity required for 75 mm compacted thickness of water bound macadam will be 0.06 – 0.09 m3 / 10m2 and 0.08 – 0.10 m3/ 10 m2 for 100 mm compacted thickness.

The above mentioned quantities should be taken as a guide only, for estimation of quantities for construction etc.

Application of binding materials may not be necessary when the screenings used are of Crushable type such as murrum or gravel.

43.2 Construction operations

(a) Preparation of base - The surface of the sub-grade /sub-base/base to the specified lines and cross fall (camber) shall be made free of dust and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained if necessary by sprinkling water. Any sub-base /base / surface irregularities, where predominant, shall be made good by providing appropriate type of profile corrective course (levelling course) to applicable clause of these specifications.

As far as possible, laying water bound macadam course over an existing thick bituminous layer may be avoided since it will cause problems of internal drainage of the pavement at the interface of two courses. It is desirable to completely pick out the existing thin bituminous wearing course where water bound macadam is proposed to be laid over it. However, where the intensity of rain is low and the interface drainage facility is efficient, water bound macadam can be laid over the existing thin bituminous surface by cutting 50 mm x 50 mm furrows at an angle of 45 degrees to the centre line of the pavement at one meter intervals in the existing road. The directions and depth of furrows shall be such that they provide adequate bondage and also serve to drain water to the existing granular base course beneath the existing thin bituminous surface.

(b) Inverted choke - If water bound macadam is to be laid directly over the sub-grade, without any other intervening pavement course, a 25 mm course of screenings (Grading B) or coarse sand shall be spread on the prepared sub-grade before application of the aggregates is taken up. In case of a fine sand or silty or clayey subgrade, it is advisable to lay 100 mm insulating layer of screening or coarse sand on top of fine grained soil, the gradation of which will depend upon whether it is intended to act as a drainage layer as well.

As a preferred alternative to inverted choke, appropriate geo-synthetics performing functions of separation and drainage may be used over the prepared subgrade as directed by the engineer. Section 700 shall be applicable for use of geo-synthetics.

(c) Spreading coarse aggregates - The coarse aggregates shall be spread uniformly and evenly upon the prepared sub-grade/sub-base/base to proper profile by using templates placed across the road about 6 m apart, in such quantities that the thickness of each compacted layer is not more than 100 mm for Grading

1 and 75 mm for Grading 2 and 3, as specified in specifications above. Wherever possible, approved mechanical devices such as aggregates spreader shall be used to spread the aggregates uniformly so as to minimize the need for manual rectification afterwards. Aggregates placed at spread in one or more layers by any approved means so as to achieve the specified results.

The spreading shall be done from stockpiles along the side of the roadway or directly from vehicles. No segregation of large or fine aggregates shall be allowed and the coarse aggregate as spread shall be of uniform gradation with no pockets of fine material.

The surface of the aggregates spread shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregates as may be required. The surface shall be checked frequently with a straight edge while spreading and rolling so as to ensure a finished surface as per approved drawings.

The coarse aggregates shall not normally be spread more than 3 days in advance of the subsequent construction operations.

(d) Rolling - Immediately following the spreading of the coarse aggregate, rolling shall be started with three wheeled power rollers of 80 to 100 KN capacity or tandem or vibratory rollers of 80 to 100 KN static weight. The type of roller to be used shall be approved by the engineer based on trial run. Except on super-elevated portions where the rolling shall proceed from inner edge to the outer, rolling shall begin from the edges gradually progressing towards the centre. First the edge/ edges shall be compacted with roller running forward and backward. The roller shall then move inward parallel to the centre line of the road, in successive passes uniformly lapping preceding tracks by at least one half width.

Rolling shall be discontinued when the aggregates are partially compacted with sufficient void space in them to permit application of screenings. However, where screenings are not to be applied, as in the case of crushed aggregates like brick metal, laterite and kankar, compaction shall be continued until the aggregates are thoroughly keyed. During rolling, slight sprinkling of water may be done, if necessary. Rolling shall not be done when the sub-grade is soft or yielding or when it causes a wave-like motion in the sub-grade or sub-base course.
The rolled surface shall be checked transversely and longitudinally, with templates and any irregularities corrected by loosening the surface, adding or removing necessary amount of aggregates and re-rolling until the entire surface conforms to desired cross fall (camber) and grade. In no case shall the use of screenings be permitted to make up depressions.
Material which gets crushed excessively during compaction or becomes segregated shall be removed and replaced with suitable aggregates.

(e) Application of screenings - After the coarse aggregate has been rolled to as per above specification, screenings to completely fill the interstices shall be applied gradually over the surface. These shall not be damp or wet at the time of application. Dry rolling shall be done while the screenings are being spread so that vibrations of the roller cause them to settle into the voids of the coarse aggregates.

The screenings shall not be dumped in piles but be spread uniformly in successive thin layers either by the spreading motions of hand shovels or by mechanical spreaders, or directly from tipper with suitable grit spreading arrangement. Tipper operating for spreading the screenings shall be so driven as not to disturb the coarse aggregate.

The screenings shall be applied at a slow and uniform rate (in three or more applications) so as to ensure filling of all voids. This shall be accompanied by dry rolling with mechanical brooms, hand-brooms or both. In no case screenings shall be applied fast and thick as to form cakes or ridges on the surface in such a manner as would prevent filling of voids or prevent the direct bearing of the roller on the coarse aggregate. These operations shall continue until no more screenings can be forced into the voids of the coarse aggregate. The spreading, rolling, and brooming of screenings shall be carried out in only such lengths of the road which could be completed within one day's operation.

(f) Sprinkling of water and grouting - After the screenings have been applied, the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screenings into voids and to distribute them evenly. The sprinkling, sweeping and rolling operation shall be continued, with additional screenings applied as necessary until the coarse aggregate has been thoroughly keyed, well-bonded and firmly set in its full depth and a grout has been formed of screenings. Care shall be taken to see that the base or sub-grade does not get damaged due to the addition of excessive quantities of water during construction.

In case of lime treated soil sub-base, construction of water bound macadam on top of it can cause excessive water to flow down to the lime treated sub-base before it has picked up enough strength (is still "green") and thus cause damage to the sub-base layer. The laying of water bound macadam layer in such cases shall be done after the sub-base attains adequate strength, as directed by the engineer.

(g) Application of binding material - After the application of screenings in accordance with the above clause, the binding material where it is required to be used shall be applied successively in two or more thin layers at a slow and uniform rate. After each application, the surface shall be copiously sprinkled with water, the resulting slurry swept in with hand brooms, or mechanical brooms to fill the voids properly, and rolled during which water shall be applied to the wheels of the rollers if necessary to wash down the binding material sticking to them. These operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.

(h) Setting and drying - After the final compaction of water bound macadam course, the pavement shall be allowed to dry overnight. Next morning hungry spots shall be filled with screenings or binding material as directed, lightly sprinkled with water if necessary and rolled. No traffic shall be allowed on the road until the macadam has set.

The engineer shall have the discretion to stop hauling traffic from using the completed water bound macadam course, if in his opinion it would cause excessive damage to the surface. The compacted water bound macadam course should be allowed to completely dry and set before the next pavement course is laid over it.

43.2.1 Reconstruction of defective macadam

The finished surface of water bound macadam shall conform to the tolerance of surface regularity as prescribed in the relevant IS standards. However, where the surface irregularity of the course exceeds the tolerances or where the course is otherwise defective due to sub-grade soil mixing with the aggregates, the course to its full thickness shall be scarified over the affected area, reshaped with added material or removed and replaced with fresh material as applicable and re-compacted. In no case shall depressions be filled up with screenings or binding material.

43.2.2 Arrangement for traffic

During the period of construction, the arrangement of traffic shall be done by the Operator in accordance with the applicable clause of this section.

43.2.3 Measurements for payment

Water bound macadam shall be measured as finished work in position in cubic metres as per Bill of Quantities item of work.

43.3 PRIMING OF BASE COURSE WITH BITUMINOUS PRIMERS

43.3.1 Scope

This specification relates to the operation of priming an absorbent base course, preparatory to a subsequent bituminous treatment, through application of a low viscosity bituminous material by spraying.

The specification is intended to indicate what is considered to be a good practice for priming and shall apply unless modified by special provisions to take into account any unusual conditions.

The scope involves, Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base of low porosity such as WBM including clearing of road surface and spraying primer at the rate of 0.75 kg/sqm using mechanical means. As per MORTH specification clause No. 502 complete in all respects with all lead & lifts etc complete.

43.3.2 Materials

The bituminous primer to be used should be such that it can penetrate into the base course to perform its intended function.

43.3.3 Types of primer

Table 11.2.1 can be used as guidance for choice of primer on different types of surfaces.

Type of Surface	Emulsion	Cut-back	Road tar

Low porosity	Not suitable	MC-0		RT-1 or RT-2
Medium porosity	SS or MS	MC-1 orSC-1	MC-2 or SC-2	RT-2 or RT-3
High porosity	MS	MC-3 or RC-1		RT-3 or RT-4

The primers shall conform to IS: 8887 – 1978 (for cationic emulsions), IS: 217-1961 (for cut-backs), and IS: 215-1981 (for road tars), as applicable.

43.3.4 Viscosity

For selecting the appropriate type of primer out of the materials indicated in Table 1, the atmospheric temperature during application should be given consideration. Also, within the range of viscosity specified, the primer for use may be selected keeping in view the level of porosity of the surface to be treated.

43.3.5 Quantity of primer

The primer shall be applied at the rate of 0.75 kg/sqm.

43.4 Construction

a. Weather and seasonal limitations

Cut-back and road tar primers shall not be applied on wet surface or during dust storm or when the weather is foggy or rainy. Bitumen emulsion can be applied on wet surface. However, emulsions shall not be applied during dust storm or when it is actually raining.

Atmospheric temperature during priming should be above 10° C.

b. Equipment

All equipment required for the execution of work should be in good working condition at site.

c. Preparation of base course surface

The base course surface to be primed shall be swept clean and free from dust. All loose materials and other foreign matter on the surface shall be removed completely, if necessary by using power blowers or sweepers.

Large irregularities, potholes, depressions, etc. shall be repaired prior to priming. Minor depressions may be ignored until the surface is primed. After which these might be patched with a suitable premixed material prior to the subsequent bituminous treatment.

The underlying surface shall be dry prior to priming. Except that in the case of bitumen emulsions, it may be desirable to dampen the surface slightly in order to obtain better penetration of the primer.

Pre-wetting should be done by water spraying, using equipment capable of uniform application of water over the entire surface. The spraying may be taken up 2 to 12 hours before priming, in such quantity that the surface during priming is damp but not saturated with water. Traffic shall be kept off the prepared areas prior to priming.

d. Application of primer

After the base to be primed has been prepared as described above, the primer shall be uniformly applied over the surface using mechanical sprayers. Rate of application of primer shall correspond to the quantities given in specifications unless specified otherwise.

The spraying should preferably be carried out using sprayer mounted on distributor truck or with hand sprayer using mechanical pump. The use of hand-held containers such as watering cans, perforated buckets etc., is unacceptable and should not be permitted under any circumstances. Quantity should be checked periodically using Tray Coating Test or any other suitable means.

Temperature of application of primer should be high enough to permit the primer to be sprayed effectively through the jets of the spray bar and to cover the base course surface effectively.

e. Curing

The primed surface shall be allowed to cure fully. No traffic shall be allowed over the primed surface during this period and in any case not before 24 hours if the primer is a cut-back bitumen and 6 hours in the case of bitumen emulsion. Any pool of excess cut-back primer, which has not been completely absorbed by any part of the base course surface during the curing period, should be carefully swept over the adjacent surface, and then a light sand blotter course applied. The amount applied should be just sufficient to blot up the excess bitumen and prevent it being picked up under traffic. If an excess of bitumen residue is found on the primed surface after bitumen emulsion has broken, a very light sand dusting may be applied to soak up the surplus material.

All loose sand should be swept from the base course surface prior to any subsequent bituminous treatment.

43.5 Tack Coat

Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at the rate of 0.375 kg/sqm on the prepared granular surface cleaned with mechanical broom such as WBM surface as per MORTH specification clause No. 503 complete in all respects with all lead & lifts etc complete for old surfaces at vertical and horizontal joints.

43.6 Specifications for single coat bituminous surface dressing (20mm thick pre-mix bituminous surfacing).

43.6.1 Scope

This specification is intended to indicate what is considered to be good practice for construction of single coat bituminous surface dressing and shall apply unless modified by special provisions to take into account unusual conditions. The work specified consists of a wearing surface composed of a single application of bituminous material covered with one application of cover material of size as specified below, applied on a previously prepared base or pavement.

The specific scope involves, Providing, laying and rolling of open-graded premix surfacing of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen 80/100 or cut-back or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in suitable plant, laying and rolling with a smooth wheeled roller 8-10 tonne capacity, finished to required level and grades. Mechanical method using Penetration grade Bitumen and HMP of appropriate capacity, as per MORTH specification No.511 complete in all respects. (Bitumen 1.46kg/sqmt. Metal = 0.027) with 40-60 TPH hot mix with all lead & lift etc complete.

43.6.2 Materials

a. Bituminous materials - The bituminous materials shall be of grade 80/100 or cut-back conforming to the requirements as specified and provided for in the proposal and satisfy the related specification, issued by the Indian Standards Institution (vide I.S.I Standards 73-1961,215-1961,217-1961 and 454-1961).

b. Cover materials

(i). General requirements - The cover material shall consist of crushed stone, crushed slag crushed gravel (shingle) or other stones, as specified, and shall have clean, strong, durable, and fairly cubical fragments free from disintegrated pieces, salt, alkali, vegetable matter, dust and adherent coatings. The aggregate shall preferably be hydrophobic in nature and of low porosity.

(ii). Physical requirements - The aggregate shall satisfy the requirements given in Table below.

Sl. No.	Property	Value	Method of test
1	Abrasion value, using Los Angeles Machine or	Max. 35%	IS: 2386 (Part IV)
	Aggregate impact value	Max. 30%	- do -
2	Flakiness index	Max. 25%	IS: 2386 (Part I)
3	Stripping value	Max. 25%	IS: 6241
4	Water absorption (except in case of slag)	Max. 1%	IS: 2386 (Part III)
5	Soundness: Loss with sodium sulphate – 5 cycles (in case of slag only)	Max. 12%	IS: 2386 (Part V)
6	Unit weight or bulk density (In case of slag only)	Min. 1120 kg per m^3	IS: 2386 (Part III)

Where all these conditions cannot be satisfied, it is left to the Engineer-in-charge to allow reasonable tolerances.

Size - The size of chippings to be used shall depend on whether the treatment is for the first coat or for the subsequent or renewal coat and shall be as per the size specified below. For single application of the aggregate, it is desirable to keep the grading of the various sizes as specified in Table below..

	Sieve designation nominal size of aggregate	Specification
I	For surfacing water-bound macadam - first coat	100 percent passing through 20 mm square mesh sieve and retained on 10 mm square mesh sieve
II	For subsequent or renewal coats 10 mm	100 percent passing through 12.5 mm square mesh sieve and retained on 6.3 mm square mesh sieve.
Note – It is essential to sieve the aggregates through proper size sieves to ensure the size stipulated in the specifications. The sieve sizes indicated above are as per IS: 460 – 1962.		

43.6.3 Construction methods

a. Weather and seasonal limitations - Preferably, the surface dressing work shall be carried on only when the atmospheric temperature in shade is 16°C or above. No bituminous material shall normally be applied when the surface or the cover material is damp, when the weather is foggy or rainy or during dust storm, except, in case of emulsions, the surface should be slightly damp.

b. Equipment - All equipment necessary for the proper construction of work shall be on the site of the work in good condition.

c. Preparation of road surface - The underlying course on which surface dressing is to be laid shall be prepared, shaped and conditioned to a uniform grade and section as specified. Any depressions or pot-holes shall be properly made up and thoroughly compacted sufficiently in advance. The defective parts should be clearly cut out and the patches of new material put in, and not put on the existing surface.

Where the existing surface shows signs of "fatting-up", such position should be rectified. It is important that the surface be dry and thoroughly cleaned immediately before applying the binder. The surface should be swept clean free of caked earth and other foreign matter cleaned first with hard brushes, then with softer brushes and finally blowing off with sacks or gunny bags to remove the fine dust. The base shall be applied with Tack coat uniformly preferably by a mechanical sprayer.

d. Application of bituminous material - After the surface to be treated has been prepared, as specified

above, bituminous material shall be sprayed uniformly over the dry surface preferably using mechanical sprayers. The binder shall be applied at a temperature appropriate to the type of binder and equipment used. The premix open graded surfacing consisting of aggregates 13.2mm to 5.60mm shall be applied to an uniform thickness as per applicable IS standards to get the final compacted thickness of 20mm.

e. Rolling cover materials - Immediately after the application of the cover materials as described, the entire surface shall be rolled with a 8 to 10 tonne smooth wheeled road roller. The rolling shall begin at the edge and proceed lengthwise, over the-area to be rolled lapping not less than one third of the roller tread and proceed towards the centre. When the centre is reached, the rolling shall then start at the opposite side and again proceed towards the centre. In the super-elevated portions, the rolling should proceed from the inner to the outer edge. While the rolling is in progress, additional aggregate shall be spread by hand in whatever quantities may be required to fill irregularities and to prevent picking up of the aggregate by the roller. Rolling shall be continued until the particles are firmly embedded in the bituminous materials and present a uniform closed surface. Excessive rolling which results in the crushing of the aggregate particles shall be avoided.

f. Finishing - The finished surface shall be uniform and conform to the lines, grades and typical cross sections shown in the specifications.

g. Opening to traffic - When straight run bitumen or road tar is employed as the binder, the finished surface shall be thrown open to traffic on the following day but if in special circumstances, the road is required to be opened to traffic immediately after rolling, speed of the traffic shall be limited to 16 km per hour till the following day.
Where cutback bitumen and emulsion is employed, the finished surface shall be kept closed to the traffic until it has sufficiently cured to hold the cover aggregates in place.
Controlling of traffic shall be done by some suitable device, such as barricading and posting of watchmen, etc.

43.6.4 SEAL COAT.

The scope of work involves Providing and laying seal coat sealing the voids in bituminous surface laid to the specified levels, grade and cross fall using Type A seal coat as per MORTH specification clause No. 513 complete in all respects with all lead & lift etc complete.(Bitumen = 0.98 kg/sqmt. Metal =0.009).

43.7 SPECIFICATIONS FOR CONSTRUCTION OF CONCRETE ROADS

43.7.1 Scope

This is intended to indicate what is considered to be good practice for the construction of cement concrete road pavements, including preparation of the subgrade and sub -base underneath these pavements. This does not however cover the requirements of fully mechanized constructions.

The scope involves providing specified thickness of 1:3:6 proportion cement concrete as base course and

specified thickness of 1:1.5:3 proportion cement concrete as wearing course as per approved construction drawings and specifications.

43.7.2 Materials

a. Ordinary Portland Cement - This should comply with the requirements of IS - 8112 with latest revisions (Specification for Ordinary Portland Cement)

b. Aggregates

General - Aggregates should comply with IS - 383 -1970 "Specification for Coarse and Fine Aggregates from Natural Sources for Concrete (Second Revision)" with special reference to the additional requirements stipulated for use in road works excepting in the case of Los Angeles Abrasion Test limit.

The Los Angeles Abrasion Test limits shall be not more than 35 per cent and 50 per cent for concrete wearing course and sub -base course respectively. ln addition, the limits of deleterious material shall not exceed the requirements set out in IS - 515 -1959 “Specification for Natural and Manufactured Aggregates for Use in Mass Concrete." Weathered rock should not be used. In order to make good concrete, it is important to avoid crushed aggregate of poor shape. Very angular, flaky, elongated or splintery aggregates give a harsh mix of low workability. Maximum size of aggregate should not exceed $l/4^{th}$ of the pavement slab thickness. In case of pavements having reinforcement, maximum size of aggregate should also not exceed l/4th of minimum clear spacing between reinforcing bars.

c. Coarse aggregates

Continuous grading - Continuously graded coarse aggregate should be furnished in at least two separate sizes with separation at 20 mm I.S. sieve when combined material graded from 40 to 4.75 mm is specified, and at 25 mm I.S. sieve when combined material graded from 50 to 4.75 mm is specified.

d. Fine aggregate - Fine aggregate shall preferably be natural sand. Crushed stone sand may also be used satisfactorily in concrete. The fine aggregate shall conform to IS: 383 -1970, the permissible percentage passing limits on 300 and 150 -micron sieves shall be 15 -55 per cent and 0 -20 per cent respectively instead of 15 -50 percent and 0 -15 per cent as stipulated in IS Specification. Crushed sand is usually more angular in shape than naturally occurring sand, and for this reason may tend to make the mix a little harsher. In some cases, it may prove advantageous to use a mixture of naturally occurring sand and crushed stone sand if the former is not obtained in adequate supply or where its grading is poor. Bulking due to presence of moisture in the fine aggregate should be accounted for when volumetric batching is employed.

e. Water - Water used in mixing or curing of concrete shall be clean and free from injurious amounts of oil, salt, acid, vegetable matter or other substances harmful to the finished concrete. It shall meet the requirements stipulated in clauses of IS: 456 -2000 "Code of Practice for Plain and Reinforced Concrete". Potable waters are generally

considered satisfactory for mixing or curing.

f. Dowel and tie bars - Dowel and tie bars shall be plain round steel bars conforming to the requirements of IS: 432 -1966.

g. Premoulded joint filler - Premoulded joint filler shall be of the thickness shown on the drawings within a tolerance of ±1.5 mm. It shall be 25 mm less in depth than the thickness of the slab, within a tolerance of ±3 mm and of the full width between road forms. Holes to accommodate dowel bars shall be accurately bored or punched out. The joint filler shall comply with the requirements of IS: 1838 -1961 "Specification for Preformed Fillers for Expansion Joint in Concrete, Non -extruding and Resilient Type (Bitumen -impregnated Fiber)."

43.7.3 Water content and workability

The water content per batch of concrete should be maintained constantly except for suitable allowances to be made for free moisture and absorption by aggregates determined from time to time during construction. Adjustments for workability shall be made by variations in the ratio of the coarse to fine aggregate or improving upon their grading without change in cement content or water -cement ratio. The slump of the concrete mix for pavements compacted by vibration should not be more than 25 mm, preferably between 0 and 12 mm, and that by manual compaction not more than 50 mm. No price adjustment would be permissible for variations in the gradations of the aggregates or in the ratio of coarse to fine aggregates necessitated from adjustment at site.

43.7.4 Tools, equipment and appliances

43.7.5 General

All tools, equipment and appliances necessary for proper preparation of sub-grade, laying of sub -base and batching, mixing, placing, finishing and curing of concrete shall be at the project site in good working condition and shall have been inspected by the engineer before the paving operations are permitted to start. Throughout the construction of the project, the construction agency shall maintain all necessary tools, equipment and appliances in first class working condition to ensure proper execution of the work. Arrangements shall also be made for requisite number of stand -by units in the event of break -downs during construction.

43.7.6 List of tools, equipment and appliances

A list of tools, equipment and appliances required for the different phases of concrete road construction is given below.

This list pertains to semi -mechanised type of construction only, as practised most in this country.

(a) Subgrade and sub -base compaction -

(i) Compaction equipment (three wheeled or tandem roller, pneumatic roller, vibratory roller

or sheep -foot roller)
(ii) Watering devices (water lorries, bhisties/water carriers or watering cans),

(b) Preparation of sub -bass for concreting and formwork
(i) Scratch templates or strike boards
(ii) Bulk -heads
(iii) Pick axes, shovels and spades
(iv) Formwork and iron stakes
(c) Concrete manufacture
(i) Shovels and spades
(ii) Sieving screens
(iii) Weigh batcher
(iv) Aggregate measuring boxes (only where volume batching of aggregates is permitted as a special case)
(v) Water pump
(vi) Water measures
(vii) Concrete mixer
(d) Transportation, laying and compaction of concrete
(i) Wheel barrows/iron pans
(ii) Wooden bridges
(iii) Spades
(iv) Concrete vibrators (both internal and screed board types)
(v) Wooden hand tampers
(e) Finishing operations - surface and joints
(i) Wooden bridges
(ii) Floats (longitudinal and long -handled wooden floats)
(iii) Templates
(iv) Three -meter long straight edges including one master straight edge
(v) Graduated wedge gauges
(vi) Mild steel sections and blocks for making joint grooves
(vii) Edging tools including double -edging tools
(viii) Canvas belts
(ix) Long handled brooms
(x) Diamond cutter (when making saw -cut joints)
(xi) Grinder (for grinding local high spots)
(f) Curing
(i) Hessian cloth burlap or polyethylene sheeting
(ii) Watering devices as in a (ii) (for ponding operation)
(g) Cleaning and sealing of joints
(i) Iron raker
(ii) Coir brush
(iii) Cycle pump/pneumatic air blower

(iv) Kerosene stove
(v) Thermometer
(vi) Transferring pot
(vii) Painter's brush
(viii) Pouring kettle
(ix) Scraper

43.8 Sub –base

Plain cement concrete of 1:3:6 proportion for specified thickness as in construction drawing shall be laid in accordance with the respective specification in Bill of Quantities and the surface finished to the required lines, levels and cross -section.

43.9 Forms

Steel forms - All side forms shall be of mild steel unless use of wooden sections is specially permitted. The steel forms shall be mild steel channel sections of depth equal to the thickness of the pavement. The sections shall have a length of at least 3 m except on curves of less than 45 m radius, where shorter sections may be used. When set to grade and staked in place, the maximum deviation of the top surface of any section from a straight line shall not exceed 3 mm in the vertical plane and 5 mm in the horizontal plane. The method of connection between sections shall be such that the joint formed shall be free from difference in level, play or movement in any direction. The use of bent, twisted or worn -out forms will not be permitted. At least three stake pockets for bracing pins or stakes shall be provided for each 3 m of form and the bracing and support must be ample to prevent springing of the forms under the pressure of concrete or the weight or thrust of machinery operating on the forms.

The supply of forms shall be sufficient to permit their remaining in place for 12 hours after the concrete has been placed, or longer if necessary in the opinion of the engineer.

Wooden forms - Wooden forms may be used only when specifically permitted in the drawing with the exception that their use is herein approved for all curves having radii of less than 45 m. Wooden forms shall be dressed on one side. They shall have minimum base width of 100 mm for slab thickness up to 200 mm and a minimum base width of 150 mm for slabs over 200 mm thick. Their depth shall be equal to the thickness of the pavement. These forms when used on straight shall have a minimum length of 3 m. Forms shall be held by stakes set at intervals not exceeding 2 m. Two stakes, one on each side, shall be placed at each joint. The forms shall be firmly nailed or secured to the side stakes, and securely braced at joints, where necessary, so that no movement will result from the pressure of the concrete or the impact of the tamper and during finishing work. Wooden forms shall be capped along the inside upper edge with 50 -mm angle iron well recessed and kept flush with the face of the wooden forms.

Setting of forms - The forms shall be jointed neatly and shall be set with exactness to the required grade and alignment. Both before and after the forms are placed and set the sub grade or sub -base under the forms shall be thoroughly tamped in an approved manner. Sufficient rigidity shall be obtained to support the forms in such a position that during the entire operation of compacting and finishing of concrete they

shall not at any time deviate more than 3 mm from a straight edge 3 m in length. Forms, which show a variation from the required rigidity or alignment and levels shown in the drawing, shall be reset or removed, as directed. The length and number of stakes shall be such as to maintain the forms at the correct line and grad -e. All forms shall be cleaned and oiled each time before they are used. Forms shall be set for about 200m ahead of the actual placing of concrete.

43.10 Joints

General - The location and type of joints shall be as shown in the drawing. The edge of the slab at all joints shall be rounded off with an edging tool having a radius of 6 ± 1mm. The concrete along the face of all joints and around all tie bars and dowels shall be compacted with an internal vibrator inserted in the concrete and worked along the joint and around all tie bars and dowels to ensure a concrete free from honeycombing.

Types of joints - There are three general types of joints. These are –

Expansion joint - Such joint provides the space into which pavement can expand thus relieving compressive stresses due to expansion and inhibiting any tendency towards buckling of concrete slabs.

Contraction joint - Such joint relieves tensile stresses in the concrete and prevents formation of irregular cracks due to restraint in free contraction of concrete. Contraction joints also relieve stresses due to warping.

Warping joint - Such joint relieves stresses due to warping. These are commonly used for longitudinal joints dividing the pavement into lanes.

In addition, construction joints are provided whenever construction operations require them. These are full depth joints and may belong to any of the above types.
All joints shall be carefully installed in accordance with the location and details given on the plans.

Transverse joints

General - Transverse joints can be expansion, contraction or construction joints and shall be placed as indicated on the drawing. They shall make a right angle with the centre line of the pavement and surface of the sub -base/subgrade. Contraction and expansion joints shall be continuous from edge to edge of the pavement through all lanes constructed at the same or different times.

a. Transverse expansion joints - These shall extend over the entire width of the pavement. They shall be of the dimensions and spacing as shown on the construction drawing.

Dowel bars (see Supplementary Note N. 4) as per dimensions, location and spacing shown on the drawing are required at expansion joints to transfer wheel loads to the adjacent slab. For slabs of thickness less than 150 mm no dowel bars may be provided (IS: 6509 -1972). The pre-moulded expansion joint filler, a compressible material used to fill the gap between adjacent slabs at expansion joint shall conform to IS:

1838 -1961.

The height of the filler board shall be such that its top is 25 mm below the surface of the pavement. The dowel bars shall be held accurately in position during the placement, compaction and finishing of concrete at and near the expansion joint. This and the protection of the joint groove during construction may be achieved by means of sufficiently strong bulkheads (as per IRC: 43 -1972) with holes drilled along the centre line to accommodate the dowel bars and a mild steel section (as per IRC - 43 -1972) respectively. The latter shall be oiled or greased before placing in position to avoid bonding with concrete. The top and bottom edges of the bulkheads and mild steel section shall be shaped to correspond to the camber of the pavement at the joint. If considered convenient, two -piece split bulkheads may also be used. When dowel bars are provided, bulkheads shall be used in pairs, one at the joint location, and the other some distance away to hold the projecting ends of the dowel bars to maintain their alignment. For cases where dowel bars are not provided, one single bulkhead without holes will be adequate.

The bulkheads shall be securely staked in place at right angles to the centre line and surface of the pavement with sufficient stakes to hold them in the specified position.

After the concrete has sufficiently hardened the mild steel metal section shall be removed carefully without disturbing the edges. The edges shall then be rounded with an edging tool. For facilitating removal of the mild steel section as well as edging operation, the top of the section may be flared on both sides with the required curvature of a rounded edge.

Under no circumstances shall any concrete be left above the expansion 'joint filler or across the joint at any point. Any concrete spanning the ends of the joint next to the forms shall be carefully cut away after the forms are removed.

b. Transverse contraction joints - These shall be placed as shown on the drawing and shall be of the weakened plane or "dummy" groove type. They shall be constructed by forming in the surface of the slab a slot not less than 6 mm wide and having a depth equal to one -third to one -fourth the depth of the pavement at the thinnest part of its section. This slot may be formed in a manner approved by the engineer such as by pushing into the concrete a flat bar or the web of a "T" bar using a suitable vibratory device, removing the bar, and keeping the slot open. It shall be ensured that no spalling of concrete occurs while removing the bar. The edges of the joint shall be rounded with an edging tool before the concrete hardens.

c. Transverse construction joints - These shall be placed whenever placing of concrete is suspended for more than 30 minutes. Excepting in the case of emergency, construction shall always be suspended at the regular site of expansion or contraction joints. If the construction joint is located at the site of an expansion joint, regular expansion joint shall be provided; if at the site of a contraction joint or otherwise, the construction joint shall be of butt type with dowels.

At all construction joints, bulkhead shall be used to retain the concrete and care shall be taken in striking

off and finishing the surface to the top face of the bulkhead. When work is resumed, the surface of concrete laid subsequently, shall conform to the grade and cross -section of previously laid pavement, and a straight edge 3m in length shall be used parallel to the centre line, to check any deviation in the surface of the two sections. Any deviation from the general surface in excess of 3 mm shall be corrected.

Longitudinal joints

These shall be of the plain butt type and shall be formed by placing the concrete against the face of the slab concreted earlier. The face of the slab concreted earlier, shall be painted with bitumen before placing of fresh concrete.

Tie bars shall be used at longitudinal joints and they shall be of the dimensions and at spacing shown in the construction drawing. Tie bars shall be supported so as not to be displaced during construction operations. Tie bars shall be bonded in the slabs across longitudinal joints, and whilst casting the first slabs, they may be bent so that one end of them lies along the forms. After removal of the forms, bars shall be straightened so that they extend into the concrete placed on the other side of the joint.

43.11 Construction

a. Storage and handling of cement

Cement shall not be stored for a long time and should be used normally within six months of its date of receipt. Even during this period of storage it is essential that cement shall be protected from moisture by storing it in suitable sheds. Storage shed with a concrete floor laid on a well -drained foundation may be satisfactory. Cement in bags shall be stored on boards raised above the floor level for the purpose of ventilation, and the bags shall not touch the walls of the shed. Different consignments should be separately stacked and used in order in which they have been received. When bulk supply cement is used, special storage facilities such as covered hopper bins will be required. Supply of cement should be co-coordinated with its consumption so that it is not stored right through the rainy season, when normally concreting is discontinued. Cement having lumps which have been caused due to improper storage or by pressure due to over -loading of bags shall not be considered for use unless these lumps can be easily powdered with pressure between fingers. Before such cement is used, representative sample containing also the lumps in fair proportion shall be taken and tested as per IS - 269 -1976, 8112 -1976, 1489 -1976, 455 -1967 or 8041E -1976 as the case may be, to fulfill the minimum requirements.

b. Storage and handling of aggregates

The location and preparation of sites, minimum size of stack and the methods adopted for dumping and stacking to prevent segregation of coarse and fine material shall be subject to the approval of the engineer. Aggregates from different sources and/or of different grading shall not be stacked together. Each separate size of coarse aggregate shall be stacked separately. The storing of aggregates upon the carriageway or shoulders shall not be permitted.

If aggregates are stored in conical stacks, segregation will be increased by the rolling of the coarser particles down the sides of the stacks. To avoid this, stacks should be built up in approximately

horizontal layers. Dry fine aggregate segregates and gets blown away easily it may be helpful to moisten it. To assist in controlling the water/cement ratio, large fluctuations in the moisture content of aggregates may be reduced by storing the bulk of the material well in advance of use. For this purpose, all washed aggregates shall be stacked for draining at least 12 hours before being batched. It is also a good practice to reserve the bottom 150 -300 mm or so of the stacks as a drainage layer. Where this cannot be done, the aggregates should not be placed on the ground. In such case, somewhat raised planks, metal sheets or concrete base should be provided and laid to slopes.

The aggregates shall be handled from the stacks and fed into the mixer in such a manner as to secure the stipulated grading of the material. Aggregates that have become mixed with earth or other foreign material shall not be used. They shall be washed clean before use.

c. Batching of materials

All batching of materials shall be by weight or volume as approved by the Engineer. the proportion of ingredients shall be as specified in the item of work in Bill of Quantities, The Engineer may permit the use of fractional bags of cement provided they are accurately weighed and are handled in a manner meeting with his approval. Water may be measured by volume. It should, however, be borne in mind that weigh batching is definitely much more desirable than volume batching. If batching by volume is permitted, as a special case, separate measuring boxes shall be provided for the different aggregates. The boxes shall be of strong construction provided with handles for convenient lifting and loading into the mixer. They shall be of such size that it should be possible to measure out the requisite quantity of aggregate per batch in whole box or by multiples thereof and capable of being lifted by two men. Each box shall be provided with a straight edge of required length for striking off after filling. If so directed by the engineer, improved facilities such as tipping boxes of accurate capacity working on run -out rails arranged for direct delivery into the hopper of the mixer shall be provided by the construction agency. In volume batching, suitable allowance shall be made for the hulking of fine aggregate due to the presence of water. For this purpose the bulking shall be determined as per relevant Indian Standard Specification.

d. Mixing

General - The mixing of concrete shall be done in a batch mixer of approved type, which will ensure a uniform distribution of materials throughout the mass, so that the mix is uniform in colour and homogeneous. All concrete shall be mixed in quantities for immediate use.
The mixer shall be equipped with approved water -measuring device capable of accurate measurement of water required per batch. The mixer shall preferably be equipped with a mechanically operated pump for filling the mixer tank.
The mixer, if so specified, shall be equipped with an approved timing device which will automatically lock the discharge lever during the full time of mixing and release it at the end of the mixing period; the device shall also be equipped with a ball, adjusted to ring each time the lock is released. If the timing device gets broken, the mixer will be permitted to be used while the same is being repaired, provided an approved time -piece equipped with minute and second bands is provided. Each batch shall be mixed for

at least one and a half minutes. Spilling of the materials at either end of the mixer shall be corrected by reducing the size of the batch and in no case shall the volume of the mixed material per batch exceed the manufacturers guaranteed capacity of the mixer. The type, size and number of mixers shall be so chosen as to provide the required output without overloading. The mixing speed of the drum shall not be less than 15 revolutions per minute nor the peripheral speed of the drum greater than 60 m per minute. The batch of cement, fine aggregate and coarse aggregate shall be fed into the mixer simultaneously with the water being introduced either at the same time or before the dry materials. The entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch.

The skip shall be so maintained and operated that each batch will be completely discharged into the mixing drum at the loading of the mixer. The mixer shall be cleaned at suitable intervals while in use.

Pick -up and throw -over blades in the drum of the miner which are worn down 20 mm or more in depth shall be replaced with new blades.

Time of mixing - The mixing of each batch will continue not less than one and half minute after all the materials are discharged into the mixer.

Re-tempering - The re-tempering of concrete i.e. remixing with or without additional cement, aggregate or water shall not be permitted.

Control of workability and strength

a. Workability of concrete - The workability of concrete shall be checked by performing "slump test" or "compacting factor test" in accordance with IS ; 1199 -1959 “Method of Sampling and Analysis of Concrete." The frequency of testing shall be one test per 10 m3 of concrete and the permissible tolerances from the specified value for workability shall be -

Slump	± 12 mm
Compacting factor	± 0.03

Where variations beyond the permitted tolerances are observed, necessary adjustment shall be made keeping the water cement ratio same.

b. Strength of concrete - The strength of concrete shall be determined either by compressive or flexural strength tests (preferably the latter, since concrete pavements are designed on the basis of flexural strength of concrete) depending on the facilities available. For this purpose, during the progress of the work, cube/beam samples shall be cast for testing at 7 and 28 days. Sampling and testing shall be done in accordance with IS - 1199 -1959 “Method of Sampling and Analysis of Concrete" and IS - 516 -1959 "Method of Test for Strength of Concrete" respectively. The minimum frequency of samples shall be 3 cube/beam samples for each age of 7 and 28 days for every 30 m3 of concrete.

On a paving job, the strength of concrete should be continuously monitored to ensure that the desired strength is achieved. In certain -cases, because of change in the source of cement or control or climatic

factors, the strength may show some variations, which would require re -designing of the mix.

Transporting and placing of concrete -

The concrete shall be mixed in quantities required for immediate use and shall be deposited on the sub -base to the required depth and width of the pavement section, in successive batches and in continuous operation without the use of intermediate forms or bulk -heads between joints. Care shall be taken to see that no segregation of materials results whilst the concrete is being transported from the mixer to the place where it is deposited. The usual method of transport of concrete in India is in pans as head loads or in small wheel barrows. The spreading shall be as uniform as possible to avoid re-handling of the concrete. Where, however, a certain amount of re -distribution is necessary, it shall be done with shovels and not with rakes. While being placed, the concrete shall be tamped with suitable tools for slab thicknesses of 12.5 cm and less so that formation of voids or honeycomb pockets is prevented. The concrete shall be particularly well placed and tapped against the forms and along all joints, For higher thicknesses an internal vibrator shall be employed in lieu of rodding of the concrete. To effect adequate compaction, the concrete shall be placed with appropriate surcharge over the final slab thickness. The amount of surcharge will depend on the mode of placement of concrete and shall be determined by trial. In general, the required surcharge is about 20 per cent of the required slab thickness. Any portion of the batch of concrete that becomes segregated while depositing it on sub-grade shall be thoroughly mixed with the main body of the batch during the process of spreading. In case of unavoidable interruption, a full depth transverse joint shall be made at the point of stoppage of work provided the section on which the work has been suspended is about 2 to 3 hours long. In placing of concrete for two course construction, necessitated by either positioning of the reinforcement, a richer mix for the wearing surface, or when thickness of the concrete is beyond 20 cm, the bottom layer of concrete shall be struck off to the required levels by a vibrating screed working on the side forms with notches corresponding to the depth of the top course of concrete.

The vibrating screed should have a vibrating unit mounted on it similar to that of the screed used for compaction of the final surface of concrete. The time lag between laying of the two courses shall not exceed the initial setting time of cement.

Placement of steel

a. Reinforcement - Reinforcing steel shall be free from dirt, scale or other foreign matter and rust of such degree or development as to impair bond of the steel with the concrete. The width of fabric sheets or bar mats shall be such that when properly placed into the work the extreme longitudinal bars or wires of the sheets or mats will be located not less than 50 mm and not more than 100 mm from the edges of the slab. Except for dummy joints, the length of fabric sheets or bar mats shall be such that when properly placed into the work, the reinforcement will be clear of transverse joints by not less than 50 mm and not more than 100 mm as measured from the centre of the Joint to the ends of longitudinal bars or wires of the sheet or mat.

While overlapping the sheets or mats in either direction, the overlap shall be at least equal to the spacing between the bars or wires in the respective direction or 40 times the diameter of the bar or wire,

whichever is more.

Whilst using reinforcement in one layer, the concrete shall be placed in two stages. The initial layer shall be uniformly struck off to a depth corresponding to the reinforcement shown in the drawings and lightly compacted by a screed to obtain uniform levels. The reinforcing fabric sheet or bar mat shall then be placed on the compacted layer of concrete and remaining depth shall be filled in with concrete thereafter.

In doing this operation, the initial layer of concrete shall be struck off to the entire width of the slabs and of sufficient length to permit sheet or mat of reinforcement to be laid full length without further manipulations of the reinforcement. Displacement of the reinforcement during concreting operations shall be prevented.

b. Load transfer devices - dowels - Transverse expansion joints shall be equipped with dowels of the dimension and at the spacing and location indicated on the drawing. They shall be firmly supported in place, accurately aligned parallel to the sub-grade/sub -base, parallel to each other and parallel to the centre line of the pavement, by means of appropriate dowel supports. The dowel supports shall ensure that the dowels are not displaced during construction. The permissible tolerances in dowel bar alignment in both vertical and horizontal directions shall be ±1 mm in 100 mm for dowels of 20 mm and smaller diameters and ±0.5 mm in 100 mm for. dowels of diameter greater than 20 mm. One -half of each dowel shall be painted with a thin film of bitumen and equipped with a tight fitting metal sleeve of the dimensions shown on the drawing to provide space for the dowel when pavement expands and the join closes. This sleeve shall be partly filled with cotton waste to prevent it being pushed too far on the dowel during construction.

These sleeves are not required on dowels, if used, in dummy contraction or construction joints.

c. Tie bars - Tie bars provided in longitudinal joints of plain butt type to prevent opening of such joints shall be bonded to the adjacent slabs on both sides of the longitudinal joint. They are installed by providing appropriate (drilled) holes in the side forms depending on the size and spacing of bars. They are bent aside temporarily to avoid obstruction to construction traffic and straightened later at the time of laying of slab in the adjacent lane.

Compaction and finishing

Compaction - The pavement shall be compacted either by means of a power-driven pavers-cum - finisher or by a vibrating screed along with internal vibrators where the slab thickness is more than 12.5 cm. For lesser thicknesses vibrating screed may be supplemented with manual rodding. For areas where the width of the slab is very small as at the corner of street junctions, etc. compaction with wooden hand tampers may be adopted subject to the approval of the engineer. In no case, however, hand compaction shall be permitted for slab thicknesses beyond 10 cm. All compaction shall be done in accordance with the following requirements –

(i) Where hand tamping is permitted as a special case –

(i) Concrete with surcharge, as soon as placed, shall be struck off uniformly and screeded, to such level above the base that when compacted and finished, the pavement shall conform to the grade and cross -section indicated by the plans. The entire surface shall then be tamped and the tamping operation continued until a close knit dense surface is obtained.

(ii) The tamper shall rest on the side forms and shall be drawn ahead with a sawing motion, in combination with a series of lifts and drops alternating with lateral shifts, the aim of this operation being compaction and screeding to the approximate level required. Subsequent tamping should advance about 75 mm at a time in the direction in which the work is proceeding, and in the final stages tamping should be closer, about 12 mm at a time until a level and dense surface is obtained.

(iii) Segregated particles of coarse aggregate which collect in front of the tamper or screed shall be thrown outside the forms or thoroughly mixed by hand with the un compacted mass of concrete already placed. Under no circumstances shall such segregate particles be carried forward and pushed on to the base in front of the mass.

(iv) Compaction by tamping or screeding shall be carried on till the mortar in the mix just works up to the surface. Care shall be exercised and the operation of tamping so controlled as to prevent an excess of mortar and water from being worked on to the top. Repeated operation other than to secure the necessary compaction and to eliminate voids shall be avoided.

(v) Immediately after the tamping or screeding has been completed and before the concrete has hardened, While the concrete is still in a plastic stage, the surface shall be inspected for irregularities with a profile checking template and any needed correction made by adding or removing concrete followed by further compaction and finishing.

Floating - As soon as practicable after the concrete has been compacted, its surface shall be smoothened by means of a longitudinal float, operated from a foot -bridge. The longitudinal float shall be worked with a sawing motion, while held in a floating position parallel to the carriageway centre line and passed gradually from one side of the pavement to the other. Movements ahead along the centre line of the carriageway shall be in successive advances of not more than one half the length of the float.

Straight-edging - After the longitudinal floating has been completed and excess water has disappeared, but while the concrete is still plastic, the slab surface shall be tested for trueness with a 3 m straight edge. The straight edge shall be held in successive positions parallel to the road centre line in contact with the surface and the whole area gone over from one side of the slab to the other. Advance along the road shall be in successive stages of not more than one -half length of the straight edge. Any area of depression

found shall be scooped to a depth of 4 -5 cm, filled immediately with freshly mixed concrete, struck, compacted, and re-finished. High areas shall be cut down and refinished. The straight edging and re-floating shall continue until the entire surface is found to be free from observable departures from the straight edge and the slab has the required grade and camber.

The slab surface shall be retested for trueness, before the concrete begins to set, with the 3 m long master straight edge and the graduated wedge gauge.

The straight edge shall be placed on the surface in successive positions, parallel to the carriageway centre line. Irregularities shall be measured with the help of the wedge gauge moved transversely at various points until it touches both the straight edge and the concrete surface.

At any point tested the concrete shall not show a departure greater than 3 mm from the true surface. If at any place the departure exceeds this value not more than 3 passes of the vibrating screed shall be allowed and the surface tested again in the specified manner. If the irregularity still exceeds the limit aforesaid, the concrete shall be removed to a depth of 50 mm or up to the top surface of the reinforcement, if any. The area of concrete to be removed shall be demarcated by the length of the straight edge in the position of measurement across the full width of the slab. Where the point of measurement in default is less than 4.5m from the nearest transverse expansion joint, the whole area upto the joint shall be removed to the required depth. The concrete so removed shall not be re -used in the carriageway. Fresh concrete shall be placed, compacted and finished in the manner already described in these specifications and shall again be subject to test for accuracy of finish.

The foregoing procedure shall be adopted at each shifting of the straight edge and the whole area shall be gone over from one side of the slab to the other. The straight edge shall advance Longitudinally in successive stages of not more than one -half the length of the straight edge.
No extra payment shall be made for the removal of the rejected concrete and or laying fresh concrete.

Although the concrete may be removed immediately following measurement of the irregularity and while it is still wet, this shall not mean any waiver from complying with the requirements of this clause, if for any reason the concrete to be removed has already hardened.
After straight edging of the surface, it shall be finished by brooming in the manner described as mentioned in the following paragraphs.

Brooming - After belting and as soon as surplus water if any has risen to the surface, the pavement shall be given a broom finish with an approved long handled steel or fiber broom conforming to the stipulations laid down in JRC - 43 -1972. The broom shall be pulled gently over the surface of the pavement from edge to edge. Adjacent strokes shall be slightly overlapped. Brooming shall be' perpendicular to the centre line of the pavement and so executed that the corrugations thus produced will be uniform in character and width, and about 5mm deep. Brooming shall be completed before the concrete reaches such a stage that the surface is likely to be torn or unduly roughened by the operation. The broomed surface shall be free from porous or rough spots, irregularities, depressions and small

pockets, such as may be caused by accidentally disturbing the particles of coarse aggregate embedded near the surface.

Curing of concrete - Immediately after the finishing operations have been completed the entire surface of the newly laid concrete shall be covered against rapid drying, and cured. Failure to provide sufficient cover material of the stipulated type or inadequate supplies of water for curing shall be adequate cause for immediate suspension of concreting operations.

Initial curing - After completion of the finishing operations, the surface of the pavement shall be entirely covered with wet hessian cloth, burlap or jute mats. The coverings used shall be of such length (or width) that when laid will extend at least 500 mm beyond the edges of the slab, shall be so placed that the entire surface and both the edges of the slab are completely covered. They shall be placed as soon as the concrete has set sufficiently to prevent marring of the surface. Prior to their being placed, the coverings shall be thoroughly wetted with water and placed with the wettest side down. They shall be so weighed down as to cause them to remain in intimate contact with the surface covered. They shall be maintained fully wetted and in position for 24 hours after the concrete has been placed, or until the concrete is sufficiently hard to be walked upon without suffering any damage. To maintain the coverings wet, water shall be gently sprayed so as to avoid damage to the fresh concrete. If it becomes necessary to remove the coverings for any reason, the concrete slab shall not be kept exposed for a period of more than half an hour.

Worn coverings or coverings with holes shall not be permitted. Coverings reclaimed from previous use other than curing concrete shall be thoroughly washed prior to use 'for curing purposes, if the covering is furnished in strips, the strips shall be laid to overlap at least 150 mm.

Covering shall be placed from suitable wooden bridges (IRC -43 -1972). Walking on freshly laid concrete to facilitate placing coverings shall not be permitted.

Final curing - Upon the removal of the covering the slab shall be thoroughly wetted and then cured by one of the following methods of final curing -

(a) Curing with wet earth - Exposed edges of the slab shall be banked with a substantial berm of earth. Upon the slab shall then be laid a system of transverse and longitudinal dykes of clay about 50 mm high, covered with a blanket of sandy soil free from stones to prevent the drying up and cracking of clay. The rest of the slab shall then be covered with sufficient sandy soil so as to produce a blanket of earth not less than 40 mm depth after wetting. The earth covering shall be thoroughly wetted while it is being placed on the surface and against the sides of the slab and kept thoroughly saturated with water for 14 days and thoroughly wetted down during the morning of the 15th day and shall thereafter remain in place until the concrete has attained the required strength and permission is given to open the pavement to traffic. When such permission is granted, the covering shall be removed and the pavement swept clean. If the earth covering becomes displaced during the curing period, it shall be replaced to the original depth and re - saturated,

Removing forms - Forms shall not be removed from freshly placed concrete until it has set, or at least 12 hours, whichever is later. They shall be carefully removed in such a manner that no damage is done to the edges of the pavement. After the forms have been removed, the slab edges shall be cleaned and any limited honey -combed areas pointed up with 1 -2 cement sand mortar, after which the sides of the slab shall be covered with earth to the level of the top of the slab for final curing Slabs with excessive honey - combing as a result of inadequate compaction shall be removed between nearest transverse joints.

Concreting during monsoon months - When concrete is being placed during monsoon months and when it may be expected to rain, sufficient supply of tarpaulins or other waterproof cloth shall be provided along the line of work. Any time when it rains, all freshly laid concrete, which has not been covered for curing purposes, shall be adequately protected by means of tarpaulins or other waterproof cloth. Any concrete damaged by rain shall be removed and replaced.

Concreting in hot weather - As placing of concrete in air temperatures above 40°C, or above 35°C combined with relative humidity below 25 percent and/or wind velocity higher than 10 km/hour, is attended with defects like loss of workability through accelerated setting, formation of plastic shrinkage cracks, etc., it is recommended that unless adequate precautions are taken, no concreting shall be done in conditions more severe than the above. The procedures recommended for adoption in case of hot weather concreting is given in IRC - 61 -1976 “Tentative Guidelines for the Construction of Cement Concrete Pavements in Hot Weather." Brief details of the procedure are given below -Aggregates, cement and water shall be protected from the direct sun and mixing operations shall also be carried out in shade. In addition portable shelters shall be provided to protect the concrete during placing and finishing operations. This may be in the form of gable frames to cover the full length of the concrete pavement laid in a day. The surfaces of the formwork and subgrade coming in contact with concrete shall be moistened prior to placing of the concrete to prevent absorption of mixing water.
Since the setting time of concrete is considerably reduced under such temperatures, labour force shall be reinforced to minimise the time between mixing and placing of concrete. The protective cover shall be adequate to exclude exposure of the concrete directly to the sun and also eliminate contact with drying winds. Prior to removal of the portable shelters, the hardened concrete shall be covered with wet hessian or burlap or the like followed by one of the usual methods of curing like ponding, etc. In addition, the moist curing period shall be extended to 4 weeks.

Work on gradients - The progress on gradient of all operations of placing, compacting and finishing of concrete should proceed from the lower to the higher reaches. The concrete mix shall be stiffer than that used on level reaches.

Protection of concrete - Suitable barricades shall be erected and maintained and watchmen employed to exclude traffic from the newly constructed pavement for the period herein prescribed, and these barriers shall be so arranged as not in any way to interfere with or impede traffic on any lane intended to be kept open and necessary signs and lights shall be maintained clearly indicating any lanes open to the traffic. Where, as shown on the plans or indicated in the special provisions, it is necessary to provide for traffic across the pavement, suitable and substantial crossings to bridge over the concrete shall have to be provided. Such crossings, as constructed, shall be adequate for the traffic and approved by the Engineer.

Any part of the pavement damaged by traffic or other causes occurring prior to its final acceptance shall be repaired or replaced in a manner satisfactory to the Engineer. The pavement shall be protected against all traffic usage including that of construction -traffic.

Sealing of joints - After the curing period is over and before the pavement is opened to traffic, the temporary seal and all other intruded materials in the transverse expansion and contraction joints as well as longitudinal joints shall be removed completely and the groove; filled with the approved joint sealing compound as per IRC - 57 -1974 "Recommended Practice for Sealing of Joints in Concrete Pavements". The joint opening shall be thoroughly cleared of all foreign matter before the primer followed by sealing material is placed. If necessary, the foreign matter shall be blown out by compressed air pressure. All contact faces of the joint shall be cleaned with a wire brush to remove loose material and shall be surface dried before the primer is applied.

Opening to traffic - In general, traffic shall be excluded from the newly constructed pavement for a period of 28 days where Ordinary Portland Cement, Portland Blast Furnace Slag Cement and Portland Pozzolona Cement are used, or for a period of 7 days where Rapid Hardening Cement is used. In all cases, before the pavement is opened to traffic it shall be cleaned and the joints shall be sealed.

44 General Civil Specifications

The following civil specifications shall be applicable for providing and executing all such items which are not mentioned in foregoing paras but are necessary to be provided and for the items in bill of quantities which are mentioned above but require some elaboration. No extra cost shall be paid for such items. It should clearly be understood by the Operator that all civil specifications mentioned here below shall be treated as part of the technical specifications already mentioned. The specific requirement of different items of work involved in the construction, completion and commissioning of the system as a whole, shall be provided in accordance with the requirement given in these civil specifications.

44.1 Site Clearance

Before taking up construction, site shall be cleared of all jungles, bushes and unwanted vegetation growth. After completion of plant, the entire site area shall be cleared of all left over material and debris. The work shall be carried out in accordance with the specifications in bill of quantities and payment shall be as per quoted rates for the respective items.

44.2 Sections for excavation for all underground structures and pipe lines

Operator shall prepare sectional drawings showing the details of excavation for all underground structures and pipe lines, in all kinds of soils, boulders, soft and hard rock etc., based on test results of soil testing and investigation reports complying to specifications in this document for earthwork excavations and shall submit to the Engineer for review and approval, prior to starting of the work. If during excavation any change in section is considered necessary for reasons of safety of workers, the Engineer will issue

directions for compliance by the Operator. The Operator shall comply with the Engineer's directions without any extra charge or payment.

44.3 Form Work

Formwork, shuttering, centering, scaffolding etc., shall be of steel plates or plywood, lined with MS-sheets and for scaffolding steel tubular shall be used. Joints should be sufficiently tied to prevent loss of cement slurry from the concrete. All forms, shuttering shall be levelled, aligned, and thoroughly cleaned, before they are used for concreting. Formwork shall be removed after specified days of curing with the prior written permission of the Engineer. The surface of RCC after removal of formwork / shuttering shall be smooth and even and without honeycombing or undulations.

44.4 Procedure and Materials used in concrete works.

The procedure for concrete works shall be in accordance with the specifications in the bill of quantities, specifications in this section and complying to standard practices in IS:456-2000 with latest amendments, all concrete works shall be executed in accordance with standard practices, including volumetric batching using boxes of standard size, concrete mixers with hopper, compaction using vibrators and according to the directions of the Engineer In-charge of works.

Aggregates

All aggregates, fine and course used in concreting works shall comply to the standards laid down in IS: 456-2000 with latest amendments and specifications in applicable clauses in this section.

Water

The water used in all concreting works shall be of potable quality and tested before usage in the construction works and shall be confirming to IS: 456-2000.

Cement

The cement used shall be of sulphate resisting cement confirming to IS: 12330 as specified and where ever the concrete is coming in contact with sewage. For other concreting works like encasing pipe, pedestals and other structures where there is no contact with sewage, it shall be OPC confirming to IS:8112 with latest amendments and revisions.

Minimum clear cover over Reinforcement

Minimum clear cover over the steel reinforcement shall be 50mm for the members contact with soil/ground water. For other faces the clear cover over the reinforcement shall be as per latest IS Codes.

Tested Steel

Only tested and approved steel shall be used for reinforcement in RCC works, and the Operator shall produce the test certificates to the Engineer. The type of steel used shall be of TMT of grade of steel Fe: 500 confirming to relevant IS.

44.5 Restoration of Storm water drains & other miscellaneous works.

The storm water drains and cover slabs damaged during execution of works which is not due to the negligence of the Operator as decided by the Engineer shall be restored as per the items in bill of quantities. The specifications in this section are deemed to govern the applicable items in the bill of quantities. All masonry works, concrete works shall be in accordance with relevant IS as mentioned in section 6 and or as directed by the Engineer. Other repairs works under heading "Miscellaneous works" in bill of quantities shall be executed in accordance with the specifications and as directed by the Engineer, the finished item of work shall give neat appearance and should serve the intended purpose of the component to the satisfaction of the Engineer.

45 Design Submissions:

Complete detailed design /hydraulic calculations & drawings of foundations and superstructure together with general arrangement drawings and explanatory sketches shall be submitted to the Owner. Separate calculations for foundations or superstructures submitted independent of each other shall be deemed to be incomplete and will not be accepted. Though no GA drawings of all units are required along with the bid, a schematic layout /GAD shall be submitted along with the bid. The design considerations described herewith establish the minimum basic requirements of plain and reinforcement concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed. The Operator shall also take care to check the stability of partly.

45.1 Design Standards

All designs shall be based on the latest International or Indian Standard (IS) Specifications or Codes of Practice. The design standards adopted shall follow the best modern engineering practice in the field based on any other international standard or specialist literature subject to such standard reference or extract of such literature in the English language being supplied to and approved by the Owner or Owner's Representative. In case of any variation or contradiction between the provision of the IS Standards or Code and the specifications given with the submitted bid document, the provision given in the Specification shall be followed.

45.2 Design Loadings

All buildings and structures / underground structures shall be designed to resist the worst combination of the following loads/stresses under test and working conditions these include dead load, live load, wind load, seismic load, stresses due to temperature changes, shrinkage and creep in materials, dynamic loads and uplift pressure.

45.2.1 **Dead Load:** This shall comprise all permanent construction including walls, floors, roofs, partitions, stairways, fixed service equipment and other items of machinery. In estimating the loads of process

equipment all fixtures and attached piping shall be included, but excluding contents shall be considered. The following minimum loads shall be considered in design of structures:

S.No	Parameter	Load
1	Weight of water	10.0 KN /m3
2	Weight of soil (irrespective of strata available at site and type of soil used for filling etc) However, for checking stability against uplift, actual weight of soil as determined by field test shall be considered	20.0 KN/m3
3	Weight of plain concrete	24.0 KN/m3
4	Weight of reinforced concrete	25.0 KN/m3
5	Weight of brickwork (exclusive of plaster)	22.0 KN/m3
6	Weight of plaster to masonry surface	18.0 KN/m3
7	Weight of granolithic terrazzo finish or rendering screed, etc	24.0 KN/m3
8	Weight of sand (filter media)	25.0 KN/m3

45.2.2 **Live Load:** Live loads shall be in general as per IS 875. However, the following minimum loads shall be considered in the design of structures.

S.No	Location	Live Load
1	Floor supporting Pumping Machinery	1000 kg/sq.m
2	Storage, Maintenance Bay, Air Blower	750 kg/sq.m
3	Platform, Staircase, Corridors, Walkways	500 kg/sq.m
4	Toilet	200 kg/sq.m
5	Roof Slab	150 kg/sq.m

In the absence of any suitable provisions for live loads in IS Codes or as given above for any particular type of floor or structure, assumptions made must receive the approval of the Owner's Representative prior to starting the design work. Apart from the specified live loads or any other loads due to material stored any other equipment load or possible overloading during maintenance or erection/construction shall be considered and shall be partial or full whichever causes the most critical condition.

45.2.3 **Wind Load:** Wind loads shall be as per IS: 875- 2002 Part-III.

45.2.4 **Dynamic Load:** Dynamic loads due to working of plant items such as pumps, blowers, compressors, switchgears, traveling cranes, etc shall be considered in the design of structures.

45.2.5 **Other Loads:** In addition to earth pressure and water pressure etc., the surcharge of 1 Ton/sq.m shall be taken into account in the design for channels, tanks, pit etc.

45.2.6 **Earthquake Load:** This shall be computed as per IS: 1893 – 2000.

45.3 Joints

Movement joints such as expansion joints, complete contraction joints, partial contraction joints and sliding joints shall be designed to suit the structure as per relevant IS code provisions. Expansion joints of

suitable gap at intervals not more than 30 m shall be provided in walls, floors and roof slabs of water retaining structures.

Construction joints shall be provided at right angles to the general direction of the member. The locations of construction joints shall be decided on convenience of construction. To avoid segregation of concrete in walls, horizontal construction joints are normally to be provided at every 2 m height, GI 18 guage/PVC water stops of suitable type and minimum 230 mm width, 6 m thick shall be used for walls and base slabs.

45.4 Waste Water Retaining Structures

Liquid retaining/conveying structures including the members covering the same (such as roof of a chamber, channel etc.) shall be designed by uncracked method of design as per BIS: 3370 and 6494. Basement RC walls and slabs below ground shall also be designed by uncracked method of design as liquid retaining structures. Shear shall be checked by working stress method as per BIS: 456. Minimum temperature and shrinkage reinforcement shall be 0.3% in each direction.

All underground or partly underground liquid containing structures shall be designed for the following conditions:

- Liquid depth up to full height of wall: no relief due to soil pressure from outside to be considered.
- Structure empty (i.e. empty of liquid, any material, etc) full earth pressure including saturated condition and surcharge pressure wherever applicable to be considered.
- Structures shall be designed for uplift in empty conditions as per water table indicated in the geotechnical report or high flood level, whichever is maximum. No reduction factor for the uplift force shall be considered.
- The dead weight of the empty structures should provide a safety factor of not less than 1.2 against uplift pressures during construction and in service.
- Wall shall be designed under operating conditions to resist earthquake forces from earth pressure mobilization and dynamic water loads;
- Underground or partially underground structures shall be checked against stresses developed due to any combination of full and empty compartments with appropriate ground/uplift pressures from below to base slab
- The walls and base slabs shall be designed for saturated earth/water pressure corresponding to high flood level or finished plot level whichever is higher.
- For design purpose, sub soil water level is to be considered as 2 meter below the average natural ground level.

45.5 Foundation

- The minimum depth of foundations for all structures, equipment's buildings and frame foundations and load bearing walls shall be as per IS: 1094.
- The earth fill above virgin ground level till formation level shall be taken as a surcharge load and shall be added in the loads coming on foundations appropriately

- Care shall be taken to avoid the foundations of adjacent buildings or structure foundations, either existing or not within the scope of this Contract Suitable adjustments in depth, location and sizes may have to be made depending on site conditions. No extra claims for such adjustments shall be accepted by the Owner.
- Special attention is drawn to danger of uplift being caused by the ground water table
- Plinth level of all structures/top of tanks shall be at least (1000) mm above high flood level.

45.6 Design Requirements

The following are the design requirements for all reinforced or plain concrete structures:

- All blinding and leveling concrete shall be minimum 100 mm thick in concrete grade M15 for Building & 150 mm thick in concrete grade M 30 for Water Retaining Structures as per IS -3370 (Part- 1)-2009 latest version..
- All structural reinforced concrete shall be with a maximum 25 mm aggregate size for footings and base slabs and with a maximum 20 mm aggregate size for all the Water Retaining Structures & other structural members.
- All liquid retaining structures shall be designed as per IS: 3370. The minimum grade of concrete shall be M30 using Sulphate resistant Cement.
- All Buildings, Pipe Pedestals, Thrust Block, Pump Foundation & other structures shall be designed as per IS-456. The minimum grade of concrete shall be M20.
- The maximum free water cement ratio shall not exceed 0.5 for all liquid retaining structures.
- The amount of reinforcement in each of the two directions at right angles within each surface zone should not be less than the minimum specified as IS:3370 or IS:456 which ever is applicable for the type of structure.
- Use of pressure relief valves to reduce uplift pressure due to ground water table shall not be allowed.
- All buildings shall have a minimum 1.0 m wide, 100mm thick plinth protection paving in M15 grade concrete or stone slabs/tiles. All plinth protection shall be supported on well-compacted strata.

The following minimum thickness shall be used for different reinforced concrete members irrespective of design thickness.

S.No	Civil Member	Width(mm)
1	Walls for liquid retaining structures	200
2	Base Slab of liquid retaining structures	350
3	Wall foundation (At Junction of Base Slab & Wall) of liquid retaining structures	400
4	Roof Slab of liquid retaining structures	150
5	Walls of Launders	150
6	Base slab of Launders	125
7	Floor slabs including roof slabs, walkways canopy slabs	100
8	Walls of cables/pipe trenches, underground pits, etc	125
9	Footing – Edge Thickness	250
10	Footing – At the Face of Column	450
11	Column	230 (width) 300 (depth)

S.No	Civil Member	Width(mm)
12	Parapets, chajja	100
13	Precast trench cover	75
14	Beam	230 (width) 300 (depth)

MINIMUM COVER TO MAIN REINFORCEMENT

S.No.	Member	Details	Cover (mm)
1	Slab	Free Face	20
		Face in contact with earth	30
2	Beam	Top /Bottom	40
		Side	30
		Face in contact with earth	40
3	Column and pedestal	Super Structure	40
		Face in contact with earth	40
4	Retaining wall, Basement and Pit wall	Free side	30
		Face in contact with earth	30
5	Liquid Retaining Structure	Face in contact with liquid	40
		Face in contact with earth	40
		Free face	40
6	Foundation	Bottom	60
		Top	60

Minimum Bar Diameter

S.No	Member	Diameter (mm)
1	Major Foundation	10

S.No	Member	Diameter (mm)
2	Block Foundation Main Bars	8
3	Block Foundation – Tie Bars	8
4	Minor Foundation (Local Foundation etc.)	8
5	Column, Pedestal – Main Bars	12
6	Column, Pedestal – Ties	8
7	Beam – Main Bars	12
8	Beam – Anchor Bars	10
9	Beam – Stirrups	8
10	Slab – Main Bars	8
11	Slab – Distribution Bars	8
12	Wall – Main Bars	10
13	Wall – Distribution Bars	8
14	Minor elements such as chajjas, Lintel Beams etc	8

Bar Spacing

S.No	Member	Minimum (mm)	Maximum (mm)
1	Foundations	125	200
2	Slabs	100	300
3	Stirrups for Beams	100	300
4	Ties for Columns, Pedestals	100	300
5	Walls	100	300

• Bar spacing shall be provided in multiple of 25 mm.

46 MATERIALS IN GENERAL

The term “materials” shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Operator for incorporation in the Works.

Expect as may be otherwise specified for particular parts of the works the provision of clauses in “Materials and Workmanship” shall apply to materials and workmanship for any part of the works. All materials shall be new and of the kinds and qualities described in the Contract and shall be at least equal to approved samples.

As soon as practicable after receiving the order to commence the works, the Operator shall inform the Owner’s Representative of the names of the suppliers from whom he proposes to obtain any materials but he shall not place any order without the approval of the Owner’s Representative which may be withheld until samples have been submitted and satisfactorily tested. The Operator shall thereafter keep the Owner’s Representative informed of orders for and delivery dates of all materials.

Materials shall be transported handled and stored in such a manner as to prevent deterioration damage or contamination failing which such damaged materials will be rejected and shall not be used on any part of the Works under this contract.

46.1 Cement

The Cement shall be Sulphate Resistant Cement grade-53 in all water retaining structures and OPC 53 grade cement for other structures, confirming to the relevant B.I.S. codes and approved by the Owner's Representative. Manufacturers Test Certificate shall have to be furnished. Minimum cement consumption for RCC M20 shall be considered as 350 kg/cum and for RCC M25 shall be 380 kg/cum. mixing of fly ash in the concrete shall not be considered. Approved Manufacturers of Cement of reputed firm with ISO certification shall be used

46.2 Reinforcement Steel

Reinforcement Steel shall confirm to BIS Specification 432-1966 (with up to date revision) and B.I.S. Specification 1786-1985 (with up to date revision). All Reinforcement Steel will be TMT Grade approved by the Owner.

Minimum Cement Content

The minimum cement content for each grade of concrete shall be as per table below.

S.No.	Grade of Concrete	Minimum Cement Content in Concrete (Kg/m3 of finished concrete)
1	M15	240
2	M20	300
3	M25	300
4	M30	320

Please refer IS code 456 –(latest version)

47 SAMPLES AND TESTS OF MATERIALS

The operator shall submit samples of such materials as may be required by the Owner and shall carry out the specified tests directed at the site or at the supplier's premises or at the laboratory approved by the Owner or the Owner's Representative. Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Owner.

The operator shall give the Owner seven days' notice in writing of the date on which any of the materials will be ready for testing or inspection at the supplier's premises or at a laboratory approved by the Owner. Owner or the Owner's Representative shall attend the test at the appointed place within seven days of the said date on which the materials are expected to be ready for testing or inspection according to the Operator, failing which the test may proceed in his absence unless instructed by the Owner's Representative to carry out such a test on a mutually agreed date in his presence.

The operator shall in any case submit to Owner within seven days of every test such number of certified copies (3) of the test results as the Owner's Representative may require.

Approval by the Owner's Representative as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Owner's Representative powers under the Contract. The provisions of this clause shall also apply to materials supplied under any nominated sub-contract.

48 ORIENTATION

The works shall be laid out within the confines of the site in order to be compatible with the existing infrastructural facilities, inlet and outlet pipe work/channels and nearby water bodies. Underground services requiring to be relocated in order to accommodate the proposed site layout shall be relocated by the operator to alignments approved by the Owners Representative.

48.1 Buildings and Structures

All the building and structure works shall generally comply with the following Owner's Requirements unless otherwise specified elsewhere:

All building works shall be of reinforced concrete framework.

All external walls shall be in 230 mm thick brick masonry built in cement mortar (1:5). Transoms and mullions of 115 mm x 230 mm size with four numbers 6 mm bars and 6 mm links at 150 mm c/c shall be provided to form panels not exceeding 3,500 mm x 3,500 mm in size. All internal partition walls except for toilets shall be in 230 mm thick brick masonry built in cement mortar 1:5 with transoms and mullions as in (b) above. Toilet partition walls shall be in 115 mm thick brick masonry built in cement mortar 1:4 and shall have transoms and mullions as in (b) above and shall form panels not exceeding 1,200 mm x 1,200 mm in size.

Finishes to concrete liquid retaining structures shall be:

a. F1 - External surfaces, buried

b. F2 - External surfaces exposed and up to 300 mm below ground level

c. F2 - Internal surfaces

Finishes to other concrete structures shall be:

a. F1 – Buried

b. F1 - Exposed, where plastering is specified

c. F2 – Exposed

All internal masonry surfaces finish shall have 12 mm thick plain faced cement plaster in cement mortar (1:4) with neat cement finish on top. Over this, one coat of primer and two coats of plastic emulsion paint of approved quality and shade shall be provided.

All external masonry and concrete with rough board finish shall have 20 mm thick sand faced cement plaster in two coats, base coat 12 mm thick in cement mortar 1:4 and finishing coat 8 mm thick in cement mortar 1:4. Waterproofing compound of approved make and quality shall be added to the cement mortar in proportions as specified by the manufacturer.

All external surfaces above ground level shall have one coat of primer and two coats of waterproof cement based paint of approved quality and shade. A coat of silicone water repellent paint shall also be applied thereon.

Toilet areas, walls and ceilings, shall have one coat of primer and two coats of plastic emulsion paint. Toilet floor slab shall be filled with brick bat coba (broken bricks in lime) and provided with

waterproofing as per the specifications of an approved specialist waterproofing company. The finished floor level in toilet areas shall be 25 mm below general finished floor level elsewhere in the building.

The flooring in all areas except toilets and staircases, pumping stations, chlorination building, centrifuge building, workshop, store room D.G. room shall be in 250 mm x 250 mm x 20 mm thick marble mosaic tiles of approved make unless otherwise specified, shade and pattern and placed in cement mortar 1:4 to give overall thickness of 50 mm. Half tile skirting shall also be provided in these areas.

The flooring in the pumping stations, chlorination building, centrifuge building, workshop, D.G.room shall be 60mm thick cement flooring with metallic concrete hardener topping, under layer of 42mm thick cement concrete 1:2:4 (1 cement : 2 coarse : 4 graded stone aggregate 16mm thick nominal size) and top layer of 18mm thick metallic concrete hardener consisting of mix 1:2 (1 cement : 2 stone aggregate 6mm nominal size) by volume & mixed with metallic hardening compound of approved quality @ 3 kg/m2 including cement slurry and rounding off edges.

The flooring in Operator's room, loading/unloading bay, MCC cum Panel room shall be in 25mm thick Kota stone slab of approved shade and pattern and placed over 20 mm thick base of cement mortar 1:4 to give overall thickness of 45 mm. Half tile skirting shall also be provided in these areas.

Toilet areas shall have 450 mm x 450 mm x 25 mm thick polished Kota stone tiles placed in cement mortar 1:4 to give an overall thickness of 50 mm. 2100 mm high dado, in 150 mm x 150 mm x 6 mm thick glazed tiles (approved make, shade and pattern) placed in cement mortar 1:3 shall also be provided in these areas.

The flooring along with skirting in administration cum laboratory building shall be 20 mm thick mirror polished, machine cut granite slab of approved shade and pattern placed in cement mortar (1:4). 150mm high skirting shall be provided in these areas. Granite stone shall be provided for laboratory platforms fixed over double sandwiched cuddappa support as directed and the edges of granite is to be embedded into the wall.

The toilet facilities shall include at least:

i. 3 Nos. Water closets with white porcelain Orissa pan minimum 580 mm long with low level flushing cistern of 10 litres capacity.

j. 4 Nos. urinals of sizes 600 mm x 400 mm x 300 mm flat back type in white porcelain separated by a marble partition of size 680 mm x 300 mm.

k. 3 Nos. wash basins of size 510 mm x 400 mm in white porcelain with inlet, outlet and overflow arrangements.

l. 3 Nos. mirror of size 400 mm x 600 mm wall mounted type fitted over wash basins.

m. 2 Nos. plastic liquid soap bottles

n. 2 Nos. chromium plated brass towel rails minimum 750 mm long.

o. All stopcocks, valves and pillar cocks shall be heavy duty chromium plated brass.

p. All fittings such as `P' or `S' traps, floor traps, pipes, down take pipes etc.

The sewage from toilet blocks shall be led to the wet well of terminal sewage pumping station if present or included under this contract or to the closest gravity sewer.

All staircases shall have 25 mm thick chequered mosaic tiles for treads and 25 mm thick plain mosaic tiles for risers of approved make and shade and half tile skirting set in cement mortar in 1:4 to give an overall thickness of 50 mm.

All concrete stairs shall have aluminum nosing over 2 mm thick rubber strip of width same as nosing for the full length of the tread. Nosing shall be fixed with countersunk screws. Stairways shall be provided to permit access between different levels within buildings. Staircase shall be minimum 1000mm wide unless specified otherwise. Staircases in general shall not be steeper than 40°. Staircases having space constraints may be steeper than 400. The maximum vertical run for a single flight of stairs shall be 3.0 M.

All roof tops and overhead tanks shall be made accessible with ladder provision. Vertical step ladders fitted with landing point extensions will be permitted where considered appropriate by the Engineer to access areas not frequently visited.

Steel staircases shall be constructed of standard channel stringers with M.S. grating treads 25mm thick with non skid nosing. Steel Ladders shall be minimum 600mm wide and shall not exceed 6m of straight run. The ladders shall be painted with epoxy paint.

All hand railing shall be provided with G.I "C" Class Pipe confirming to latest Indian standards. The minimum height of hand railing shall be 1m.

The reinforced concrete roofs shall be made waterproof by application of an approved roof polythene / bitumen membrane / brick bat coba. The finished roof surface shall have adequate slope to drain quickly the rain water to R.W down take inlet points.

All roof floors shall have minimum 750 mm height solid concrete block parapet wall where accessible is provided and shall have minimum 300 mm height solid concrete block parapet wall where accessible is not provided.

For roofing drainage, cast iron or uPVC rainwater down takes with C.I. bell mouth or u PVC bend and C.I. or uPVC grating at top shall be provided. For roof areas up to 40 sq m minimum two nos. 100 mm diameter down take pipes shall be provided. For every additional area of 40 sq m or part thereof, at least one no. 100 mm dia. down take pipe shall be provided.

Top surfaces of chajjas and canopies shall be made waterproof by providing a screed layer of adequate slope or application of an approved roof membrane and sloped to drain the rain water.

Building plinth shall be minimum 450 mm above average finished ground level around building or high flood level whichever is more.

q. Doors and Windows

All doors, windows, rolling shutters shall have lintels above. Chajja protection to lintels on external walls shall be such as to prevent the rain water splashing into the building. Chajja projection of minimum 750 mm for rolling shutters, 600 mm for doors and 450 mm for windows shall be provided to prevent the rain water splashing into the building. Chajja shall be projected 150 mm on either side from size of doors/windows/rolling shutters. All windows and ventilators shall have 25 mm thick Kota stone sills bedded in cement mortar (1:3).

All doors and windows shall be painted with two coats of synthetic enamel paint over a priming coat (ready mixed Zinc Chromate Yellow primer of approved brand and manufacturer confirming to I.S.: 127-106, 341 and 340).

All doors, windows and ventilators shall be made of aluminum confirming to latest version of IS: 1948. All fixtures for doors, windows and ventilators shall also be of aluminum. Aluminum grills shall be provided in all the windows. Doors shall be in two panel and both panels shall be glazed/unglazed. Minimum weight of aluminum doors & windows shall be as follows

Single Glazed Window : (Weights indicated shall be aluminum)

- Open able Outer Frame: Weight 0.70 kg/Rmt
- Shutter Frame: Weight 0.97 kg/Rmt
- Intermediate Mullion: Weight 0.97 kg/RMt.
- Beading: Weight 0.31 kg/Rmt
- Fixing Louvers windows/ventilators
- Outer Frame: Weight 0.46 kg/Rmt

Double Glazed Window

- Outer Frame: Weight 0.72 kg/Rmt
- Shutter Frame: Weight 0.97 kg/ Rmt
- Intermediate Mullion: Weight 0.98 kg/ Rmt
- Beading: Weight 0.31 kg/ Rmt

Sliding Windows

- Bottom & Top Frame: Weight 0.70 kg/m
- Shutter Frame: Weight 0.42 kg/m
- Interlocking Section: Weight 0.47 kg/m

Aluminum Door

- Outer Frame: Weight 2.508 kg/Rmt
- Shutter Frame: Weight 2.508 kg/Rmt
- Bottom Stile: Weight 2.508 kg/Rmt
- Glazing shall be 5.5 mm thick glass.

Openings of the windows & ventilators shall be minimum 25% of the external wall area.

Ventilator shall be provided where height of floor is more than 3m. All windows and ventilators shall have wire mesh. Frame of doors, windows and ventilators shall be of aluminum of standard rolled section. Doors, Windows and Ventilators shall be of size as per schedule to be submitted by the Operator for approval of Engineer. The minimum size shall be as per below:

a. Door of opening size 1.2m x 2.1m
b. Door of opening size 0.75m x 2.1m for toilets
c. Glazed widows of minimum size 1.2m x 1.2m
d. Ventilators of minimum size 0.6m x 0.6m

Rolling shutters shall be made of 80 x 1.25 mm MS laths. Rolling shutter shall be of minimum size 3m wide x 3.0m high. Rolling shutter shall be provided in MCC cum panel room, chlorine toner shed, at entry and exit of the pump house for access to pumps, motors, valves, panels and as wherever required.

q) All concrete channels and ducts used for conveying liquid shall have inside finish of type F2. The width of concrete channels shall not be less than 500 mm. All open channels shall be provided with Stainless Steel Type 304 hand railings or concrete walls to a minimum height of 1 m from the access surface elevation. All concrete surfaces of structures conveying raw sewage or primary effluent shall be protected with Epoxy Coating as specified.

r) Kerbs to be provided below the hand railing on the catwalks/pathways should be as per relevant sections of Factory Act. It shall not be less than 150mm.

s) All exposed surfaces of inserts embedded in concrete shall be painted with two coats of enamel paint over one coat of red oxide zinc chrome primer. Surfaces in contact with concrete shall not be painted.

t) All structural steel members shall be painted with two coats of enamel paint over one shop and one field coat of red oxide zinc chrome primer.

u) The design of buildings shall reflect the climatic conditions existing on site. Process buildings shall as far as is possible permit the entry of natural light , and the use of glazed panelling shall be kept to a minimum and preference given to wall openings protected by weather canopies.

v) Emergency exit doorways shall be provided from all buildings in order to comply with local and international regulations .Stairways and paved areas shall be provided at the exit points.

w) Toilet blocks in process buildings and control blocks shall be provided with a sink with two drinking water taps of 20 mm size with adequate inlet and outlet connections.

x) All the walkways in shall have minimum 1 m width and shall be covered with mosaic tiles.

y) Hand railings shall be made up of G.I "C" Class Pipe confirming to latest Indian standards.

z) For structures containing water or process liquid, the top of the wall shall be at least 0.5m higher than the maximum water surface level calculated at high flood level and peak plant flow. The top level of internal plant roads and approaches shall be at least 0.5m above the site High Flood Level.

aa) If the High flood level is more then Ground Level then road shall be constructed on the earthen embankment. Earthen embankment shall be constructed with side slope of atleast 2 horizontal to 1 vertical. Stone pitching shall be provided at both sides of the embankment as per IS: 8237. Top width of embankment shall be taken as 6.0m. Top level of embankment shall be 0.5m above high flood level. Excavated earth from the plant can be used for embankment construction and if required, extra earth can be borrowed from the borrow pit as approved by Engineer.

48.2 Site Drainage

The operator shall provide a site drainage system. The system shall comprise of the following:

Storm Water Drainage
Foul Drainage (if any)

48.2.1 Storm Water Drainage

Storm water drains adjacent to the existing and proposed roads (under this Contract) shall be sized for a rainfall intensity of 50 mm/hr, allowing for 100% runoff. Drains adjacent to roads shall be in stone masonry in CM (1:4) of appropriate thickness, topped with 75 mm thick M10 concrete and internally flush pointed in cement mortar (1:4), 20 mm thick. The minimum width of drain shall be 450mm.

The storm water drainage system shall also be designed to cater the run-off from the existing plot areas and structures, if necessary depending upon the site topography.

48.2.2 Foul Drainage

(b) The foul drainage system shall accept discharge from toilets, washrooms, offices and the laboratory. The foul drainage system shall be conveyed to the nearest public sewer wherever exist or to a pumping station or a new soak pit followed by septic tank shall be constructed.

48.3 Cable and Pipe work Trenches

(a) Cable and pipe work trenches shall generally be constructed in reinforced concrete. However, 500 mm x 500 mm size or smaller trenches, not on fill may be constructed in 200 mm thick solid cement concrete blocks over 150mm thick M 15 PCC base. The trenches will be 20mm thick plastered internally with cement mortar (1:4) and externally in cement mortar (1:3).

(b) All floor cut-outs and cable ducts, etc. shall be covered with M20 precast concrete covers (Heavy Duty) or MS grating as per direction of Engineer in outdoor areas and M.S. chequered plates, suitably painted of adequate thickness in indoor areas. All uncovered openings shall be protected with hand railing. The pipe, cable trenches shall be suitably sloped to drain off rainwater to a suitable location.

(c) Layout of trenches outside the buildings shall allow space for construction of future trenches where necessary with due consideration for planning for future developments. This aspect shall be brought to the notice of the Engineer while planning the works.

48.4 Pipes and Ducts

(a) R.C.C ducts for drainage shall have minimum 1 metre pre-cast cover (M20 concrete, Heavy duty) while laid under roads. Access shafts of size not less than 600 mm x 1000 mm shall be provided.

(b) All drains (except storm water drains adjacent to roads) shall be covered and designed structurally for appropriate loads.

48.5 Landscaping

(a) The site shall be landscaped once the works are substantially complete. Landscaping area shall be marked in the layout plan of Sewerage Network.

(b) Landscaping shall include planting of suitable trees and development of lawn/grassed areas. Landscaping in general shall meet ecological and environmental conditions of the site. Road widths shall determine the size of the tree height and spread to be selected for planting. Trees suitable for local conditions shall be selected as approved by the Engineer. Medicinal and fruit trees shall be avoided. Landscaping shall be maintained in good condition till the completion of the contract.

48.6 Tree Planting

(a) Pits dug a few days in advance of actual planting shall be allowed to weather and be filled with top soil mixed with manure. Size of the pit shall be as per standard requirement. Only one tree shall be planted in each pit. A guard made of bamboo with wire mesh or bricks or M.S. ring as approved by Engineer, shall be provided.

49 CONCRETE

49.1 General

Applicable provisions of Conditions of Contract shall govern work under this section.

All concrete work, plain or reinforced shall be carried out in strict accordance with this specification and any working drawing or instructions given from time to time to the operator. The operator's rates shall allow for wastage in all materials as well as for all tests of materials and for concrete. No concrete shall be cast in the absence of the Owner's representative or any other person duly authorized by him. The operator's Engineer shall personally check that both the formwork and reinforcement have been correctly placed and fixed, and shall satisfy himself that all work preparatory to the casting is completely ready, before calling the owner's representative for final inspection and approval and for which purpose at least 24 hours' notice shall be given by the operator. The Indian Standards wherever referred to herein shall be the latest edition of such Standards.

Cement

Cement shall be ordinary Portland cement as per I.S. 269 or Sulphate Resistance Cement as per IS 12330. Cement tests shall have to be carried out at operator's expense as and when directed.

Aggregate

The fine and coarse aggregate shall conform to IS: 383 & IS: 456. The necessary test indicated in IS – 383 and IS – 456 shall have to be carried out to ensure the acceptability and shall meet prior approval of the Owner.

Reinforcement

The reinforcement conforming to latest relevant Indian Standards shall be of tested quality. It shall also comply with relevant part of IS. 456. All the reinforcement shall be clean and free from dirt, oil, paint, grease, mill scale or loose or thick rust at the time of placing. The reinforcement shall be bent to the shapes shown on the drawings prior to placing and all bars must be bent cold. The Steel shall be placed in such a way that it is rigidly held in position while concrete is being cast. The correct clearance from the form shall be maintained by either precast mortar blocks or by metal supporting chairs to be supplied by the operator free of charge. The intersections of rods crossing one another shall bound together with soft pliable wire No. 16 S.W.G. at frequent intervals so that reinforcement will not be displaced during the process of depositing concrete. The loops of binding wire should be tightened by pliers.

Water

Water shall conform to IS: 456, clean and free from alkali, oil or injurious amounts of deleterious material. As far as possible, the water should be of such quality that is potable. If any chemical analysis of the water is necessary and ordered the same shall be got done at approval laboratory at the operator's expense.

49.2 Concrete Proportioning

The concrete proportion shall be as indicated on the approved drawings and shall conform to IS: 456.The minimum cover to main reinforcement shall be 25 mm or the diameter of the bar whichever is greater. In the case of surfaces exposed to corrosive action as in sumps, the cover shall be increased up to 50 mm as directed.

Type of joints, spacing of joints, use of all jointing materials and other features pertaining to the provision of movement joints in liquid retaining structures shall be got approved prior to commencement of construction. All reinforced concrete work shall be thoroughly and efficiently vibrated during laying by use of vibrators.

For liquid retaining structures M:30 grade (SRC) shall be used, the same shall be deemed to be satisfactorily watertight if the external faces show no signs of leakage and remain apparently dry over the period of observation of 7 days after allowing a period of 7 days for absorption after filling. Covered tank, where all faces are not accessible for inspection, shall be kept filled with water for 7 days and thereafter the drop of water over the next 7 days shall not exceed totally a depth of 12.5 mm per day. Approved corrective measures, if necessary, shall be undertaken by the Operator at his own expense. The operator shall use appropriate water proofing compound during the process of pouring of concrete in required proportion.

49.3 Workmanship

All concreting work shall be carried out according to the IS: 456 'Indian Standard Code of Practice for Plain and Reinforced Concrete for general Building Construction'. It should, however, be note that for Over 60 m3 of concrete placed or for every one day's work a minimum of 6 (six) cubes shall be cast for test purposes and tested at the operator's expense in an approved laboratory.

49.4 Formwork

The formwork shall conform to IS: 456.

49.5 Curing

The concrete shall be cured according to IS: 456 or as directed.

49.6 Concrete Finish:

The concrete surface on removal of form work shall be such that no finishing is necessary if however the surface is not satisfactory, the operator shall if so instructed, remove unwanted projecting parts by chipping and smoothen the surface with cement rendering at his own expense.

49.7 Construction Joints / Water Stops

These shall be in accordance with IS: 456 or as shown on the approved drawings.

The centering for forming, the construction joint shall be firmly fixed and adequately slotted for reinforcement extending beyond the joint. If any concrete has set, care shall be taken not to disturb the reinforcing steel in casting the second half of a member with a construction joint and thereby crack the concrete previously placed. The PVC joints shall be of the 'rebated' or 'keyed' type and shall have a minimum width of 300 mm inclined 'feather' or 'straight joints' shall not be permitted. The Joints/Water stops shall be got approved by the Engineer before their placement into the structure.

49.8 Expansion Joints

Expansion joints shall be provided at positions shown on the approved drawing or as directed and shall comply strictly with the details shown on construction drawings. Reinforcement shall not extend across any expansion joint and the break between the two sections MUST be complete. Unless otherwise specified, the gap shall be filled with an elastic joint filler consisting of the following ingredients (by weight), preheated to a temperature of 190 (375 F).

a) Very find sand 60%

b) Hot bitumen emulsion 33%
c) Cement 5%
d) Fine chopped hemp 2%

49.9 Operator's Supervision

The operator shall provide constant and strict supervision of all the item of construction during progress of work, including the proportioning and mixing of the concrete and bending and placing of reinforcement. Before any important operation such as concreting or stripping of formwork is begun, adequate notice shall be given.

49.10 Laying Cement Concrete in Foundations & Under Floors

Before laying the concrete, the bottom and sides of the trench up to the proposed height of the concrete shall be moistened. The concrete shall be tamped immediately after laying.

49.11 Protective Epoxy Paint Treatment:

Epoxy Paint of standard specifications manufactured/purchased from a reputed firm approved by IS shall be applied to the outside Concrete surface and all mild steel works within the sewage pumping station. The coverage capacity of layers shall be at 125 Microns D.F.T. 7.60 sq. mt. /Litre.

49.12 Chases, Holes, Recesses and Inserts:

All chases, holes and recesses for foundation bolts, various services and other requirements must be formed as shown on the drawings or as directed by the Owner's Engineer during the execution of the work, without extra charge. The operator shall fix all necessary inserts in the concrete for support of hangers for pipes and cables, ceiling clamps for lights and fans or for duct etc. If any of the inserts are to be supplied by other agencies not extra payment will be made to the Operator for placing the inserts position.

49.13 Load Testing of Structures

Load tests shall be carried out in accordance with IS: 456, if required by the Executive Engineer.

50 BRICK WORK

50.1 General

Applicable provisions of Conditions of Contract shall govern the work under this section. The operator shall build the whole of brickwork shown on the drawings with first-class bricks in cement mortar. The Indian Standard wherever referred to herein shall be the latest edition of such Standards.

50.2 Materials

Bricks	The bricks used shall generally conform to IS: 1077
Cement	The cement used shall conform to IS: 269
Sand	The sand used shall conform to IS: 1344
Water	The water used shall be clean and free from injurious amounts of deleterious materials. As far as possible, the water should be of such quality that it is potable

50.3 Mortar Proportion

Unless otherwise specified, the proportions of cement-sand-mortar by volume for various classes of work shall be as under:

Type of work	Cement	Sand
Ordinary brickwork for building	1	5
Brickwork in pillars	1	4
Half-brick thick or brick-on edge partition wall	1	4

50.4 Workmanship

The cement and sand shall be thoroughly mixed dry in specified proportions. Water shall then be added by a sprinkler just sufficient to make a stiff and workable paste. The mortar shall be used within half an hour of mixing. The mortar, which is unused within half an hour of mixing, shall be removed from the site.

50.5 Brick-work

All the bricks shall be kept in water till they are completely soaked & only thoroughly soaked bricks shall be used in the work. The operator shall set out & build all brickwork to the respective dimensions, thickness and height, as shown on the drawings.

The operator shall build all brickwork uniformly, no one portion being raised more than 1 meter above another at one time. The operator shall keep wet all brickwork for at least 10 days after laying. The surface of unfinished work shall be cleaned and thoroughly wetted before joining new work to it.

In curved brickwork, the bricks shall be dressed to shape obtain joints redial to the curve. The joints shall not exceed 12 mm in thickness and should extend the full thickness of the curved brickwork.

50.6 Damp-proof Course

Damp-proof course shall be provided at positions where ever necessary. In masonry walls of buildings, it shall normally be placed above the external ground level. It shall be laid for the full width of solid walls and shall be prepared as specified.

A layer of cement concrete 1:2:4 (cement: sand: coarse aggregate) mix, and of specified thickness shall be provided. If a damp-proof course requiring the use of bitumen felt is specified, bitumen used shall conform to IS: 1322 and workmanship shall conform to IS: 1609. All exposed surface of the damp-proof course shall be finished fair and smooth. The external edge shall be chamfered if specified, and shall be finished flush with masonry surface.

51 FLOORS AND PAVEMENTS

51.1 General

Applicable provisions of Conditions of Contract shall govern work under this section. The Indian Standards wherever referred to herein shall be the latest edition of such standards.

51.1.1 Types of Floors and Pavements

The principal types of floors and pavements considered in this specification are as under:

a) Cast-in-situ artificial stone flooring (plain)

b) Natural stone slab flooring
c) Pre-cast artificial stone flooring (Plain/Textured)

51.2 Materials

51.2.1 Cement

Ordinary Portland cement and white and colored cement shall conform to IS: 269.

51.2.2 Lime

Where lime is required to be used, it shall conform to IS: 712 and slaking of lime shall be done according to IS: 1635.

51.2.3 Aggregates

The aggregates shall conform to IS: 383. Fine aggregates shall range in size from 1.5 mm to 6 mm. unless specified otherwise. Not more than 5 percent of grains shall pass IS sieve 15 (0.151 mm mesh) and not more than 10 per cent shall pass IS sieve 30 (0.296 mm mesh). Coarse aggregate shall all pass through 19 mm mesh, unless specified otherwise and shall be graded as directed. The coarse aggregate for concrete pavements for approaches and driveways shall all pass through 25 mm ring and shall be formed by mixing 80% of 25 mm to 12 mm size and 20% of 12 mm to 6 mm size. The above proportion shall be altered to suit workability if so approved.

51.2.4 Natural Stone Slabs

The stone slabs if used shall be best quality obtainable from Neemuch, Kotah, Shahabad, Tandur or other places as specified and shall be hard, even durable, uniform in color and free from cracks, flakes and other defects. No stone shall be thinner at its thinnest part than 25 mm. unless otherwise specified; the stones shall be 300 mm x 300 mm in size dressed square and with straight edges. The top surface of stones shall be smooth or polished as specified and edges dressed to a true fir or chisel dressed as directed.

51.2.5 Water

Water shall be clean and free from injurious amounts of deleterious materials. As far as possible, water shall be of potable quality.

51.3 Cast in situ Artificial Stone Flooring

Grey and colored artificial stone is to be composed of 4 parts of fine stone chips 12 mm and below 2 parts of sand and properly screened to one part of cement. The topping in all cases and to consist of clean and fine sand and cement (2:1) and sufficient skin thickness to be kept and finally trowelled with neat cement finish perfectly smooth to satisfaction. In the case of dados and skirting the total thickness is to be 19 mm of which the bottom layer is to be 12 mm and the toping 6 mm thick in all cases both the layers are to be laid simultaneously without hiatus so that it will in effect be one complete layer; the mixing be made in two different lots.

51.4 Natural stone slab flooring

The stone slabs shall be evenly and firmly bedded to the required level and slopes as directed. Unless otherwise specified, the thickness of joints shall not exceed 6 mm for unpolished stone slabs and 1 mm for polished stones. The joints shall be raked out to an adequate depth and pointed flush or slightly sunk, as directed, with cement-sand mortar of 1:2 proportions. The stone slabs shall be laid to pattern which

shall be approved prior to ordering the stones. The flooring shall be kept wet with wet sand or water for at least seven days. The flooring shall be well washed and shall be perfectly clean and free from all mortar stains etc. when completed

52 PLASTERING AND POINTING

52.1 General

Applicable provisions of Conditions of Contract shall govern work under this section. The Indian Standards wherever referred to herein shall be the latest edition of such Standards.

52.2 Cement Plaster Materials

- Cement : Cement shall confirm to IS: 269.
- Sand : Shall confirm to IS: 1542.

Other materials, tools and Accessories, they shall confirm to relevant IS codes listed above and to the requirements specified in IS: 1661.

52.2.1 Proportioning and thickness of Cement Plasters:

The proportions of materials, number of coats and thickness of each coat shall be as a specified or as directed.

52.2.2 Workmanship

Unless otherwise specified, all plasterwork shall be carried out as per IS: 1661 "Code of Practice for Cement and Cement-Lime Plaster Finished on Walls and Ceilings".Special finishing textures to the plaster shall be executed according to Clause 16 of IS: 1661 and/or as directed.

52.2.3 Curing

After the completion of the work, the pointed face shall be kept well wetted for at least for 10 days in the case of Cement Pointing.

53 PAINTING AND GLAZING

53.1 General

Applicable provisions of Conditions of Contract shall govern work under this section.
The Indian Standards wherever referred to herein shall be the latest edition of such standards.
Painting of Iron and Steel Work
Painting of iron and steel work shall generally be carried out as per IS: 1447 (Part I).

53.2 Preparation of Surfaces:

The surface to be painted shall be cleaned free of dirt, oil rust, mill scale and be thoroughly dry before painting. Cleaning, degreasing, and descalling wherever necessary shall be carried out as specified in IS: 1477 (Part I) and the method adopted for surface preparation shall have prior approval.

53.2.1 Primer Coat:

Unless otherwise specified, the primer coat for steel and iron work shall be of Red Lead paint, conforming to IS: 102. The Red Lead primer shall be applied by means of approved brushes. The Red Lead paint shall be allowed to dry sufficiently hard before the application of the succeeding coat A red

lead painted surface shall not however be left exposed permanently, as it is liable to heavy chalking. The primer coat shall be applied as specified in IS: 1477 (Part-I) and the number of coats shall be as necessary for as directed.

53.2.2 Finish Coat

The type of intermediate and finish coat and the number of coats to be applied shall be as necessary or as directed. Intermediate and finish coats may be oil bound bituminous, aluminum or other types of paints. Aluminum conforms to IS: 165. The intermediate and finish coats for structural steel work, sheet metal work and cast iron work shall be applied as specified in IS: 1477 (Part-I).

53.3 Glazing Materials

53.4 Glass

All glass used in the work shall be best quality glass free from specks, bubbles, smokes, wanes, air holes and other defects, Unless other-wise specified, sheet glass shall be transparent and of the following weights. For panes up to 600 mm x 600 mm in size, glass weighing not less than 7.97 kg/sq.m. shall be used for panes 750 mm x 750 mm to 900 mm x 900 mm size, the weight of glass shall be 9.76 kg/sq.m. Unless other-wise specified, for sizes of glass above 900 mm x 900, plate glass shall be used.

53.4.1 Putty

Putty for use on wooden frames shall conform to IS: 419 and on metal frames to IS: 420.

53.4.2 Workmanship

All glass be cut according to the sizes required as per drawings. Glazing of metal doors, windows and ventilators shall conform to IS: 1081 and glazing of timber doors, windows, and ventilators shall conform to IS: 1003, unless specified otherwise. For glazing wooden doors and windows, the wooden frame, particularly the rebate, shall be well oiled to prevent oil from putty being sucked in by wood.

The Operator shall thoroughly clean all glass and replace all putty or glass damaged during the work.

54 MISCELLANEOUS STEEL AND IRON WORK

54.1 General

Applicable provisions of Conditions of Contract shall govern work under this section.

The Indian Standards wherever referred to herein shall be the latest edition of such Standard.

54.2 Iron Grills

The grills for Windows, verandahs, balconies, etc. shall be of mild steel or wrought iron as specified for the work. The design of grills and shapes and sizes of various components shall be as approved. The edges, angles and corners shall be clean and true to shape. The joints shall be mechanically inter-locked and overlapping areas spot welded in such a way that the grill is rigid.

Where moulded grills are specified, the moulded work shall be as approved, and shall have clean, straight and sharply defined profiles. The operator shall do the necessary cutting, fitting, drilling, tapping, scribing etc. required to fix grills to adjacent surfaces. The grills shall be fixed plumb, in line and level. Unless otherwise specified, grills shall be painted with two coats of red lead paint conforming to IS: 102 before they are fixed.

54.3 Rolling Shutters

Rolling shutters, where specified shall be of the size to suit the openings and shall be positioned as shown on the drawings and/or as directed.

The rolling shutter shall be fabricated from 18 B.G. Steel and machine rolled with 75 mm rolling contras with effective bridge depth of 12 mm lath sections, interlocked with each other and ends locked with malleable cast iron. The guides shall be either rolled or pressed deep channel sections 75 mm deep and 25 mm wide fitted with necessary fittings and fixtures.

The suspension shaft shall be formed from solid drawn seamless tubes 60 mm O.D. of wall thickness of 25 mm in 3 segments coupled 2 with 2 pairs C.I. dog-tailed flange coupling forming one complete unit eliminating deflection in the center to a minimum.

The springs shall be imported high tensile English flat springs 50/60 mm breadth and 1.6/1.8 mm thickness hardened and tempered. These shall be fitted inside the fabricated housing on either ends, which counterbalance the shutter curtain. The ball bearings shall be double row self aligning ball bearing fitted inside C.I. housing fixed on side brackets holding the suspension shaft at either end

.The suspension of the curtain shall be belted in specially fabricated cages formed from MS flats, and plates all are welded. The hood cover shall be made of 20 gauge G.P. sheets with necessary stiffeners and framework to prevent sag, the bottom lock plate shall be made of 3 mm thick M.S. plate and 95 mm wide reinforced with angle/T iron of suitable section with 6 mm dia. M.S.rivets interlocked with last stride of curtain.

The locking arrangement shall consist of hasp and staple on the bottom plate, lockable from both sides. Unless otherwise specified, for overall area of rolling shutters up to 9 sq. m. pull and push type hand-operated shutters shall be used, for area between 9 and 12 sq. m. Pull and Push type shutters shall be provided with ball bearings; for area larger than 12 sq. m. , Mechanical Gear type shutters shall be supplied.

54.4 Collapsible Gates

Collapsible gates shall be of the size and type as specified by the Owner's Engineer. The gates shall be manufactured out of M.S. channel pickets of size 20 mm x 10 mm and flats 20 mm x 6 mm. The top runner flat shall be at least 50 mm x 12 mm in section. The bottom guide shall consist of a channel or two angles of specified size laid in the flooring to guide the free movement of the gate. The gate shall move in the guide channel on rollers of adequate size fixed at the top and bottom of the gate as specified. The gate shall be painted with one coat of red lead paint conforming to IS : 102 before fixing in position.

55 WOODWORK AND JOINARY

55.1 Wood:

All wood required to be used, shall be dry, well-seasoned, Bulsar teak wood and shall be free from knots, cracks or any other kind of defects frames for doors and windows.

55.2 Jointing Materials:

All nails, screws, fixtures shall be of standard quality as approved by the Owner.

55.3 Cutting Edges:

Cutting edge for well to be fabricated as per the drawing approved by Owner's engineer The structural steel to be used, should confirm to IS: 226-1961 and IS: 2062-1962. The steel shall be free from defects as mentioned in IS: 226-1962 and shall have a smooth uniform finish. Material shall be free from loose mile scale, rusting or other defects affecting its strength and durability. The test certificates shall have to be submitted for the structural steel used in cutting edge.

ILLUMINATION:

All internal and external areas shall be provided with lighting. The illumination levels to be achieved shall be as follows:

AREA	LUX
Office and labs	300 Lux
Switchgear Room	200 Lux
Control Room	300 Lux
Pump House	200 Lux
DG set room	200 Lux
Chemical and general store	150 Lux
Chemical Plant room	200 Lux
Other indoor areas	100 Lux
Outdoor plant from and	50 Lux
Building entrance	100 Lux
Indoor Plant Area	200 Lux
Outdoor Plant Area	50 Lux
Transformer Area	100 Lux
Roads	10 Lux

Fluorescent luminaries shall be used primarily for internal lighting. High pressure vapour or metal halide type luminaries shall be used in indoor application where their use is appropriate. If mercury or metal halide is used in indoor then they should be supplemented with fluorescent luminaries to assure that

minimum illumination levels are maintained following momentary power dips. All other internal areas shall be lit with fluorescent luminaries. Where specific recommendations of lux level are not covered above, illumination level in such areas shall be finalized in consultation with Owner.

Owner shall be required to measure levels of illumination after completion of lighting installation work and short fall in illumination level shall be made good by the Operator. Complete set of calculations showing, room, index, copy MF shall be given during detailed engineering.

Switches / sockets of piano type shall be used in general and in offices of staff, control room, MMI room, decorative modular switches shall be used. Suitable fans shall be provided in rooms/ plant areas as per standards. For exhaust fans it must be provided in panel rooms, pump rooms, chemical rooms, stores, toilets and at least 20 air changes per hour must be maintained.

The following type of lighting fixtures shall be proposed:

a) Decorative type 2x36W fixtures for fluorescent luminaries inside office/ administrative buildings and control rooms.
b) Corrosion resistant fixture with canopy made of FRP for fluorescent luminaries for corrosive areas like chlorine handling or chemical store or area with corrosive smell/gases etc.
c) Industrial type vitreous enameled fixture for fluorescent luminaries inside 415V switchgear, MCC room and pump house.
d) In outdoor process areas, lighting fixtures shall be sodium vapour type subjected to minimum of IP protection class.
e) All outside lights as plant field lights, building outside lights, flood lights etc. which are to be switched on only during night hours should be controlled through photo cell/ clock switch installed at a central place. All lights shall have minimum IP65 protection class.
f) Street lighting wiring shall be through buried underground.
g) All bulb fittings (except fluorescent lamps) will have screw type caps.
h) For outdoor lighting, the lighting feeder shall be operated through a contactor, controlled by photocell/ clock switch and shall also have a manual by pass switch.

Luminaries shall be installed to permit ease of maintenance i.e. it shall not be necessary to shut down plant in order to carryout maintenance or to access luminaries located over areas of water etc. The Operator shall provide all equipment necessary to carryout maintenance on the lighting installation and demonstrate its operation to the satisfaction of Owner

Indoor lighting circuit will be arranged in such a way that 50% lighting can be put off in each room through switches. All lighting circuits will be wired with 2.5sq.mm. Stranded copper wire or through 2.5 sq.mm. armoured cable laid in cable trays. Sub circuit from switch to fixture could be wired with1.5 sq.mm. stranded copper wire in MS conduits or armoured copper cable of similar size provided total voltage drop in any lighting distribution board to last lighting point shall not exceed 2%. All lighting circuits will have separate neutral, separate earth from Lighting Distribution Board. For illumination of roads, outdoors areas where operation of equipment or units required and sub station area, lighting fixtures of appropriate type (such as street lighting type, flood lighting type, post top lanterns etc.) incorporating high pressure sodium vapour lamps shall be proposed. Street light poles shall not have less than 7500 mm height above the finished road level and the arm shall not project more than 1200 mm along the road width. Poles of bigger heights may also be used if some outdoor areas are to be

illuminated. Poles of 4 / 4.5 Mtrs using post top lantern may be used in gate office walk way or in front of office area. Complete area, streets, lanes, boundary shall be covered with street lighting.

Receptacles (Lighting & Small Power) :

d) Decorative and industrial type units of above shall be proposed in all plant areas, offices, stores, workshop, plant room and they shall be located at least two numbers in each room. Distance between two receptacles shall not be more than 8 – 10 mtr. All small 5 amps 5 pin lighting & small power sockets shall be wired by multi stranded copper wire of 2.5 sq. mm laid in rigid MS conduits along with earth wire of1.5 sq.mm flexible copper wire or equivalent size armoured cables. All wiring shall be coded with Red, Yellow, Blue & Black as per the phase used. If required, wiring can be done alternatively through armoured copper cables of similar size laid in MS perforated trays of minimum 2.0 mm thick.

e) Three phase power receptacles (convenience outlets) suitable for operation of 415V,3 Phase 4 wire, 50 Hz power supply shall be proposed. In indoor areas one such unit shall be provided to cover areas of 20 meter radius (or at least one in each room housing plant items) and in outdoors areas on such unit shall be provided at 50 meter interval. Actual requirement of such units shall be finalized by MMC during detailed engineering. One three phase receptacle shall be provided near entrance of each building for utilities like welding.

f) Single phase 15 Amp 5 Pin / 6 Pin receptacles will be provided in each room and in halls they will be provided in such a way that with 15 meter cord we should reach every place in building. These shall be wired with 4 sq. mm copper earth wire in MS rigid conduits along with 2.5 sq. mm earth wire. Not more than two sockets shall be looped in one circuit. Alternatively they can also be connected through armoured cable of 4 sq. mm running in appropriate cable trays.

Separate lighting panels and lighting distribution boards shall be installed and they shall not take tapping for power from motor control centers or power distribution boards.

56 Section IV Electro Mechanical Works

56.1 Technical Specifications for Electrical Works: All works shall be carried out in accordance with the requirements of:

i.	IE Rules
ii.	State Electricity Board
iii.	Rules and regulations of Local authorities, and
iv.	The standards in this specification

The Operator is responsible for applying and obtaining necessary statutory approvals and shall ensure workmanship of good quality and shall assign qualified supervisor / engineers and competent labour who are skilled, careful and experienced in carrying out similar works.

56.2 IS codes for electrical Works:

IS : 10418	Specification for drums of electric cables

IS : 2633	Methods of testing weight, thickness and uniformity of coating on hot dipped galvanized articles
IS : 209	Specifications for Zinc

Code No.	Title
IS : 2062	**Steel for general structural purposes**
IS : 808	**Dimensions for hot rolled steel beam, column channel and angle sections**
IS : 816	**Code of practice for use of metal arc welding for general construction in mild steel**
IS : 2629	**Hot deep galvanising of iron & steel**
IS : 2633	**Methods of testing uniformity of coating**
IS : 4759	**Hot dip zinc coatings on Structural steel and other allied Products**

Code No.	**Title**
IS2026/BS 171/IEC76	Power Transformer
IS3639	Fittings and Accessories
IS1180	Auxiliary Transformer
IS6600/BS CP.1010/IEC354	Loading of oil immersed transformer
IS335/BS 148/IEC296	Transformer Oil
IS2099/BS 223/IEC137	Bushings for > 1000V, AC
IS7421	Bushings for ≤ 1000V, AC
IS13947 (Part 1) / IEC947-1	Degree of Protection
IS3637	Buchholz Relay
IS 1271/BS2757/IEC85	Insulation Materials for Electrical Machinery
IS 3202/	Climate Proofing

BSCP1014 / IEC354	
IS 1886	Installation & Maintenance of Transformers
IS 2705	Current Transformers
I.S. 3043 – 1987.	Earth Pits
	General Specification for Electrical works Part VII (DG Sets) published by CPWD.

56.3 Specifications for mechanical equipment: Mechanical equipment: will be required for following units

1. Screen channels, mechanically cleaned fine screens.
2. Sluice gates
3. Grit chambers with mechanical grit removal equipment
4. Parshall flumes
5. Various sizes of interconnecting piping.
6. Fire-fighting equipment as per state Government department of Fire services.

All mechanical equipment such as screens, degritting devices, sluice gates, etc which comes into contact with sewage shall be fabricated in non corrosive materials and metallic parts in contact with sewage shall conform to Stainless steel. All walkways shall be in RCC or stainless steel with stainless steel handrails. Provide appropriate explosion proof construction and devices at any enclosed locations components where incoming sewage is exposed to atmosphere.

Mechanical screens shall be operated with Shaftless screw conveyors to transfer screenings to the screw compactor to dewater and compact the screenings. The screen will be controlled by a timer as backup to level control, so that, the cleaning mechanism can run at a set interval.

The deposited grit will be removed from the grit chambers by appropriate and efficient removing mechanism. Grit removal shall be accompanied with a grit classifier and grit washing system to ensure the grit is free from organic matter before disposal.

Parshall flumes downstream of each grit chamber structure shall be required where an ultrasonic flow meter will be installed for measuring and adding the total flow of raw sewage entering the site.

Isolation weir gates and bye pass shall be required to control and/or isolate flow to any one units

56.4 <u>IS codes for mechanical equipment:</u>

IS 6280 – 1971 – Sewage Screens
IS 8413 – 1982 – Biological Treatment Equipment – Part II and its modifications
IS 10037 – Part I – 1981 & Part II & III – 1983 – Sludge dewatering equipments
IS 10261 – Requirements for settling tank for waste water
IS 105533 – Part I, II, III – Chlorination Plants
IS 5600 – 1970 - Sewage and Drainage Pumps
IS 6279 – 1971 – Grit Removal devices

The list is not exclusive and the operator shall be responsible to follow the appropriate standards:
Instrumentation, Control and SCADA System
A Supervisory Control and Data Acquisition (SCADA) system will be installed in the Sewage Pumping station networked to the PLC and shall acquire, display, monitor and issue remote control actions for maintaining the pumps. The SCADA system shall also originate custom performance reports for management reporting.

Section- V TRAINING AFTER COMMISSIONING & DEFECT LIABILITY PERIOD

57 TRAINING OF OWNER'S PERSONNEL

The Operator shall be responsible to provide practical training in all aspects of the operation, maintenance, and facilities to all personnel selected by the Owner, who will ultimately be responsible for the operation, maintenance and repair of the system and its facilities after defects liability period.
For this purpose, the Operator shall provide a comprehensive training program for the Owner's personnel during the entire period of the trial run, and for as long thereafter as may be reasonably required to ensure that the designated personnel are adequately trained to take up their responsibilities.
All costs for the Operator's personnel and the training facilities required for the training during trial run period, and any incidental training expenses, shall be borne by the Operator.

58 TRIAL RUN OF THE SYSTEM

After commissioning of works, the Operator shall maintain the works for 3 (three) months to demonstrate satisfactory performance to the Engineer prior to taking over by the Owner. The cost of electricity, if required for operation & maintenance of works during the period of this trial run will be borne by the Owner. The cost towards Operator's Engineer and other operating personnel during the said period of trial run, along with cost of tools and spare parts which are required for operation and maintenance of the works and equipment during the trial run period shall be borne by the Operator and shall be included in the quoted bid price. In the event that the system or any of the facilities do not satisfactorily achieve the required performance standards during this period, the trial run period shall be extended until such time as the Operator has satisfactorily rectified any deficiencies as may be necessary to satisfy the performance requirements. No additional compensation will be paid to the Operator for such extension.

Schedule 11

Allowed and Suggested alignments / Locations for design of the Sewerage Network and/or I&D Works

TO (i) DESIGN AND BUILD SEWAGE TREATMENT PLANT OF INSTALLED CAPACITY …. MLD AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; (ii) SURVEY, REVIEW THE DESIGNS, REDESIGN WHERE NECESSARY, AND BUILD NEW UNDERGROUND SEWERAGE NETWORKAND/OR DIVERSION WORKS WITH INTERCEPTION SEWER OF ABOUT …. KM LENGTH INCLUDING SURVEY, DESIGN, CONSTRUCTION OF …. No. PUMPING STATIONS AND ALL APPURTENANT STRUCTURES AND ALLIED WORKS; AND (iii) OPERATION & MAINTENANCE OF THE COMPLETE WORKS OF SEWAGE TREATMENT PLANT, SEWERAGE NETWORK AND/OR INTERCEPTION AND DIVERSION WORKS AND PUMPING STATIONS FOR A PERIOD OF 15 YEARS IN ……., STATE OF……., INDIA.

Date: 11.06.2020

Talleen Kumar
Chief Executive Officer
Government E-Marketplace (GeM)

Subject: Uploading of the EPC Contract for Remediation of Legacy Waste Dumpsite, and Hybrid Annuity Models for Integrated Solid Waste Management and Integrated Liquid Waste Management - Regarding

Sir,

The National Green Tribunal (NGT) in its order dated 18/10/2019 passed in O.A. No. 606/2018 (Main) Compliance of Municipal Solid Waste Management Rules, 2016 and other environmental issues stated that - "*There is need to standardize necessary technologies with cost breakups for operation and maintenance, including procurement. Besides this, the service providers need to be identified and empanelled. This exercise may also require the concerned authority to explore business models*".

For the above mentioned purpose a Committee was constituted under the Chairmanship of the nominee of Vice-Chairman, NITI Aayog, i.e, the CEO, NITI Aayog.

The Committee held three meetings on 19.11.2019, 20.11.2019 and 17.03.2020. Pursuant to the decisions taken during these meeting, NITI Aayog has formulated the Model Concession Agreements and Model RFPs for Integrated Solid Waste Management (including Bio-Remediation of Legacy Waste) and Integrated Liquid Waste Management (including Faecal Sludge Management) on Hybrid Annuity Model of Public Private Partnerships.

Ministry of Housing and Urban Affairs (MoHUA) has provided Engineering Procurement Construction Contract for Legacy Waste Dumpsite Remediation and several other documents relating to legacy waste dumpsite remediation and integrated solid waste management activities such as collection, transportation, processing and disposal of municipal solid waste.

National Mission for Clean Ganga (NMCG) has also provided documents for setting up of sewage treatment plants and other guiding documents for improved liquid waste management in the country.
As per paragraph 5 of the NGT Order, the Tribunal was of the opinion that *placing these documents on the GeM Portal would go a long way in tackling the situation by curtailing procedural delay.*

In accordance with the requirement of the NGT Order, the following documents are attached herewith:

(A) Solid Waste Management

(i) Model Concession Agreement (Solid waste management enveloping bio-remediation of legacy waste) including Schedules (prepared by NITI Aayog)

(ii) Model RFP for Solid Waste Management (prepared by NITI Aayog)

(iii) EPC Contract for Legacy Waste Dumpsite Remediation

(iv) DPR preparation Toolkit for Dumpsite remediation

(v) EPC Contractors & O&M Vendors for dumpsite remediation

(vi) Equipment & Suppliers for dumpsite remediation

(vii) Template for management of Dumpsites

(viii) Toolkit for DPRs preparation

(ix) List of SWM Empanelled Agencies

(x) Empanelled Institutes – SWM

(xi) Empanelled Transaction Advisers - SWM

(xii) Checklist for scrutiny of DPR for SWM projects

(xiii) Checklist for scrutiny of PPR or PFR for SWM projects

(B) Liquid Waste Management

(i) Model Concession Agreement (Liquid Waste Management enveloping fecal sludge management) (prepared by NITI Aayog)

(ii) Schedules to Model Concession Agreement (15 Schedules) (prepared by NITI Aayog)

(iii) Model RFP for Liquid Waste Management (prepared by NITI Aayog)

(iv) DPR Guidelines – LWM

(v) Empanelled Institutes for evaluation of DPRs - LWM

(vi) List of Transaction Advisers & Project Engineers - LWM

(vii) Model Bidding Documents for NMCG projects – STP

The above documents have been approved by the competent authority at NITI Aayog. In this regard, it is requested that the process for uploading these documents on the GeM Portal may be initiated as per the order of the NGT.

Yours faithfully,

(Avinash Mishra)
Adviser
Water Resources & Land Resources
NITI Aayog

Copy to,
Adviser to Hon'ble Chairperson of National Green Tribunal