IN THE HON'BLE NATIONAL GREEN TRIBUNAL, SOUTHERN ZONE BENCH, CHENNAI

ORGINAL APPLICATION NO. 136 of 2023

IN THE MATTER OF: -

Venkata Reddy

…. Applicant

Versus

The State of Telengana & Ors. **…. Respondent**

COUNTER AFFIDAVIT FILED ON BEHALF OF THE MINISTRY OF ENVIRONMENT FOREST AND CLIMATE CHANGE



Filed by:
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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
SOUTHORN ZONE CHENNAI.

Original Application No. 136 of 2023 (SZ).

In the matter of:

M. Venkat Reddy ……Applicant

VERSES

The State of Telangana and Ors … Respondent (S)

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Mr. Syed Nurullah Sheriff
Advocate
MoEF&CC.

(1)

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

ORIGINAL APPLICATION No. 136 of 2023

IN THE MATTER OF: -

M.VENKATA REDDY **...APPLICANT**

VERSUS

STATE OF TELANGANA & ors **.... RESPONDENT(s)**

COUNTER AFFIDAVIT ON BEHALF OF RESPONDENT NO.2 MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE (MoEF&CC).

MOST RESPECTFULLY SHOWETH:-

I, Sh. Tarun Kumar S/o Shyamala Rao aged about 46 years presently working as Director/Scientist 'F' in the Ministry of Environment, Forest and Climate Change (MoEF&CC) having office at Hyderabad, Telangana State, do hereby solemnly affirm and state as under:

1. That I, in the capacity of Director/Scientist 'F' in the MoEF&CC, am fully conversant with facts of the case and competent to swear this affidavit on behalf of the MoEF&CC.

2. That the instant application has been filed against the unauthorized construction of "Manair River Front Development Project" at Karimnagar of Telangana State without obtaining Environmental Clearance from the statutory authorities. It is alleged that the River front development project was initiated on River Manair adjacent to the Lower Maneru Dam (LMD). Further,

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it is also alleged that as per the EIA Notification, 2006, the Riverfront project falls under Townships and area development project, 8(b), B category projects as the area under development would be more than 50 hectares.

3. Instant application has been filed on the following **GROUNDS**:

   i. *Because the project proponent executing the riverfront project without conducting environmental impact studies which are mandatory under EIA notification 2006 for area development projects.*

   ii. *Because the project contractors are conducting heavy blasting within the river which is detrimental to the river ecology and flora and fauna.*

   iii. *Because the blasting site is very near to the existing Lower Manair Dam. The massive blast are likely to cause damage to the dam which may result in disaster.*

   iv. *Because the authorities have failed to control the pollution due to the blasting, construction activities in the river Manair which have caused immense damage to the environment.*

   v. *Because the project proponents in case of Ganga riverfront project and Sabarmati riverfront project has conducted EIA studies and obtained appropriate clearances from the authorities. But in the present case, the project proponent has completely ignored the environmental issues before undertaking the project. That in a similar circumstances, it requires to take the Environment clearance and Pollution clearance from the proper authorities.*

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(3)

vi. *Because the adverse effect the people, environment, river is irreparable. Hence, the intervention of this Hon'ble Tribunal is essential.*

vii. *Because it is mandatory to obtain Environment clearance for executing activities within river. More particularly the present activities are comes under Area development activities, which requires prior environment clearance as per EIA Notification, 2006. But, the PP has not undertaken environment clearance process.*

4. Instant application has been filed on the following **PRAYERS**:

"(a) Direct the project proponent to execute the Maneru Riverfront project only after conducting EIA studies and after obtaining appropriate Environment and other clearances from TSEIAA/Union Ministry of Environment, Forest and Climate Change and Telangana State Pollution Control Board.

(b) Direct the Project proponent and Respondents of Telangana not to construct permanent structure on floodplains, within river contrary to the guidelines of MoEF&CC and Ministry of Housing and Urban Development.

(c) Direct the regulatory agencies to assess the damage caused to Maneru river and its surroundings by the Project Proponent.

(d) Direct the official respondents to restore the damaged area."

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(4)

APPLICABLE PROVISONS:

5. That the answering respondent issued an Environmental Impact Assessment Notification number S.O. 1533(E) dated 14.09.2006 superseding the Environmental Impact Assessment (EIA) Notification 1994 under the Environment (Protection) Act, 1986. The EIA Notification, 2006 regulates developmental projects in respect of construction of new projects/activities/ expansion or modernization of existing projects in different parts of the country after the prior Environmental Clearance under sub section (3) of section 3 of the said Act, in accordance with the procedure specified in the notification under the provisions of the EIA Notification, 2006, Environment Clearance for Building and Construction Projects & Township and Area Development Projects are covered under entry 8 (a) & (b) of the Schedule to the EIA Notification, 2006. The entry 8(a) and 8(b) of the Schedule of EIA Notification 2006, as amended provides as follows:

   8(a): Building and Construction projects - ≥20000 sq. mtrs and < 1,50,000 sq. mtrs. of built-up area require EC.

   8(b): Townships and Area Development projects - Covering an area of ≥ 50 ha and or built up area ≥ 1,50,000 sq. mtrs require EC.

The aforementioned entries under item 8(a) and 8(b) are categorised as category B projects under the EIA Notification, 2006 and require appraisal by the State Level Expert Appraisal Committees (SEACs) and approved by the State Level Environment Impact Assessment Authorities (SEIAAs). Further, in the absence of a duly constituted SEIAA/SEAC, a category B project shall be considered at the Central Level as category B project. **A copy of the**

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(5)

Environmental Impact Assessment Notification, 2006 is annexed as Annexure - R-/1.

6. It is humbly submitted that the answering respondent vide Notification No. S O 637(E) dated 28.02.2014, has authorized the SEIAAs which have been constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 and delegated the powers under the Section 19 of the said Act. Therefore, SEIAA is empowered to take necessary action against the violations, if any. **A copy of Notification is annexed as Annexure-R/2.**

7. It is submitted that this answering respondent constitutes SEIAAs/SEACs in respective States/UTs under the provisions of the EIA Notification, 2006 as amended from time to time, which function as per the provisions of the EIA Notification 2006.

SITE VISIT WITH REGARD TO THE ALLEGATION:

8. It is humbly submitted that w.r.t the allegation made by the applicant, the answering respondent (i.e. MoEF&CC) has conducted a site inspection of the project in question through its Regional office, Hyderabad. Accordingly, the site inspection was conducted on 17.05.2024 wherein officials from the Telangana Irrigation Department and Tourism Department were present. The observations/conclusions during the inspection are as follows:

> ***3. Key Observation:***
> *"(i) The Telangana Department of Irrigation is constructing two protection walls on both sides of the river to the extent of 2.6 km, starting at 1.1 km from the Lower Maneru Dam and ending at 3.7*

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km distance from LMD and a half barrage and half wire for storing 0.1 TMC of water.

(ii) On the inspection day, PP is constructing protection walls on both sides of the Manair River and check dam comprising half wire and half barrage with abutment totalling 1,38,256.40 sq.m. The construction being taken up for river protection walls for a length of 2.6 km on both sides, alongwith the upper promenade, slope, and lower promenade, is 1,60,160 sq.m, as observed during the site inspection and as indicated in the KML file.

(iii) The said construction was initiated by the irrigation Department as per the Government of Telangana G.O.No. 125 dated 09.06.2021.

(iv) Notably, the Government of Telangana G.O No. 125 dated 09.06.2021, sanctioning allocation of funds to the extent of Rs.310.464 crores does not explicitly state the said construction is intended to meet the needs of the Manair Riverfront Project. However, in the tender floated by irrigation department states that the constructing check dams and protection walls is for catering to the riverfront.

(v) According to the drawing provided by the irrigation department and as observed during the site inspection, most of the protection walls on both sides were built inside the river banks, encroaching river bed, especially at chainage 0 to 1350 mts and 2350 to 3600 mts Annexure-3. Further promenade with slopes were also under construction on either side of the protection wall. An approach road is also constructed, partially on the river bed at chainage 2400 to 25 mts.

(vi) The Tourism Department said they had not prepared the Master Plan for the Maneru Riverfront project, so no funds were received till date for the development of the Manair Riverfront Project. However, Telangana State Tourism Development Corporation Ltd (TSTDC) floated a Request for Proposal (RFP) in June 2021 for the "Selection of Master Planning, Architectural and Engineering Consultant for Riverfront Development with Tourism Facilities at Lower Manair Dam, Karimnagar District, Telangana."

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(vii) In the RFP floated by TSTDC, under the heading

5. Terms of Reference mentioned that- TSTDC intends to develop a 10 km stretch downstream of Lower Manair Dam, including the river banks up to 150m on either side of the river, integrating the existing government lands available for development. Initially, a stretch of 3.75 km is proposed for development under Phase-1, and the balance of 6.25 km shall be developed under Phase II

(viii) The RFP indicated that the Consultancy Services broadly include: (i) Conceptual and detailed Master plan for the entire 10 km stretch downstream of Lower Manair Dam including the River banks of up to 150 m on both sides integrating the government land parcels available for development and (ii) Planning and design of basic infrastructure for 3.75 km stretch (as Phase-I) including the River banks of up to 150 m on both sides including but not limited internal Roads, water supply, Storm water drainage and management, Sewerage, Solid Waste Management and disposal, Rain water harvesting, Electrical system, ICT network, smart street lighting and illumination, Surveillance and safety, Public Address system, Landscape design, Public Mobility plan, crowd management and other Modern infrastructure components as may be required.

ix. The RFP also mentions conducting an environmental impact assessment to identify any critical/potential environmental aspects and their sensitivity to the proposed project.

x. In the RFP, it is also mentioned that consultant has to focus on the following while preparing the master plan:

a) Preliminary hydraulic study and calculations for fixing structures' conceptual design and sizing.

b) Riverbed levels, riverbank area, the protection study of existing structures, and affected localities

c) Dredging or excavating riverbed levels based on the survey and hydraulic flow requirements to fulfill the needs of riverfront development.

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d) Hydraulic flow levels in steady still condition and maximum flood condition to design the river bunds.

e) Sizing of various structures in the proposed riverfront development for detailed design.

f) Flood calculation to meet the requirement of CDO, Irrigation Department of Government of Telangana.

xi. The Irrigation Department of Telangana has written to the District Collector, Karimnagar, vide a letter dated 04.05.2024 stating that the project collaborates with the tourism department and attend the site inspection together at the time of visit of MoEF&CC official:

4. Conclusion:

i. TSTDC is developing the master plan for the Manair Riverfront in two phases, totaling a 10 km stretch with 150 m on both sides. In the first phase, 3.75 km with 150 m stretch is planned on both sides of the river, and in the second phase, 6.25 km with 150 m stretch is developed as per TSTDC's RFP.

ii. The irrigation department's ongoing work (Check dam of 1,38,256.40 sq.mts and two protection walls comprising 1,60,160 sq.mts) caters to the foundational requirements of the Manair Riverfront project, as the tender copy shared by the Irrigation Department stated that the tender is "for the work of Protection wall, Half Weir and Half Barrage duly utilizing the intact portion of Check Dam-II, Improvements of Check Dam II, Canal for feeding Riverfront."

iii. The undersigned cannot assess the total Manair Riverfront Project's exact area (size) and build up area unless the final KML file and construction Master Plan are provided together by PPs (Telangana Irrigation Department and Tourism Department).

iv. Telangana's irrigation department has also not provided the details of studies done, as mentioned in the TSTDC RFP at point 3 (x) above, that are relevant.

v. It is observed that the two protection walls are being constructed

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inside the river banks on both sides at chainage 0 to 1350 mts and 2350 to 3600 mts, encroaching river bed."
A copy of Inspection report is annexed as Annexure-R/3.

9. It is already stated in para 5 above, that if the total area of the project/activity is more than 50 Ha. then it is covered under category B of Item 8(b) Township and Area Development Project of the schedule of the EIA Notification, 2006 as amended. Further, the category B projects require appraisal by State Level Expert Appraisal Committee (SEACs) and approved by the State Level Environment Impact Assessment Authority (SEIAAs).

10. It is submitted that the present counter affidavit may kindly be taken on record and into consideration and the Hon'ble Tribunal may pass appropriate Order(s), direction(s) as deemed fit and proper under the facts and circumstances of the present case.

11. That other/ancillary issues raised in the application under reply do not pertain to the answering respondent. The Answering Respondent seeks leave to make additional submissions, if required, during the course of the proceedings.

DEPONENT

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VERIFICATION

Verified at Hyderabad on 15th this day of October, 2024 that the contents of the above affidavit are correct to my knowledge and belief based on official records and nothing material has been concealed therefrom.

DEPONENT

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(Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii)
MINISTRY OF ENVIRONMENT AND FORESTS
New Delhi 14th September, 2006
Notification

S.O. 1533(E). - Whereas, a draft notification **under sub-rule (3) of Rule 5 of the Environment (Protection) Rules, 1986 for imposing** certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts as indicated in the Schedule to the notification, being undertaken in any part of India[1], unless prior environmental clearance has been accorded in accordance with the objectives of National Environment Policy **as approved by the Union Cabinet on 18th May, 2006** and the procedure specified in the notification, by the Central Government or the State or Union territory Level Environment Impact Assessment Authority (SEIAA), to be constituted by the Central Government in consultation with the State Government or the Union territory Administration concerned under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 for the purpose of this notification, was published in the Gazette of India ,Extraordinary, Part II, section 3, sub-section (ii) vide number S.O. 1324 (E) dated the 15th September ,2005 inviting objections and suggestions from all persons likely to be affected thereby within a period of sixty days from the date on which copies of Gazette containing the said notification were made available to the public;

And whereas, copies of the said notification were made available to the public on 15th September, 2005;

And whereas, all objections and suggestions received in response to the above mentioned draft notification have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986, read with clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 and in supersession of the notification number S.O. 60 (E) dated the 27th January, 1994, except in respect of things done or omitted to be done before such supersession, the Central Government hereby directs that on and from the date of its publication the required construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to this notification entailing capacity addition with change in process and or technology shall be

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

undertaken in any part of India only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment
Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified hereinafter in this notification.

_____
[1]Includes the territorial waters

2. Requirements of prior Environmental Clearance (EC):- The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category 'B' in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

(i) All new projects or activities listed in the Schedule to this notification;

(ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;

(iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

3. State Level Environment Impact Assessment Authority:- (1) A State Level Environment Impact Assessment Authority hereinafter referred to as the SEIAA shall be constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 comprising of three Members including a Chairman and a Member – Secretary to be nominated by the State Government or the Union territory Administration concerned.

(2) The Member-Secretary shall be a serving officer of the concerned State Government or Union territory administration familiar with environmental laws.

(3) The other two Members shall be either a professional or expert fulfilling the eligibility criteria given in Appendix VI to this notification.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(4) One of the specified Members in sub-paragraph (3) above who is an expert in the Environmental Impact Assessment process shall be the Chairman of the SEIAA.

(5) The State Government or Union territory Administration shall forward the names of the Members and the Chairman referred in sub- paragraph 3 to 4 above to the Central Government and the Central Government shall constitute the SEIAA as an authority for the purposes of this notification within thirty days of the date of receipt of the names.

(6) The non-official Member and the Chairman shall have a fixed term of three years (from the date of the publication of the notification by the Central Government constituting the authority).

[I] "(7) All decisions of the SEIAA shall be taken in a meeting and shall ordinarily be unanimous:

Provided that, in case a decision is taken by majority, the details of views, for and against it, shall be clearly recorded in the minutes and copy thereof sent to MoEF."

4. Categorization of projects and activities:-

(i) All projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.

(ii) All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification;

(iii) All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification. [II] "In the absence of a duly constituted SEIAA

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

or SEAC, a Category 'B' project shall be considered at Central Level as a Category 'B' project;"

5. Screening, Scoping and Appraisal Committees:-

The same Expert Appraisal Committees (EACs) at the Central Government and SEACs (hereinafter referred to as the (EAC) and (SEAC) at the State or the Union territory level shall screen, scope and appraise projects or activities in Category 'A' and Category 'B' respectively. EAC and SEAC's shall meet at least once every month.

(a) The composition of the EAC shall be as given in Appendix VI. The SEAC at the State or the Union territory level shall be constituted by the Central Government in consultation with the concerned State Government or the Union territory Administration with identical composition;

(b) The Central Government may, with the prior concurrence of the concerned State Governments or the Union territory Administrations, constitutes one SEAC for more than one State or Union territory for reasons of administrative convenience and cost;

(c) The EAC and SEAC shall be reconstituted after every three years;

(d) The authorised members of the EAC and SEAC, concerned, may inspect any site(s) connected with the project or activity in respect of which the prior environmental clearance is sought, for the purposes of screening or scoping or appraisal, with prior notice of at least seven days to the applicant, who shall provide necessary facilities for the inspection;

(e) The EAC and SEACs shall function on the principle of collective responsibility. The Chairperson shall endeavour to reach a consensus in each case, and if consensus cannot be reached, the view of the majority shall prevail.

6. Application for Prior Environmental Clearance (EC):-

An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 annexed herewith and Supplementary Form 1A, if applicable, as given in Appendix II, after the identification of prospective site(s) for the project and/or activities to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant shall furnish, along with the application, a copy

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

of the pre-feasibility project report except that, in case of construction projects or activities (item 8 of the Schedule) in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan shall be provided, instead of the pre-feasibility report.

7. Stages in the Prior Environmental Clearance (EC) Process for New Projects:-

7(i) The environmental clearance process for new projects will comprise of a maximum of four stages, all of which may not apply to particular cases as set forth below in this notification. These four stages in sequential order are:-

- Stage (1) Screening (Only for Category 'B' projects and activities)
- Stage (2) Scoping
- Stage (3) Public Consultation
- Stage (4) Appraisal

I. **Stage (1) - Screening**:

In case of Category 'B' projects or activities, this stage will entail the scrutiny of an application seeking prior environmental clearance made in Form 1 by the concerned State level Expert Appraisal Committee (SEAC) for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project . The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests shall issue appropriate guidelines from time to time.

II. **Stage (2) - Scoping**:

(i) "Scoping": refers to the process by which the Expert Appraisal Committee in the case of Category 'A' projects or activities, and State level Expert Appraisal Committee in the case of Category 'B1' projects or activities, including applications for expansion and/or modernization and/or change in product mix of existing projects or activities, determine detailed and comprehensive Terms Of Reference (TOR) addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought. The Expert Appraisal Committee or State level Expert Appraisal Committee

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

concerned shall determine the Terms of Reference on the basis of the information furnished in the prescribed application Form1/Form 1A including Terns of Reference proposed by the applicant, a site visit by a sub- group of Expert Appraisal Committee or State level Expert Appraisal Committee concerned only if considered necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, Terms of Reference suggested by the applicant if furnished and other information that may be available with the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction/Township/Commercial Complexes /Housing) shall not require Scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.

(ii) The Terms of Reference (TOR) shall be conveyed to the applicant by the Expert Appraisal Committee or State Level Expert Appraisal Committee as concerned within sixty days of the receipt of Form 1. In the case of Category A Hydroelectric projects Item 1(c) (i) of the Schedule the Terms of Reference shall be conveyed along with the clearance for pre-construction activities .If the Terms of Reference are not finalized and conveyed to the applicant within sixty days of the receipt of Form 1, the Terms of Reference suggested by the applicant shall be deemed as the final Terms of Reference approved for the EIA studies**.** The approved Terms of Reference shall be displayed on the website of the Ministry of Environment and Forests and the concerned State Level Environment Impact Assessment Authority.

(iii) Applications for prior environmental clearance may be rejected by the regulatory authority concerned on the recommendation of the EAC or SEAC concerned at this stage itself. In case of such rejection, the decision together with reasons for the same shall be communicated to the applicant in writing within sixty days of the receipt of the application.

III. **Stage (3) - Public Consultation**:

(i) "Public Consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category B1 projects or activities shall undertake Public Consultation, except the following:-

(a) modernization of irrigation projects (item 1(c) (ii) of the Schedule).

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(b) all projects or activities located within industrial estates or parks (item 7(c) of the Schedule) approved by the concerned authorities, and which are not disallowed in such approvals.

(c) expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land.

[III] "(cc) maintenance dredging provided the dredged material shall be disposed within port limits.";

[III] "(d) All Building or Construction projects or Area Development projects (which do not contain any category 'A' projects and activities) and Townships (item 8(a) and 8(b) in the Schedule to the notification)."

e) all Category 'B2' projects and activities.

f) all projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government.

(ii) The Public Consultation shall ordinarily have two components comprising of:-

(a) a public hearing at the site or in its close proximity- district wise, to be carried out in the manner prescribed in Appendix IV, for ascertaining concerns of local affected persons;

(b) obtain responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity.

(iii) the public hearing at, or in close proximity to, the site(s) in all cases shall be conducted by the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) concerned in the specified manner and forward the proceedings to the regulatory authority concerned within 45(forty five) of a request to the effect from the applicant.

(iv) in case the State Pollution Control Board or the Union territory Pollution Control Committee concerned does not undertake and complete the public hearing within the specified period, and/or does not convey the proceedings of the public hearing within the prescribed period directly to the regulatory authority concerned as above, the regulatory

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

authority shall engage another public agency or authority which is not subordinate to the regulatory authority, to complete the process within a further period of forty five days,.

(v) If the public agency or authority nominated under the sub paragraph (iii) above reports to the regulatory authority concerned that owing to the local situation, it is not possible to conduct the public hearing in a manner which will enable the views of the concerned local persons to be freely expressed, it shall report the facts in detail to the concerned regulatory authority, which may, after due consideration of the report and other reliable information that it may have, decide that the public consultation in the case need not include the public hearing.

(vi) For obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity, the concerned regulatory authority and the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) shall invite responses from such concerned persons by placing on their website the Summary EIA report prepared in the format given in Appendix IIIA by the applicant along with a copy of the application in the prescribed form, within seven days of the receipt of a written request for arranging the public hearing. Confidential information including non-disclosable or legally privileged information involving Intellectual Property Right, source specified in the application shall not be placed on the web site*.* The regulatory authority concerned may also use other appropriate media for ensuring wide publicity about the project or activity. The regulatory authority shall, however, make available on a written request from any concerned person the Draft EIA report for inspection at a notified place during normal office hours till the date of the public hearing. All the responses received as part of this public consultation process shall be forwarded to the applicant through the quickest available means.

(vii) After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation.

IV. Stage (4) - Appraisal:

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(i) Appraisal means the detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents like the Final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of environmental clearance. This appraisal shall be made by Expert Appraisal Committee or State Level Expert Appraisal Committee concerned in a transparent manner in a proceeding to which the applicant shall be invited for furnishing necessary clarifications in person or through an authorized representative. On conclusion of this proceeding, the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall make categorical recommendations to the regulatory authority concerned either for grant of prior environmental clearance on stipulated terms and conditions, or rejection of the application for prior environmental clearance, together with reasons for the same.

(ii) The appraisal of all projects or activities which are not required to undergo public consultation, or submit an Environment Impact Assessment report, shall be carried out on the basis of the prescribed application Form 1 and Form 1A as applicable, any other relevant validated information available and the site visit wherever the same is considered as necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iii) The appraisal of an application be shall be completed by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within sixty days of the receipt of the final Environment Impact Assessment report and other documents or the receipt of Form 1 and Form 1 A, where public consultation is not necessary and the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee shall be placed before the competent authority for a final decision within the next fifteen days .The prescribed procedure for appraisal is given in Appendix V ;

7(ii). Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects:

All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product –mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance.

8. Grant or Rejection of Prior Environmental Clearance (EC):

(i) The regulatory authority shall consider the recommendations of the EAC or SEAC concerned and convey its decision to the applicant within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned or in other words within one hundred and five days of the receipt of the final Environment Impact Assessment Report, and where Environment Impact Assessment is not required, within one hundred and five days of the receipt of the complete application with requisite documents, except as provided below.

(ii) The regulatory authority shall normally accept the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. In cases where it disagrees with the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, the regulatory authority shall request reconsideration by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned while stating the reasons for the disagreement. An intimation of this decision shall be simultaneously conveyed to the applicant. The Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, in turn, shall consider the observations of the regulatory authority and furnish its views on the same within a further period of sixty days. The decision of the regulatory authority after considering the views of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be final and conveyed to the applicant by the regulatory authority concerned within the next thirty days.

(iii) In the event that the decision of the regulatory authority is not communicated to the applicant within the period specified in sub-paragraphs (i) or (ii) above, as applicable, the

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

applicant may proceed as if the environment clearance sought for has been granted or denied by the regulatory authority in terms of the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iv) On expiry of the period specified for decision by the regulatory authority under paragraph (i) and (ii) above, as applicable, the decision of the regulatory authority, and the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be public documents.

(v) Clearances from other regulatory bodies or authorities shall not be required prior to receipt of applications for prior environmental clearance of projects or activities, or screening, or scoping, or appraisal, or decision by the regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to a requirement of law, or for necessary technical reasons.

(vi) Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

9. Validity of Environmental Clearance (EC):

The "Validity of Environmental Clearance" is meant the period from which a prior environmental clearance is granted by the regulatory authority, or may be presumed by the applicant to have been granted under sub paragraph (iv) of paragraph 7 above, to the start of production operations by the project or activity, or completion of all construction operations in case of construction projects (item 8 of the Schedule), to which the application for prior environmental clearance refers. The prior environmental clearance granted for a project or activity shall be valid for a period of ten years in the case of River Valley projects (item 1(c) of the Schedule), project life as estimated by Expert Appraisal Committee or State Level Expert Appraisal Committee subject to a maximum of thirty years for mining projects and five years in the case of all other projects and activities. However, in the case of Area Development projects and Townships [item 8(b)], the validity

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

period shall be limited only to such activities as may be the responsibility of the applicant as a developer. This period of validity may be extended by the regulatory authority concerned by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for Construction projects or activities (item 8 of the Schedule). In this regard the regulatory authority may also consult the Expert Appraisal Committee or State Level Expert Appraisal Committee as the case may be.

10. Post Environmental Clearance Monitoring:

[IV] "(i)(a) In respect of Category 'A' project, it shall be mandatory for the project proponent to make public the environment clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the district or State where the project is located and in addition, this shall also be displayed in the project proponent's website permanently.

(b) In respect of Category 'B' projects, irrespective of its clearance by MoEF / SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environment clearance and the details of the MoEF website where it is displayed.

(c) The Ministry of Environment and Forests and the State/Union Territory Level Environmental Impact Assessment Authorities (SEIAAs), as the case may be, shall also place the environmental clearance in the public domain on Governmental portal.

(d) The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.";

[IV] (ii) It shall be mandatory for the project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year.

[IV] (iii) All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

concerned regulatory authority. The latest such compliance report shall also be displayed on the web site of the concerned regulatory authority.

11. Transferability of Environmental Clearance (EC):

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor, or by the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period. No reference to the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned is necessary in such cases.

12. Operation of EIA Notification, 1994, till disposal of pending cases:

From the date of final publication of this notification the Environment Impact Assessment (EIA) notification number S.O.60 (E) dated 27th January, 1994 is hereby superseded, except in suppression of the things done or omitted to be done before such suppression to the extent that in case of all or some types of applications made for prior environmental clearance and pending on the date of final publication of this notification, the Central Government may relax any one or all provisions of this notification except the list of the projects or activities requiring prior environmental clearance in Schedule I , or continue operation of some or all provisions of the said notification, for a period not exceeding one year from the date of issue of this notification.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

SCHEDULE

(See paragraph 2 and 7)

LIST OF PROJECTS OR ACTIVITIES REQUIRING PRIOR ENVIRONMENTAL CLEARANCE

Project or Activity		Category with threshold limit		Conditions if any
		A	B	
1		Mining, extraction of natural resources and power generation (for a specified production capacity)		
(1)	(2)	(3)	(4)	(5)
[V] "1(a)	(i) Mining of minerals.	≥ 50 ha. of mining lease area in respect of non-coal mine lease. > 150 ha of mining lease area in respect of coal mine lease. Asbestos mining irrespective of mining area	<50 ha ≥ 5 ha .of mining lease area in respect of non-coal mine lease. ≤ 150 ha ≥ 5 ha of mining lease area in respect of coal mine lease.	General Condition shall apply Note: Mineral prospecting Is exempted.";
	(ii) Slurry pipelines (coal lignite and other ores) passing through national parks / sanctuaries / coral reefs, ecologically sensitive areas.	All projects.		
1(b)	Offshore and onshore oil and gas exploration, development & production	All projects		Note Exploration Surveys (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey
1(c)	River Valley pojects	(i) ≥ 50 MW hydroelectric power generation; (ii) ≥ 10,000 ha. of culturable command area	(i) < 50 MW ≥ 25 MW hydroelectric power generation; (ii) < 10,000 ha. of culturable command area	[V] "General Condition shall apply. Note: Irrigation projects not involving submergence or inter-state domain shall be appraised by the SEIAA as Category 'B' Projects.";

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
1(d)	Thermal Power Plants	[v] "≥ 500 MW (coal / lignite / naphtha & gas based); ≥ 50 MW (Pet coke diesel and all other fuels including refinery residual oil waste except biomass); ≥ 20 MW (based on biomass or non hazardous municipal waste as fuel).";	< 500 MW (coal / lignite / naphtha & gas based); <50 MW ≥ 5MW (Pet coke, diesel and all other fuels including refinery residual oil waste except biomass); ≥ 20 MW > 15 MW (based on biomass or non hazardous municipal waste as fuel).";	[v] "General Condition shall apply. Note: (i) Power plant up to 15 MW, based on biomass and using auxiliary fuel such as coal / lignite / petroleum products up to 15% are exempt. (ii) Power plant up to 15 MW, based on non-hazardous municipal waste and using auxiliary fuel such as coal / lignite / petroleum products up to 15% are exempt. (iii) Power plants using waste heat boiler without any auxiliary fuel are exempt.";
1(e)	Nuclear power projects and processing of nuclear fuel	All projects		
2		Primary Processing		
2(a)	Coal washeries	≥ 1 million ton/annum throughput of coal	<1million ton/annum throughput of coal	General Condition shall apply (If located within mining area the proposal shall be appraised together with the mining proposal)
2 (b)	Mineral beneficiation	≥ 0.1million ton/annum mineral throughput	< 0.1million ton/annum mineral throughput	General Condition shall apply (Mining proposal with Mineral beneficiation shall be appraised together for grant of clearance)

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[v] I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

3		Materials Production		
(1)	(2)	(3)	(4)	(5)
3(a)	Metallurgical industries (ferrous & non ferrous)	a)Primary metallurgical industry All projects b) Sponge iron manufacturing ≥ 200TPD c) Secondary metallurgical processing industry All toxic and heavy metal producing units ≥ 20,000 tonnes /annum	 Sponge iron manufacturing <200TPD Secondary metallurgical processing industry i.)All toxic and heavy metal producing units <20,000 tonnes /annum ii.)All other non –toxic secondary metallurgical processing industries >5000 tonnes/annum	[V] "General condition shall apply. Note: (i) The recycling industrial units registered under the HSM Rules, are exempted. (ii) In case of secondary metallurgical processing industrial units, those projects involving operation of furnaces only such as induction and electrical arc furnace, submerged arc furnace, and cupola with capacity more than 30,000 tonnes per annum (TPA) would require environmental clearance. (iii) Plant / units other than power plants (given against entry no. 1(d) of the schedule), based on municipal solid waste (non-hazardous) are exempted."
3(b)	Cement plants	≥ 1.0 million tonnes/annum production capacity	<1.0 million tonnes/annum production capacity. All Stand alone grinding units	General Condition shall apply
4		Materials Processing		
(1)	(2)	(3)	(4)	(5)
4(a)	Petroleum refining industry	All projects	-	-
4(b)	Coke oven plants	≥2,50,000 tonnes/annum	<2,50,000 & ≥25,000 tonnes/annum	[V] "General Condition shall apply."
4(c)	Asbestos milling and asbestos based products	All projects	-	-

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
4(d)	Chlor-alkali industry	≥300 TPD production Capacity or a unit located out side the notified industrial area/ estate	V "(i) All projects irrespective of the size, if located in a Notified Industrial Area/ Estate. (ii) <300 tonnes per day (TPD) and located outside a Notified Industrial Area/ Estate."	V "General as well as specific condition shall apply. No new Mercury Cell based plants will be permitted and existing units converting to membrane cell technology are exempted from this notification."
4(e)	Soda ash Industry	All projects	-	-
4(f)	Leather/skin/hide processing industry	New projects outside the industrial area or expansion of existing units out side the industrial area	All new or expansion of projects located within a notified industrial area/ estate	V "General as well as specific condition shall apply."
5		Manufacturing / Fabrication		
5(a)	Chemical fertilizers	V "All projects except Single Super Phosphate."	V "Single Super Phosphate."	-
5(b)	Pesticides industry and pesticide specific intermediates (excluding formulations)	All units producing technical grade pesticides	-	-
5(c)	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	All projects -	-	-
5(d)	Manmade fibers manufacturing	Rayon	Others	General Condition shall apply
5(e)	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	Located out side the notified industrial area/ estate -	Located in a notified industrial area/ estate	V "General as well as specific condition shall apply."

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
5(f)	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	Located out side the notified industrial area/ estate	Located in a notified industrial area/ estate	[v] "General as well as specific condition shall apply."
5(g)	Distilleries	(i)All Molasses based distilleries (ii) All Cane juice/ non-molasses based distilleries ≥30 KLD	All Cane juice / non-molasses based distilleries – <30 KLD	General Condition shall apply
5(h)	Integrated paint industry	-	All projects	General Condition shall apply
5(i)	Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp with out bleaching	Pulp manufacturing and Pulp& Paper manufacturing industry	Paper manufacturing industry without pulp manufacturing	General Condition shall apply
5(j)	Sugar Industry	-	≥ 5000 tcd cane crushing capacity	General Condition shall apply
5(k)	[v] Omitted			
6		Service Sectors		
6(a)	Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks / sanctuaries /coral reefs / ecologically sensitive areas including LNG Terminal	All projects		-

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
6(b)	**Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000)**	**-**	**All projects**	**General Condition shall apply**
7		**Physical Infrastructure including Environmental Services**		
7(a)	**Air ports**	**[v] "All projects including airstrips, which are for commercial use."**	**-**	**[v] "Note: Air strips, which do not involve bunkering/ refueling facility and or Air Traffic Control, are exempted."**
7(b)	All ship breaking yards including ship breaking units	All projects	-	-
7©	**Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.**	**If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area.** **Industrial estates with area greater than 500 ha. and housing at least one Category B industry.**	**Industrial estates housing at least one Category B industry and area <500 ha.** **Industrial estates of area> 500 ha. and not housing any industry belonging to Category A or B.**	**[v] "Genral as well as special conditions shall apply.** **Note:** **1. Industrial Estate of area below 500 ha. and not housing any industry of Category 'A' or 'B' does not require clearance.** **2. If the area is less than 500 ha. but contains building and construction projects > 20,000 Sq. mts. And or development area more than 50 ha it will be treated as activity listed at serial no. 8(a) or 8(b) in the Schedule, as the case may be."**
7(d)	**Common hazardous waste treatment, storage and disposal facilities (TSDFs)**	**All integrated facilities having incineration &landfill or incineration alone**	**All facilities having land fill only**	**General Condition shall apply**

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
7(e)	[V] "Ports, harbours, break waters, dredging."	≥ 5 million TPA of cargo handling capacity (excluding fishing harbours)	< 5 million TPA of cargo handling capacity and/or ports/ harbours ≥10,000 TPA of fish handling capacity	[V] "General Condition shall apply. Note: 1. Capital dredging inside and outside the ports or harbors and channels are included; 2. Maintenance dredging is exempt provided it formed part of the original proposal for which Environment Management Plan (EMP) was prepared and environmental clearance obtained."
7(f)	Highways	i) New National High ways; and ii) Expansion of National High ways greater than 30 KM, involving additional right of way greater than 20m involving land acquisition and passing through more than one State.	[V] " i) All State Highway Project; and ii) State Highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas."	General Condition shall apply. Note: Highways include expressways."
7(g)	Aerial ropeways	[V(xvi)(a)] "(i) All projects located at altitude of 1,000 mtr. And above. (ii) All projects located in notified ecologically sensitive areas."	[V(xvi)(b)] "All projects except those covered in column (3)."	General Condition shall apply
7(h)	Common Effluent Treatment Plants (CETPs)		All projects	General Condition shall apply
7(i)	Common Municipal Solid Waste Management Facility (CMSWMF)		All projects	General Condition shall apply
8		Building /Construction projects/Area Development projects and Townships		
8(a)	Building and Construction projects		≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#	#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)
8(b)	Townships and Area Development projects.		Covering an area ≥ 50 ha and or built up area ≥1,50,000 sq .mtrs ++	++All projects under Item 8(b) shall be appraised as Category B1

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

Note:-

[V(xvii)] **"General Condition (GC):**
Any project or activity specified in Category 'B' will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as identified by the Central Pollution Control Board from time to time, (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleshwar Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley, and (iv) inter-State boundaries and international boundaries:

Provided that the requirement regarding distance of 10 km of the inter-State boundaries can be reduced or completely done away with by an agreement between the respective States or U.Ts sharing the common boundary in case the activity does not fall within 10 kilometres of the areas mentioned at item (i), (ii) and (iii) above."

Specific Condition (SC):
If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre –defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate).

[No. J-11013/56/2004-IA-II (I)]
(R.CHANDRAMOHAN)
JOINT SECRETARY TO THE GOVERNMENT OF INDIA

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX I

(See paragraph – 6)

FORM 1

[VI(a)] **"(I) Basic Information**

Serial Number	Item	Details
1.	Name of the project/s	
2.	S. No. in schedule	
3.	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	
4.	New/Expansion/Modernization	
5.	Existing Capacity/Area etc.	
6.	Category of Project i.e. 'A' or 'B'	
7.	Does it attract the general condition? If' Yes, please specify.	
8.	Does it attract the specific condition? If' Yes, please specify.	
9.	Location	
	Plot/Survey/Khasra No.	
	Village	
	Tehsil	
	District	
	State	
10.	Nearest railway station/airport along with distance in kms.	
11.	Nearest Town, city, District Headquarters along with distance in kms.	
12.	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone nos. to be given)	
13.	Name of the applicant	
14.	Registered Address	
15.	Address for correspondence:	
	Name	
	Designation (Owner/Partner/CEO)	
	Address	
	Pin Code	
	E-mail	
	Telephone No.	
	Fax No.	
16	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	Village-District-State 1. 2. 3.
17.	Interlinked Projects	
18	Whether separate application of interlinked project has been submitted?	

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

19.	If yes, date of submission	
20.	If no, reason	
21.	Whether the proposal involves approval/ clearance under: If yes, details of the same and their status to be given. (a) The Forest (Conservation) Act, 1980 ? (b) The Wildlife (Protection) Act, 1972 ? (c) The C.R.Z. Notification, 1991 ?	
22.	Whether there is any Government Order/Policy relevant/ relating to the site ?	
23.	Forest land involved (hectares)	
24.	Whether there is any litigation pending against the project and/or land in which the project is propose to be set up ? (a) Name of the Court. (b) Case No. (c) Orders/directions of the Court, if any and its relevance with the proposed project.	

(II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)		
1.2	Clearance of existing land, vegetation and buildings?		
1.3	Creation of new land uses?		
1.4	Pre-construction investigations e.g. bore houses, soil testing?		
1.5	Construction works?		
1.6	Demolition works?		
1.7	Temporary sites used for construction works or housing of construction workers?		
1.8	Above ground buildings, structures or earthworks including linear structures, cut And fill or excavations		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

1.9	Underground works including mining or tunneling?		
1.10	Reclamation works?		
1.11	Dredging?		
1.12	Offshore structures?		
1.13	Production and manufacturing processes?		
1.14	Facilities for storage of goods or materials?		
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?		
1.16	Facilities for long term housing of operational workers?		
1.17	New road, rail or sea traffic during construction or operation?		
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?		
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?		
1.20	New or diverted transmission lines or pipelines?		
1.21	Impoundment, damming, culverting, realignment or other changes to the ydrology of watercourses or aquifers?		
1.22	Stream crossings?		
1.23	Abstraction or transfers of water form ground or surface waters?		
1.24	Changes in water bodies or the land surface affecting drainage or run-off?		
1.25	Transport of personnel or materials for construction, operation or decommissioning?		
1.26	Long-term dismantling or decommissioning or restoration works?		
1.27	Ongoing activity during decommissioning which could have an impact on the environment?		
1.28	Influx of people to an area in either temporarily or permanently?		
1.29	Introduction of alien species?		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

1.30	Loss of native species or genetic diversity?		
1.31	Any other actions?		

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)		
2.2	Water (expected source & competing users) unit: KLD		
2.3	Minerals (MT)		
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)		
2.5	Forests and timber (source – MT)		
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)		
2.7	Any other natural resources (use appropriate standard units)		

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)		
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)		
3.3	Affect the welfare of people e.g. by changing living conditions?		
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,		
3.5	Any other causes		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes		
4.2	Municipal waste (domestic and or commercial wastes)		
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)		
4.4	Other industrial process wastes		
4.5	Surplus product		
4.6	Sewage sludge or other sludge from effluent treatment.		
4.7	Construction or demolition wastes		
4.8	Redundant machinery or equipment		
4.9	Contaminated soils or other materials		
4.10	Agricultural wastes		
4.11	Other solid wastes		

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources.		
5.2	Emissions from production processes		
5.3	Emissions from materials handling including storage or transport		
5.4	Emissions from construction activities including plant and equipment		
5.5	Dust or odours from handling of materials including construction materials, sewage and waste		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

5.6	Emissions from incineration of waste		
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)		
5.8	Emissions from any other sources		

6. Generation of Noise and Vibration, and Emissions of Light and Heat:

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers		
6.2	From industrial or similar processes		
6.3	From construction or demolition		
6.4	From blasting or piling		
6.5	From construction or operational traffic		
6.6	From lighting or cooling systems		
6.7	From any other sources		

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials		
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)		
7.3	By deposition of pollutants emitted to air into the land or into water		
7.4	From any other sources		
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances		
8.2	From any other causes		
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?		

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting**.** lities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: • Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) • housing development • extractive industries • supply industries • other		
9.2	Lead to after-use of the site, which could have an impact on the environment		
9.3	Set a precedent for later developments		
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(III) Environmental Sensitivity

S.No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value		
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests		
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, esting, foraging, resting, over wintering, migration		
4	Inland, coastal, marine or underground waters		
5	State, National boundaries		
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas		
7	Defence installations		
8	Densely populated or built-up area		
9	Areas occupied by sensitive man-made land uses *(hospitals, schools, places of worship, community facilities)*		
10	Areas containing important, high quality or scarce Resources *(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)*		
11	Areas already subjected to pollution or environmental damage. *(those where existing legal environmental standards are exceeded)*		
12	Areas susceptible to natural hazard which could cause the project to present environmental Problems (*earthquakes, subsidence, landslides, erosion, Flooding or extreme or adverse climatic conditions*)		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(IV). Proposed Terms of Reference for EIA studies

VI(b) "I hereby given undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance give, if any to the project will be revoked at our risk and cost."

Date: _____

Place: _____

Signature of the applicant
With Name and Full Address
(Project Proponent/Authorised Signatory)

NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a C.R.Z. map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z. (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Sinmultaneous action shall also be taken to obtain the requisite clearance under the provisions of the C.R.Z. Notification, 1991 for the activities to be located in the CRZ.
2. The projects to be located within 10 km of the National Prks, Sancturies, Biosphere Reserves, Migratory Corridors of Wile Animals, the project proponenet shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)."
3. All correspondence with the Ministry of Environment & Forests including aubmission of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC Meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being and authorized signatory for the specific project."

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX II
(See paragraph 6)

FORM-1 A (only for construction projects listed under item 8 of the Schedule)

CHECK LIST OF ENVIRONMENTAL IMPACTS

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring programme)

1. LAND ENVIRONMENT

(Attach panoramic view of the project site and the vicinity)

1.1. Will the existing landuse get significantly altered from the project that is not consistent with the surroundings? (Proposed landuse must conform to the approved Master Plan / Development Plan of the area. Change of landuse if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

1.2. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

1.3. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing landuse, disturbance to the local ecology).

1.4. Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).

1.5. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)

1.6. What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

1.7. Give details regarding water supply, waste handling etc during the construction period.

1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)

1.9. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)

2. WATER ENVIRONMENT

2.1. Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.

2.2. What is the capacity (dependable flow or yield) of the proposed source of water?

2.3. What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)

2.4. How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)

2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)

2.6. What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)

2.7. Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

2.9. What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)

2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)

2.11. How is the storm water from within the site managed?(State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)

2.12. Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)

2.13. What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)

2.14. Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.

3. VEGETATION

3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with it's unique features, if any)

3.2. Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)

3.3. What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

4. FAUNA

4.1. Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

4.2. Any direct or indirect impacts on the avifauna of the area? Provide details.

4.3. Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna

5. AIR ENVIRONMENT

5.1. Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)

5.2. What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.

5.3. Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.

5.4. Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.

5.5. Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.

5.6. What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details.

6. AESTHETICS

6.1. Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?

6.2. Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?

6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.

6.4. Are there any anthropological or archaeological sites or artefacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.

7. SOCIO-ECONOMIC ASPECTS

7.1. Will the proposal result in any changes to the demographic structure of local population? Provide the details.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

7.2. Give details of the existing social infrastructure around the proposed project.

7.3. Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

8. BUILDING MATERIALS

8.1. May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)

8.2. Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?

8.3. Are recycled materials used in roads and structures? State the extent of savings achieved?

8.4. Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

9. ENERGY CONSERVATION

9.1. Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?

9.2. What type of, and capacity of, power back-up to you plan to provide?

9.3. What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?

9.4. What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.

9.5. Does the layout of streets & buildings maximise the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?

9.7. Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.

9.8. What are the likely effects of the building activity in altering the micro-climates? Provide a self assessment on the likely impacts of the proposed construction on

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

creation of heat island & inversion effects?

9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.

9.10. What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.

9.11. If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.

9.12. What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.

9.13. To what extent the non-conventional energy technologies are utilised in the overall energy consumption? Provide details of the renewable energy technologies used.

10. Environment Management Plan

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX III

(See paragraph 7

GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSENT DOCUMENT

S.NO	EIA STRUCTURE	CONTENTS
1.	Introduction	• Purpose of the report • Identification of project & project proponent • Brief description of nature, size, location of the project and its importance to the country, region • Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)
2.	Project Description	• Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects. Details should be provided to give clear picture of the following: • Type of project • Need for the project • Location (maps showing general location, specific location, project boundary & project site layout) • Size or magnitude of operation (incl. Associated activities required by or for the project • Proposed schedule for approval and implementation • Technology and process description • Project description. Including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose • Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements (as required by the scope) • Assessment of New & untested technology for the risk of technological failure

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

3.	Description of the Environment	• Study area, period, components & methodology • Establishment of baseline for valued environmental components, as identified in the scope • Base maps of all environmental components
4.	Anticipated Environmental Impacts & Mitigation Measures	• Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project • Measures for minimizing and / or offsetting adverse impacts identified • Irreversible and Irretrievable commitments of environmental components • Assessment of significance of impacts (Criteria for determining significance, Assigning significance) • Mitigation measures
5.	Analysis of Alternatives (Technology & Site)	• In case, the scoping exercise results in need for alternatives: • Description of each alternative • Summary of adverse impacts of each alternative • Mitigation measures proposed for each alternative and • Selection of alternative
6.	Environmental Monitoring Program	• Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)
7.	Additional Studies	• Public Consultation • Risk assessment • Social Impact Assessment. R&R Action Plans
8.	Project Benefits	• Improvements in the physical infrastructure • Improvements in the social infrastructure

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

		• Employment potential –skilled; semi-skilled and unskilled • Other tangible benefits
9.	Environmental Cost Benefit Analysis	If recommended at the Scoping stage
10.	EMP	• Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA
11	Summary & Conclusion (This will constitute the summary of the EIA Report)	• Overall justification for implementation of the project • Explanation of how, adverse effects have been mitigated
12.	Disclosure of Consultants engaged	• The names of the Consultants engaged with their brief resume and nature of Consultancy rendered

APPENDIX III A

(See paragraph 7)

CONTENTS OF SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

The Summary EIA shall be a summary of the full EIA Report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following Chapters of the full EIA Report: -

1. Project Description
2. Description of the Environment
3. Anticipated Environmental impacts and mitigation measures
4. Environmental Monitoring Programme
5. Additional Studies
6. Project Benefits
7. Environment Management Plan

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX IV

(See paragraph 7)

PROCEDURE FOR CONDUCT OF PUBLIC HEARING

1.0 The Public Hearing shall be arranged in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site(s) or in its close proximity District -wise, by the concerned State Pollution Control Board (SPCB) or the Union Territory Pollution Control Committee (UTPCC).

2. 0 **The Process:**

2.1 The Applicant shall make a request through a simple letter to the Member Secretary of the SPCB or Union Territory Pollution Control Committee, in whose jurisdiction the project is located, to arrange the public hearing within the prescribed statutory period. In case the project site is covering more than one District or State or Union Territory, the public hearing is mandated in each District, State or Union Territory in which the project is located and the applicant shall make separate requests to each concerned SPCB or UTPCC for holding the public hearing as per this procedure.

2.2 The Applicant shall enclose with the letter of request, at least 10 hard copies and an equivalent number of soft (electronic) copies of the draft EIA Report with the generic structure given in Appendix III including the Summary Environment Impact Assessment report in English and in the official languageof the state/local language, prepared strictly in accordance with the Terms of
Reference communicated after Scoping (Stage-2). Simultaneously the applicant shall arrange to forward copies, one hard and one soft, of the above draft EIA Report along with the Summary EIA report to the following authorities or offices, within whose jurisdiction the project will be located:

(a) District Magistrate/District collector/Deputy commissioner/s
(b) Zila Parishad or Municipal Corporation or Panchayats Union
(c) District Industries Office
(d) Urban Local Bodies (ULBs) / PRIs Concerned / Development authorities.
(d) Concerned Regional Office of the Ministry of Environment and Forests

2.3 On receiving the draft Environmental Impact Assessment report, the abovementioned authorities except the Regional Office of MoEF, shall arrange to widely publicize it within their respective jurisdictions requesting the interested persons to send their comments to the concerned regulatory authorities. They shall also make available the draft EIA Report for inspection electronically or otherwise to the public during normal office hours till the Public Hearing is over.

2.4 The SPCB or UTPCC concerned shall also make similar arrangements for giving publicity about the project within the State/Union Territory and make available the Summary of the draft Environmental Impact Assessment report (Appendix III A) for

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

inspection in select offices or public libraries or any other suitable location etc. They shall also additionally make available a copy of the draft Environmental Impact Assessment report to the above five authorities/offices as given in para 2.2.

3.0 Notice of Public Hearing:

3.1 The Member-Secretary of the concerned SPCB or UTPCC shall finalize the date, time and exact venue for the conduct of public hearing within 7(seven) days of the date of receipt of the draft Environmental Impact Assessment report from the project proponent, and advertise the same in one major National Daily and one Regional vernacular Daily / Official State Language. A minimum notice period of 30(thirty) days shall be provided to the public for furnishing their responses;

3.2 The advertisement shall also inform the public about the places or offices where the public could access the draft Environmental Impact Assessment report and the Summary Environmental Impact Assessment report before the public hearing**.** In places where the newspapers do not reach, the Competent Authority should arrange to inform the local public about the public hearing by other means such as by way of beating of drums as well as advertisement / announcement on radio / television.

3.3 No postponement of the date, time, venue of the public hearing shall be undertaken, unless some untoward emergency situation occurs and then only on the recommendation of the concerned District Magistrate/District collector/Deputy Commissioner, the postponement shall be notified to the public through the same National and Regional vernacular dailies and also prominently displayed at all the identified offices by the concerned SPCB or Union Territory Pollution Control Committee;

3.4 In the above exceptional circumstances, fresh date, time and venue for the public consultation shall be decided by the Member – Secretary of the concerned SPCB or UTPCC only in consultation with the District Magistrate/District collector/Deputy Commissioner and notified afresh as per procedure under 3.1 above.

4.0 Supervision and Presiding over the Hearing:

4.1 The District Magistrate/District collector/Deputy Commissioner or his or her representative not below the rank of an Additional District Magistrate assisted by a representative of SPCB or UTPCC**,** shall Supervise and preside over the entire public hearing process.

5.0 Videography

5.1 The SPCB or UTPCC shall arrange to video film the entire proceedings. A copy of the videotape or a CD shall be enclosed with the public hearing proceedings while Forwarding it to the Regulatory Authority concerned.

6.0 Proceedings

6.1 The attendance of all those who are present at the venue shall be noted and annexed with the final proceedings.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

6.2 There shall be no quorum required for attendance for starting the proceedings.

6.3 A representative of the applicant shall initiate the proceedings with a presentation on the project and the Summary EIA report.

6.4 Persons present at the venue shall be granted the opportunity to seek information or clarifications on the project from the Applicant. The summary of the public hearing proceedings accurately reflecting all the views and concerns expressed shall be recorded by the representative of the SPCB or UTPCC and read over to the audience at the end of the proceedings explaining the contents in the local/vernacular language and the agreed minutes shall be signed by the District Magistrate/District collector/Deputy Commissioner or his or her representative on the same day and forwarded to the SPCB/UTPCC concerned**.**

6.5 A Statement of the issues raised by the public and the comments of the Applicant shall also be prepared in the local language or the Official State language, as the case may be, and in English and annexed to the proceedings:

6.6 The proceedings of the public hearing shall be conspicuously displayed at the office of the Panchyats within whose jurisdiction the project is located, office of the concerned Zila Parishad, District Magistrate/District collector/Deputy Commissioner, and the SPCB or UTPCC . The SPCB or UTPCC shall also display the proceedings on its website for general information. Comments, if any, on the proceedings which may be sent directly to the concerned regulatory authorities and the applicant concerned.

7.0 **Time period for completion of public hearing**

7.1 The public hearing shall be completed within a period of 45 (forty five) days from date of receipt of the request letter from the Applicant. Thereafter the SPCB or UTPCC concerned shall sent the public hearing proceedings to the concerned regulatory authority within 8(eight) days of the completion of the public hearing.Simultaneously, a copy will also be provided to the project proponent.The applicant may also directly forward a copy of the approved public hearing proceedings to the regulatory authority concerned along with the final Environmental Impact Assessment report or supplementary report to the draft EIA report prepared after the public hearing and public consultations incorporating the concerns expressed in the public hearing along with action plan and financial allocation, item-wise, to address those concerns.”.

7.2 If the SPCB or UTPCC fails to hold the public hearing within the stipulated 45(forty five) days, the Central Government in Ministry of Environment and Forests for Category ‘A’ project or activity and the State Government or Union Territory Administration for Category ‘B’ project or activity at the request of the SEIAA, shall engage any other agency or authority to complete the process, as per procedure laid down in this notification.

APPENDIX –V

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(See paragraph 7)

PROCEDURE PRESCRIBED FOR APPRAISAL

1. The applicant shall apply to the concerned regulatory authority through a simple communication enclosing the following documents where public consultations are mandatory:

- Final Environment Impact Assessment Report [20(twenty) hard copies and 1 (one) soft copy)]
- A copy of the video tape or CD of the public hearing proceedings
- A copy of final layout plan (20 copies)
- A copy of the project feasibility report (1 copy)

2. The Final EIA Report and the other relevant documents submitted by the applicant shall be scrutinized in office within 30 days from the date of its receipt by the concerned Regulatory Authority strictly with reference to the TOR and the inadequacies noted shall be communicated electronically or otherwise in a single set to the Members of the EAC /SEAC enclosing a copy each of the Final EIA Report including the public hearing proceedings and other public responses received along with a copy of Form -1or Form 1A and scheduled date of the EAC /SEAC meeting for considering the proposal.

3. Where a public consultation is not mandatory, the appraisal shall be made on the basis of the prescribed application Form 1 and EIA report, in the case of all projects and activities other than Item 8 of the Schedule. In the case of Item 8 of the Schedule, considering its unique project cycle, the EAC or SEAC concerned shall appraise all Category B projects or activities on the basis of Form 1, Form 1A and the conceptual plan and make recommendations on the project regarding grant of environmental clearance or otherwise and also stipulate the conditions for environmental clearance."

4. Every application shall be placed before the EAC/SEAC and its appraisal completed within 60 days of its receipt with requisite documents / details in the prescribed manner.

5. The applicant shall be informed at least 15 (fifteen) days prior to the scheduled date of the EAC /SEAC meeting for considering the project proposal.

6. The minutes of the EAC /SEAC meeting shall be finalised within 5 working days of the meeting and displayed on the website of the concerned regulatory authority. In case the project or activity is recommended for grant of EC, then the minutes shall clearly list out the specific environmental safeguards and conditions. In case the recommendations are for rejection, the reasons for the same shall also be explicitly stated.

Note: The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) vide notification number S.O. 1533 (E), dated 14th September, 2006 and amended vide S.O. 1737 (E), dated the 11th October, 2007.

APPENDIX VI

(See paragraph 5)

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

COMPOSITION OF THE SECTOR/ PROJECT SPECIFIC EXPERT APPRAISAL COMMITTEE (EAC) FOR CATEGORY A PROJECTS AND THE STATE/UT LEVEL EXPERT APPRAISAL COMMITTEES (SEACs) FOR CATEGORY B PROJECTS TO BE CONSTITUTED BY THE CENTRAL GOVERNMENT `

1. The Expert Appraisal Committees (EAC(s) and the State/UT Level Expert Appraisal Committees (SEACs) shall consist of only professionals and experts fulfilling the following eligibility criteria:

Professional: The person should have at least (i) 5 years of formal University training in the concerned discipline leading to a MA/MSc Degree, or (ii) in case of Engineering /Technology/Architecture disciplines, 4 years formal training in a professional training course together with prescribed practical training in the field leading to a B.Tech/B.E./B.Arch. Degree, or (iii) Other professional degree (e.g. Law) involving a total of 5 years of formal University training and prescribed practical training, or (iv) Prescribed apprenticeship/article ship and pass examinations conducted by the concerned professional association (e.g. Chartered Accountancy),or (v) a University degree , followed by 2 years of formal training in a University or Service Academy (e.g. MBA/IAS/IFS). In selecting the individual professionals, experience gained by them in their respective fields will be taken note of.

Expert: A professional fulfilling the above eligibility criteria with at least 15 years of relevant experience in the field, or with an advanced degree (e.g. Ph.D.) in a concerned field and at least 10 years of relevant experience.

Age: Below 70 years. However, in the event of the non-availability of /paucity of experts in a given field, the maximum age of a member of the Expert Appraisal Committee may be allowed up to 75 years

2. The Members of the EAC shall be Experts with the requisite expertise and experience in the following fields /disciplines. In the event that persons fulfilling the criteria of “Experts” are not available, Professionals in the same field with sufficient experience may be considered:

- **Environment Quality Experts**: Experts in measurement/monitoring, analysis and interpretation of data in relation to environmental quality

- **Sectoral Experts in Project Management**: Experts in Project Management or Management of Process/Operations/Facilities in the relevant sectors.

- **Environmental Impact Assessment Process Experts**: Experts in conducting and carrying out Environmental Impact Assessments (EIAs) and preparation of Environmental Management Plans (EMPs) and other Management plans and who have wide expertise and knowledge of predictive techniques and tools used in the EIA process

- **Risk Assessment Experts**

- **Life Science Experts in floral and faunal management**

- **Forestry and Wildlife Experts**

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

• **Environmental Economics Expert with experience in project appraisal**

3. The Membership of the EAC shall not exceed 15 (fifteen) regular Members. However the Chairperson may co-opt an expert as a Member in a relevant field for a particular meeting of the Committee.

4. The Chairperson shall be an outstanding and experienced environmental policy expert or expert in management or public administration with wide experience in the relevant development sector.

5. The Chairperson shall nominate one of the Members as the Vice Chairperson who shall
preside over the EAC in the absence of the Chairman /Chairperson.

6. A representative of the Ministry of Environment and Forests shall assist the Committee as its Secretary.

7. The maximum tenure of a Member, including Chairperson, shall be for 2 (two) terms of 3 (three) years each.

8. The Chairman / Members may not be removed prior to expiry of the tenure without cause and proper enquiry.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

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पर्यावरण और वन मंत्रालय

अधिसूचना

नई दिल्ली, 28 फरवरी, 2014

का.आ. 637(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 23 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए उक्त अधिनियम की धारा 5 के अधीन इसमें निहित शक्तियों को पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उप-धारा (3) के अधीन केंद्रीय सरकार द्वारा गठित किए गए सभी राज्य और संघराज्यक्षेत्र पर्यावरण समाघात प्राधिकरणों (जिन्हें इसमें इसके पश्चात् उक्त प्राधिकरण कहा गया है) को उक्त प्राधिकरणों द्वारा अपनी अधिकारिता के भीतर परियोजनाओ या क्रिया कलापों को जारी पर्यावरण अनापत्तियों की शर्तों के अतिक्रमण की दशा में परियोजना प्रस्तावकों को कारण बताओ नोटिस जारी करने तथा इस शर्त के अधीन कि केंद्रीय सरकार शक्तियों के ऐसे प्रत्यायोजन का प्रतिसंहरण कर सकेगी या उक्त अधिनियम की धारा 5 के उपबंधों को स्वयं अवलंब ले सकेगी, यदि केंद्रीय सरकार की राय में लोक हित में ऐसी कार्यवाही आवश्यक है, यदि अपेक्षित हो तो अतिक्रमणों के लिए उक्त परियोजना प्रस्तावकों को ऐसी पर्यावरण अनापत्तियों को उन्हें प्रास्थगित रखने या वापस लिए जाने हेतु निदेश जारी करने की शक्तियों का प्रत्यायोजन करती है।

[सं. जे-11013/2/2013-आई ए (आई)]

अजय त्यागी, संयुक्त सचिव

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 28th February, 2014

S.O. 637(E).—In exercise of the powers conferred by section 23 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby delegates the powers vested in it under section 5 of the said Act to all the State and Union Territory Environment Impact Assessment Authorities (Hereinafter referred to as the said Authorities) constituted by the Central Government under sub-section (3) of section 3 of Environment (Protection) Act, 1986, to issue show cause notice to project proponents in case of violation of the conditions of the envioronment clearances issued by the said Authorities to projects or activities within their jurisdiction and to issue directions to the said project proponents for keeping such environment clearances in abeyance or withdrawing them, if required, for violations, subject to the condition that the Central Government may revoke such delegations of powers or may itself invoke the provisions of section 5 of the said Act, if in the opinion of the Central Government such a Course of action is necessary in the public interest.

[No. J-11013/2/2013-IA. (I)]

AJAY TYAGI, Jt. Secy.

अधिसूचना

नई दिल्ली, 28 फरवरी, 2014

का.आ. 638(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 19 के खण्ड (क) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए उक्त की धारा के प्रयोजन के लिए इससे उपाबद्ध उस सारणी के स्तंभ (3) में उनमे से प्रत्येक के सामने उल्लिखित अधिकारिता के साथ उस सारणी के स्तंभ (2) में उल्लिखित प्राधिकरण या अधिकारी को प्रातिकृत करती है:

सारणी

क्रम संख्यांक	प्राधिकरण/अधिकारी	अधिकारिता
(1)	(2)	(3)
1.	पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उपधारा (3) के अधीन केंद्रीय सरकार द्वारा गठित राज्य या संघ राज्यक्षेत्र स्तर पर्यावरण समाघात प्राधिकरण (एस.ई.आई.ए.ए.)	संपूर्ण राज्य या संघ राज्यक्षेत्र
2.	पर्यावरण और वन मंत्रालय (एम.ओ.ई.एफ.) के किन्हीं प्रादेशिक कार्यालयों में तैनात कोई निदेशक, वन संरक्षक या अपर प्रधान मुख्य वन संरक्षक	पर्यावरण और वन मंत्रालय द्वारा यथा-विनिश्चित प्रादेशिक कार्यालय की अधिकारिता

[सं. जे-11013/2/2013-आई ए (आई)]

अजय त्यागी, संयुक्त सचिव

NOTIFICATION

New Delhi, the 28th February, 2014

S.O. 638(E).—In exercise of the powers conferred by clause (a) of section 19 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby authorises the Authority or officer mentioned in column (2) of the Table hereto for the purpose of the said section with the jurisdiction mentioned against each of them in column (3) of that Table:

TABLE

S. No.	Authority/Officer	Jurisdiction
(1)	(2)	(3)
1.	State or Union Territory level Environment Impact Assessment Authority (SEIAA) constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986.	Whole of State or Union Territory
2.	Any Director, Conservator of Forests or Additional Principal Chief Conservator of Forests Posted in any of the Regional Offices of the Ministry of Environment and Forests (MoEF).	Jurisdiction of the Regional Office as decided by the Ministry of Environment and Forests

[No. J-11013/2/2013-IA. (I)]

AJAY TYAGI, Jt. Secy.

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OFFICIAL SITE INSPECTION REPORT OF SUB-OFFICE, MOEFCC, HYDERABAD, TELANGANA, CONDUCTED ON 17TH MAY 2024 AT MANEUR RIVERFRONT PROJECT CONCERNING OA NO. 136 OF 2023 (SZ) TITLED AS M. VENKATA REDDY VS STATE OF TELANGANA AND ORS PENDING BEFORE NGT (SZ), CHENNAI

The Sub-Office of the Ministry of Environment, Forest and Climate Change, Hyderabad, Telangana, has received MoEFCC letter No. IA-3-3/3/2024-IA-III dated 03.04.2024, indicating a court case filed by Sh. M. Venkata Reddy. This case is against the unauthorized construction of the "Manair River Front Development Project" at Karimnagar Telangana State. The petitioner alleges that the project was initiated on River Manair adjacent to the Lower Maneru Dam (LMD) without obtaining EC from the Statutory authorities. The letter also notes the absence of further details regarding the area of the project site or proposed built-up area, which are crucial for determining the eligibility of any project for grant of Environment Clearance as per provisions mentioned in the EIA, Notification, 2006 as amended.

2. A site inspection of the project is sought in light of the court case and the lack of detailed information. A factual report is also requested, including the total project area, built-up area, etc., and other related issues mentioned in the applications above. In this context, the undersigned, Sh. Tarun Kathula, Scientist 'F,' Sub-Office, MoEFCC, Hyderabad, Telangana, inspected the site on 17th May 2024, wherein officials from the Telangana irrigation department and Tourism Department were present.

3. The site inspection revealed several key observations that are crucial for understanding the project's current status:

i. The Telangana Department of Irrigation is constructing two protection walls on both sides of the river to the extent of 2.6 km, starting at 1.1 km from the Lower Maneru Dam and ending at 3.7 km distance from LMD and a half barrage and half wire for storing 0.1 TMC of water.

ii. On the inspection day, PP is constructing protection walls on both sides of the Manair River and checked dam No. II of Karimnagar Rural (M), and the construction area of the check dam comprising half wire and half barrage with abatement totaling 1,38,256.40 sq. mts. The construction being taken up for river protection walls for a length of 2.6

km on both sides, along with the upper promenade, slope, and lower promenade, is 1,60,160 sqmts, as observed during the site inspection and as indicated in the KML file. (The screenshot of the KML file is **Annexure 2**).

iii. The said construction was initiated by the Irrigation Department as per the Government of Telangana G.O No. 125 dated 09.06.2021. **(Annexure 1)**

iv. Notably, the Government of Telangana G.O No. 125, dated 09.06.2021, sanctioning allocation of funds to the extent of Rs.310.464 crores does not explicitly state that the said construction is intended to meet the needs of the Manair Riverfront Project. However, in the tender floated by irrigation department states that the constructing check dams and protection walls is for catering to the riverfront. A copy of the tender is in **Annexure 6.**

v. According to the drawings provided by the irrigation department **(Annexure 3)** and as observed during the site inspection, most of the protection walls on both sides were built inside the river banks, encroaching river bed, especially at chainage 0 to 1350 mts and 2350 to 3600 mts **(Annexure 3)**. Further promenade with slopes were also under construction on either side of the protection wall. An approach road is also constructed, partially on the river bed at chainage 2400 to 2500 mts.

vi. The Tourism Department said they had not prepared the Master Plan for the Maneru Riverfront project, so no funds were received till date for the development of the Manair Riverfront Project. However, Telangana State Tourism Development Corporation Ltd (TSTDC) floated a Request for Proposal (RFP) in June 2021 for the "Selection of Master Planning, Architectural and Engineering Consultant for Riverfront Development with Tourism Facilities at Lower Manair Dam, Karimnagar District, Telangana." A copy of the RFP is placed as **Annexure 4.**

vii. In the RFP floated by TSTDC, under the heading *5. Terms of Reference* mentioned that - TSTDC intends to develop a 10 km stretch downstream of Lower Manair Dam, including the river banks up to 150 m on either side of the river, integrating the existing government lands available for development. Initially, a stretch of 3.75 km is proposed for development

under Phase I, and the balance of 6.25 km shall be developed under Phase II **(on Page 32 of Annexure 4)**

viii. The RFP indicated that the Consultancy Services broadly include: (i) Conceptual and detailed Master plan for the **entire 10 km stretch downstream** of Lower Manair Dam including the River banks of up **to 150 m on both sides** integrating the government land parcels available for development and (ii) Planning and design of basic infrastructure for 3.75 km stretch (as Phase-I) including the River banks of up to 150 m on both sides including but not limited internal Roads, water supply, Storm water drainage and management, Sewerage, Solid Waste Management and disposal, Rain water harvesting, Electrical system, ICT network, smart street lighting and illumination, Surveillance and safety, Public Address system, Landscape design, Public Mobility plan, crowd management and other Modern infrastructure components as may be required. **(on Page 33 of Annexure 4)**

ix. The RFP also mentions conducting an **environmental impact assessment** to identify any critical/potential environmental aspects and their sensitivity to the proposed project. **(Page 35 of Annexure 4)**

x. In the RFP, it is also mentioned **(pages 36 and 37 of Annexure 4)** that consultant has to focus on the following while preparing the master plan:

a) Preliminary hydraulic study and calculations for fixing structures' conceptual design and sizing.
b) Riverbed levels, riverbank area, the protection study of existing structures, and affected localities
c) Dredging or excavating riverbed levels based on the survey and hydraulic flow requirements to fulfill the needs of riverfront development.
d) Hydraulic flow levels in steady still condition and maximum flood condition to design the river bunds.
e) Sizing of various structures in the proposed riverfront development for detailed design.
f) Flood calculation to meet the requirement of CDO, Irrigation Department of Government of Telangana.

xi. The Irrigation Department of Telangana has written to the District Collector, Karimnagar, vide a letter dated 04.05.2024 **(Annexure 5)** stating that the project collaborates with the tourism department and

attends the site inspection together at the time of visit of MoEFCC official.

4. **Conclusion:**

i. TSTDC is developing the master plan for the Manair Riverfront in two phases, totaling a 10 km stretch with 150 m on both sides. In the first phase, 3.75 km with 150 m stretch is planned on both sides of the river, and in the second phase, 6.25 km with 150 m stretch is developed as per TSTDC's RFP.

ii. The irrigation department's ongoing work (Check dam of 1,38,256.40 sqmts and two protection walls comprising 1,60,160 sqmts) caters to the foundational requirements of the Manair Riverfront project, as the tender copy shared by the Irrigation Department stated that the tender is "for the work of Protection wall, Half Weir and Half Barrage duly utilizing the intact portion of Check Dam-II, Improvements of Check DamII, Canal **for feeding Riverfront**." A copy of the tender is in **Annexure 6.**

iii. The undersigned cannot assess the total Manair Riverfront Project's exact area (size) and buildup area unless the final KML file and construction Master Plan are provided together by PPs (Telangana Irrigation Department and Tourism Department).

iv. Telangana's irrigation department has also not provided the details of studies done, as mentioned in the TSTDC RFP at point 3 (x) above, that are relevant.

v. It is observed that the two protection walls are being constructed inside the river banks on both sides at chainage 0 to 1350 mts and 2350 to 3600 mts, encroaching river bed. **(Annexure 3)**

5. Photographs of the site inspection are placed in **Annexure 7.**

(Tarun Kathula)
Scientist 'F'
Sub-Office, Hyderabad
Telangana

GOVERNMENT OF TELANGANA

ABSTRACT

Minor Irrigation – Karimnagar District - Administrative Approval for the work "Construction of Protection Wall along Manaiar River both sides on both flanks between downstream of Lower Manair Dam & Check Dam No.II" of Karminagar Rural (M) for an amount of Rs.310.464 crores - Accorded – Orders – Issued.

IRRIGATION & CAD (MI) DEPARTMENT

G.O.Rt.No. 215 **Dated: 09-06-2021.**

Read the following:-

1. From the Secretary to Chief Minister, Govt. of Telangana Letter. No.CMO / Secy / Irrigation /2020 Dated.16.09.2020
2. From the Chief Engineer, Minor Irrigation (GB), Hyderabad Letter No.DCE-II/OT1/TO1/Retaining walls/Construction of 5 Nos of Check Dams across Manair vagu/2020, Dated 07-12-2020)
3. From the Engineer-in-Chief (General), Hyderabad, Letter No. ENC(G)/ CE(I)/ DCE I/OT3/AEE7/Protection Works/2021, Dated 16-03-2021
4. From the Engineer-in-Chief (General), Hyderabad, Letter No. ENC(G)/ CE(I)/ DCE I/OT3/AEE7/Protection Works/2021, Dated.17-05-2021

.****

ORDER:-

In the references 3rd and 4th the Engineer-in-Chief (General), Hyderabad has submitted the detailed estimate for Construction of Protection Wall along Manair River both sides on both flanks between downstream of Lower Manair Dam and Check Dam No.II of Karimnagar Rural (M), Karimnagar District for an amount of Rs.335.28 cores. The Engineer-in-Chief (General), Hyderabad has also furnished the Justification report and necessity for construction of the said Protection Wall.

2. After careful examination of the matter, Government hereby accord Administrative Approval for an amount of Rs.310.464 Crores (Rupees three hundred ten crores forty six lakhs and forty thousand only) for the work "Construction of Protection Wall along Manaiar River both sides on both flanks between downstream of Lower Manair Dam & Check Dam No.II" of Karimnagar (M), Karimnagar District subject to the following conditions.

1. The Engineer-in-Chief, Irrigation, Karimnagar is responsible for the correctness of quantity and provisions made in the estimate.

2. The Engineer-in-Chief, Irrigation, Karimnagar should ensure the preparation of detailed quantity statement @ 25 m interval for removal of obstructions in the river Bed portion before according technical sanction.

3. The Engineer-in-Chief, Irrigation, Karimnagar is responsible for classification of soils for foundation of protection wall on both sides and removal of obstructions in the river Bed portion.

4. The Engineer-in-Chief, Irrigation, Karimnagar should ensure the decision on the controlled blasting is confirmed by the committee of Chief Engineers before according technical sanction.

(PTO)

3. The expenditure sanctioned in para (2) above shall be debited to the Head of Account “"4700 - 01 – 232 – 25 – 27 – 500/531.

4. The Engineer-in-Chief (General), Hyderabad shall take necessary action as per rules accordingly.

5. This order issues with the concurrence of Finance (EBS.IX) Department vide their U.O. No.802/110/A1/EBS.IX/2021, Dated 19-4-2021

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF TELANGANA)

Dr. RAJAT KUMAR
SPECIAL CHIEF SECRETARY TO GOVERNMENT

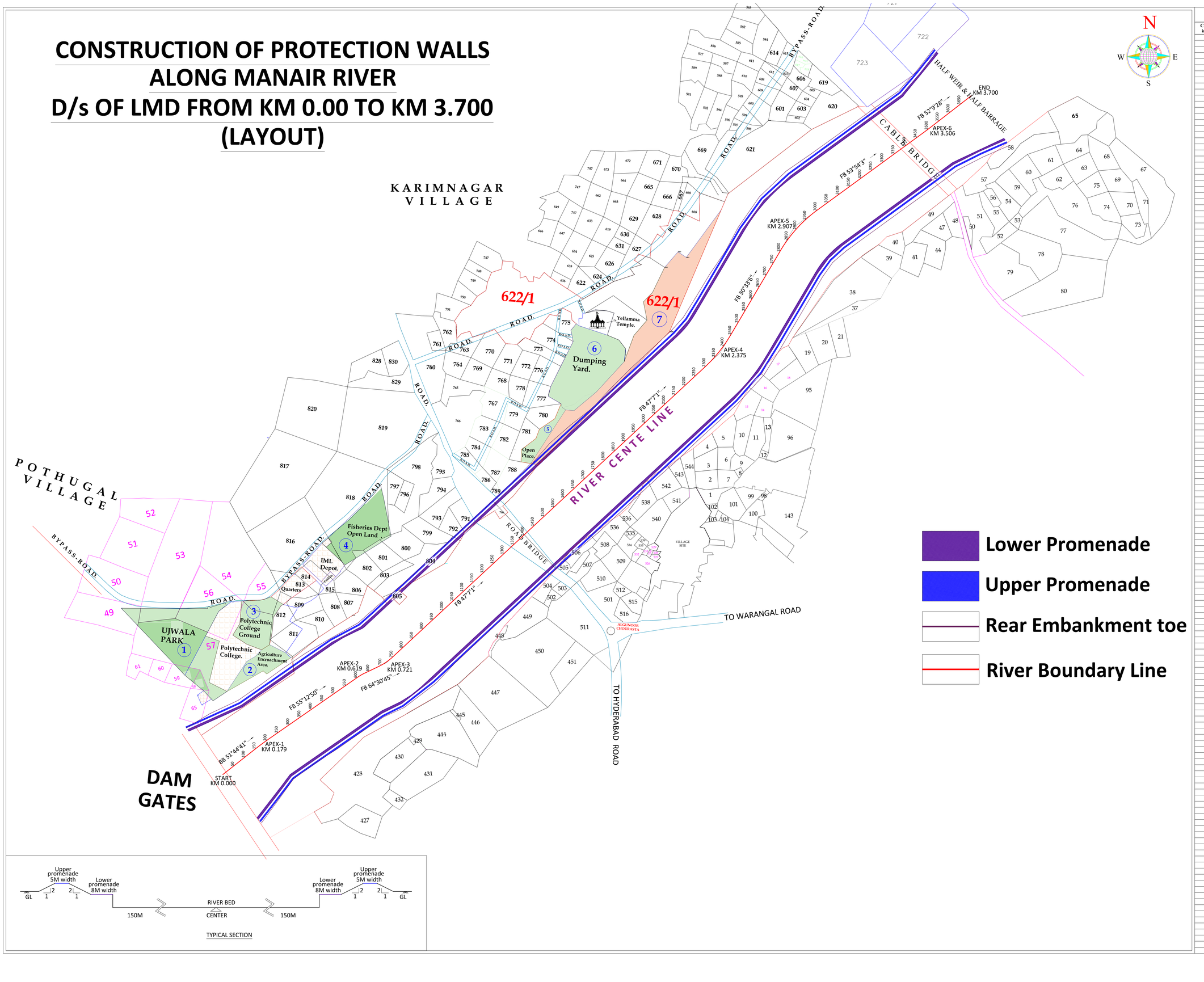
To
The Engineer-in-Chief (General), Hyderabad.
The Engineer-in-Chief, Irrigation, LMD, Karimnagr.
Copy to:-
The Accountant General, Telangana, Hyderabad.
The Director of Works & Accounts, M.J. Market Road, T.S., Hyderabad.
The Pay and Accounts Officer, Karimnagar.
The P.S. to Secretary to Hon’ble Chief Minister.
The OSD / PS to Spl. Chief Secretary to Government.
The District Collector, Karimnagar.
The PA to Deputy Secretary to Government (S).
The Deputy Director, Monitoring, I & CAD.
The Finance (EBS.IX) Department.
SF/SCs

// FORWARDED:: BY ORDER //

SECTION OFFICER


3.700 KM
Barrage
Chor Ali Baba dargah
Asian Paints Ltd Karimnagar
Ganesh temple
Maruti Suzuki ARENA Adarsha Automotives...
GVMR Filling S
HP PETROL PUMP - SRI DIVYA FUELS...
ASL Convention (Konda Satyalaxmi Gardens)
PATHABASTI LIDHURGAUSTAV...
Laxmi Narasimha Convention
NV Function Hall
1.100 KM
Karimnagar Deer Park
PAMENCAP
1.100 KM
Ujwala Park telangana tourism
AMR Unnati Convention
Image © 2024 Airbus
SR Junior College For Boys
Google Earth

CONSTRUCTION OF PROTECTION WALLS ALONG MANAIR RIVER D/s OF LMD FROM KM 0.00 TO KM 3.700 (LAYOUT)



CONSTRUCTION OF PROTECTION WALLS ALONG MANAIR RIVER
D/s OF LMD FROM KM 0.00 TO KM 3.700, KARIMNAGAR

Chainage in Mtrs.	L/s Protection Wall		Center line		R/s Protection Wall	
	Easting	Northing	Easting	Northing	Easting	Northing
0	302463.443	2035553.081	302584.181	2035399.955	302704.918	2035246.829
25	302484.071	2035567.296	302603.812	2035415.434	302720.68	2035267.216
50	302507.606	2035577.825	302623.444	2035430.913	302739.282	2035284.001
75	302531.143	2035588.351	302643.075	2035446.392	302755.008	2035304.433
100	302554.682	2035598.874	302662.707	2035461.871	302770.731	2035324.869
125	302578.225	2035609.393	302682.338	2035477.350	302786.452	2035345.307
150	302600.987	2035620.902	302701.970	2035492.830	302802.953	2035364.758
175	302626.887	2035628.431	302721.601	2035508.309	302816.316	2035388.187
200	302655.852	2035646.719	302741.429	2035523.526	302826.489	2035401.078
225	302676.384	2035660.982	302761.962	2035537.789	302847.539	2035414.596
250	302696.916	2035675.245	302782.494	2035552.052	302868.071	2035428.859
275	302717.449	2035689.507	302803.026	2035566.314	302888.604	2035443.121
300	302737.981	2035703.77	302823.558	2035580.577	302909.136	2035457.384
325	302758.513	2035718.033	302844.090	2035594.840	302929.668	2035471.647
350	302779.045	2035732.296	302864.622	2035609.103	302950.2	2035485.91
375	302799.577	2035746.559	302885.155	2035623.366	302970.732	2035500.173
400	302820.109	2035760.822	302905.687	2035637.629	302991.264	2035514.436
425	302840.641	2035775.085	302926.219	2035651.892	303011.796	2035528.699
450	302861.173	2035789.348	302946.751	2035666.155	303032.328	2035542.962
475	302881.706	2035803.611	302967.283	2035680.418	303052.86	2035557.225
500	302902.238	2035817.874	302987.815	2035694.681	303073.392	2035571.488
525	302922.77	2035832.136	303008.347	2035708.943	303093.925	2035585.75
550	302943.303	2035846.399	303028.880	2035723.206	303114.457	2035600.013
575	302963.835	2035860.662	303049.412	2035737.469	303134.989	2035614.276
600	302984.367	2035874.925	303069.944	2035751.732	303155.521	2035628.539
625	303004.899	2035889.188	303090.476	2035765.995	303176.853	2035642.691
650	303047.759	2035913.495	303112.306	2035778.093	303176.31	2035642.433
675	303070.326	2035924.253	303134.873	2035788.851	303199.42	2035653.449
700	303092.893	2035935.011	303157.440	2035799.609	303221.987	2035664.207
725	303110.437	2035943.335	303179.977	2035810.428	303249.517	2035677.521
750	303100.197	2035936.223	303200.457	2035824.653	303300.716	2035713.082
775	303118.127	2035950.04	303218.784	2035841.655	303320.86	2035731.744
800	303135.027	2035968.579	303237.103	2035858.668	303339.179	2035748.756
825	303153.346	2035985.592	303255.422	2035875.681	303357.497	2035765.769
850	303171.664	2036002.605	303273.740	2035892.693	303375.816	2035782.782
875	303189.983	2036019.617	303292.059	2035909.706	303394.134	2035799.794
900	303208.302	2036036.63	303310.377	2035926.718	303412.453	2035816.807
925	303226.62	2036053.643	303328.696	2035943.731	303430.772	2035833.819
950	303244.938	2036070.656	303347.014	2035960.744	303449.09	2035850.833
975	303263.257	2036087.668	303365.333	2035977.756	303467.409	2035867.845
1000	303281.576	2036104.68	303383.652	2035994.769	303485.728	2035884.857
1025	303299.894	2036121.693	303401.970	2036011.782	303504.046	2035901.87
1050	303318.213	2036138.706	303420.289	2036028.794	303522.365	2035919.882
1075	303336.531	2036155.719	303438.607	2036045.807	303540.683	2035935.896
1100	303354.85	2036172.731	303456.926	2036062.819	303559.002	2035952.908
1125	303373.169	2036189.743	303475.245	2036079.832	303577.321	2035969.92
1150	303391.487	2036206.756	303493.563	2036096.845	303595.639	2035986.933
1175	303409.806	2036223.769	303511.882	2036113.857	303613.958	2036003.945
1200	303428.124	2036240.782	303530.200	2036130.870	303632.276	2036020.959
1225	303446.443	2036257.794	303548.519	2036147.883	303650.594	2036037.971
1250	303464.762	2036274.806	303566.838	2036164.895	303668.914	2036054.983
1275	303483.08	2036291.819	303585.156	2036181.908	303687.232	2036071.996
1300	303501.399	2036308.832	303603.475	2036198.920	303705.551	2036089.009
1325	303519.717	2036325.845	303621.793	2036215.933	303723.869	2036106.022
1350	303538.036	2036342.857	303640.112	2036232.946	303742.187	2036123.034
1375	303556.355	2036359.87	303658.430	2036249.958	303760.506	2036140.047
1400	303574.673	2036376.883	303676.749	2036266.971	303778.825	2036157.059
1425	303592.992	2036393.895	303695.068	2036283.984	303797.143	2036174.072
1450	303611.31	2036410.908	303713.386	2036300.996	303815.462	2036191.085
1475	303629.629	2036427.92	303731.705	2036318.009	303833.781	2036208.097
1500	303647.948	2036444.933	303750.023	2036335.021	303852.099	2036225.11
1525	303666.266	2036461.946	303768.342	2036352.034	303870.418	2036242.122
1550	303684.585	2036478.958	303786.661	2036369.047	303888.736	2036259.135
1575	303702.903	2036495.971	303804.979	2036386.059	303907.055	2036276.148
1600	303721.222	2036512.983	303823.298	2036403.072	303925.374	2036293.16
1625	303739.54	2036529.996	303841.616	2036420.085	303943.692	2036310.173
1650	303757.859	2036547.009	303859.935	2036437.097	303962.011	2036327.185
1675	303776.178	2036564.021	303878.254	2036454.110	303980.329	2036344.198
1700	303794.497	2036581.034	303896.572	2036471.122	303998.648	2036361.211
1725	303812.815	2036598.046	303914.891	2036488.135	304016.967	2036378.223
1750	303831.133	2036615.059	303933.209	2036505.148	304035.285	2036395.236
1775	303849.452	2036632.072	303951.528	2036522.160	304053.604	2036412.249
1800	303867.77	2036649.085	303969.846	2036539.173	304071.922	2036429.262
1825	303886.09	2036666.097	303988.165	2036556.185	304090.241	2036446.274
1850	303904.408	2036683.109	304006.484	2036573.198	304108.56	2036463.286
1875	303922.726	2036700.123	304024.802	2036590.211	304126.878	2036480.299
1900	303941.045	2036717.135	304043.121	2036607.223	304145.197	2036497.312
1925	303959.363	2036734.148	304061.439	2036624.236	304163.515	2036514.325
1950	303977.682	2036751.16	304079.758	2036641.249	304181.834	2036531.337
1975	303996.001	2036768.172	304098.077	2036658.261	304200.153	2036548.349
2000	304014.319	2036785.186	304116.395	2036675.274	304218.471	2036565.362
2025	304032.638	2036802.198	304134.714	2036692.286	304236.79	2036582.375
2050	304050.956	2036819.211	304153.032	2036709.299	304255.108	2036599.388
2075	304069.275	2036836.223	304171.351	2036726.312	304273.427	2036616.4
2100	304087.594	2036853.235	304189.670	2036743.324	304291.746	2036633.412
2125	304105.912	2036870.249	304207.988	2036760.337	304310.064	2036650.426
2150	304123.775	2036886.736	304226.356	2036777.296	304328.937	2036667.856
2175	304139.905	2036902.13	304244.441	2036794.556	304348.978	2036686.982
2200	304155.754	2036917.812	304262.212	2036812.139	304368.67	2036706.467
2225	304171.319	2036933.777	304279.664	2036830.040	304388.009	2036726.303
2250	304186.593	2036950.02	304296.790	2036848.252	304406.986	2036746.484
2275	304201.572	2036966.536	304313.584	2036866.770	304425.597	2036767.004
2300	304216.251	2036983.319	304330.043	2036885.588	304443.835	2036787.857
2325	304230.625	2037000.364	304346.160	2036904.699	304461.694	2036809.034
2350	304244.69	2037017.664	304361.930	2036924.097	304479.169	2036830.529
2375	304258.441	2037035.216	304377.347	2036943.776	304496.254	2036852.337
2400	304274.011	2037055.829	304392.408	2036963.730	304511.805	2036871.632
2425	304286.89	2037072.485	304407.664	2036983.526	304528.438	2036894.568
2450	304301.716	2037092.614	304422.490	2037003.655	304543.264	2036914.697
2475	304316.543	2037112.743	304437.317	2037023.784	304558.091	2036934.825
2500	304331.369	2037132.872	304452.143	2037043.913	304572.917	2036954.954
2525	304341.325	2037147.273	304466.386	2037064.450	304591.447	2036981.627
2550	304355.129	2037168.117	304480.190	2037085.294	304605.251	2037002.47
2575	304368.91	2037188.933	304493.991	2037106.139	304619.072	2037023.345
2600	304382.709	2037209.78	304507.790	2037126.986	304632.871	2037044.192
2625	304392.723	2037225.726	304521.100	2037148.142	304649.477	2037070.558
2650	304405.652	2037247.122	304534.030	2037169.539	304662.407	2037091.955
2675	304418.581	2037268.514	304546.961	2037190.935	304675.341	2037113.355
2700	304431.511	2037289.911	304559.891	2037212.332	304688.27	2037134.752
2725	304446.202	2037313.64	304573.053	2037233.585	304699.904	2037153.529
2750	304459.545	2037334.782	304586.396	2037254.727	304713.246	2037174.671
2775	304477.555	2037361.681	304600.315	2037275.484	304723.075	2037189.286
2800	304491.921	2037382.141	304614.681	2037295.944	304737.441	2037209.747
2825	304511.315	2037408.21	304629.614	2037315.985	304747.912	2037223.759
2850	304526.687	2037427.926	304644.985	2037335.701	304763.283	2037243.476
2875	304547.36	2037452.992	304660.901	2037354.970	304774.442	2037256.948
2900	304563.696	2037471.916	304677.238	2037373.894	304790.779	2037275.871
2925	304585.597	2037495.918	304694.097	2037392.343	304802.597	2037288.768
2950	304602.859	2037514.001	304711.360	2037410.427	304819.86	2037306.852
2975	304625.932	2037536.878	304729.120	2037428.010	304832.308	2037319.142
3000	304644.077	2037554.076	304747.265	2037445.208	304850.453	2037336.34
3025	304668.264	2037575.771	304765.882	2037461.882	304863.5	2037347.993
3050	304687.245	2037592.04	304784.864	2037478.152	304882.481	2037364.262
3075	304712.487	2037612.5	304804.291	2037493.874	304896.095	2037375.248
3100	304732.258	2037627.8	304824.062	2037509.174	304915.866	2037390.548
3125	304755.689	2037645.347	304844.075	2037524.153	304932.461	2037402.959
3150	304775.888	2037660.078	304864.274	2037538.884	304952.66	2037417.69
3175	304796.104	2037674.819	304884.474	2037553.614	304972.843	2037432.408
3200	304816.305	2037689.547	304904.675	2037568.342	304993.044	2037447.136
3225	304836.506	2037704.275	304924.876	2037583.070	305013.246	2037461.864
3250	304856.706	2037719.004	304945.077	2037597.799	305033.446	2037476.593
3275	304876.908	2037733.732	304965.278	2037612.527	305053.647	2037491.321
3300	304897.109	2037748.46	304985.479	2037627.255	305073.848	2037506.049
3325	304917.309	2037763.189	305005.679	2037641.983	305094.049	2037520.778
3350	304937.51	2037777.917	305025.880	2037656.712	305114.25	2037535.506
3375	304957.711	2037792.645	305046.081	2037671.440	305134.451	2037550.234
3400	304977.912	2037807.374	305066.282	2037686.168	305154.652	2037564.963
3425	304998.113	2037822.102	305086.483	2037700.897	305174.853	2037579.691
3450	305018.314	2037836.83	305106.684	2037715.625	305195.054	2037594.419
3475	305038.515	2037851.558	305126.885	2037730.353	305215.255	2037609.147
3500	305058.716	2037866.287	305147.086	2037745.082	305235.455	2037623.876
3525	305075.008	2037878.612	305167.028	2037760.154	305259.048	2037641.696
3550	305091.684	2037897.897	305186.771	2037775.490	305281.858	2037653.083
3575	305105.288	2037921.128	305206.514	2037790.827	305307.739	2037660.526
3600	305121.963	2037940.415	305226.256	2037806.165	305330.549	2037671.915
3625	305137.871	2037960.687	305245.999	2037821.502	305354.126	2037682.317
3650	305153.78	2037980.959	305265.742	2037836.839	305377.703	2037692.718
3675	305169.688	2038001.233	305285.484	2037852.176	305401.28	2037703.119
3700	305185.596	2038021.506	305305.227	2037867.514	305424.857	2037713.521

Lower Promenade

Upper Promenade

Rear Embankment toe

River Boundary Line

GOVERNMENT OF TELANGANA

TELANGANA STATE TOURISM DEVELOPMENT CORPORATION LTD.

REQUEST FOR PROPOSAL

FOR

SELECTION OF
MASTER PLANNING, ARCHITECTURAL & ENGINEERING CONSULTANT
FOR RIVERFRONT DEVELOPMENT WITH TOURISM FACILITIES AT LOWER MANAIR DAM, KARIMNAGAR DISTRICT, TELANGANA

June 2021

Telangana State Tourism Development Corporation Ltd (TSTDC)
Tourism House, Himayathnagar, Hyderabad - 500 027 India

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SCHEDULE OF TENDER PROCESS

Event Description	Scheduled Date
RFP upload on TSTDC website (www.tstdc.in / https://tourism.telangana.gov.in/tenders)	***21.06.2021***
Due date and time for sending queries	**16.00 Hrs (IST) on 26.06.2021**
Due date for Receipt of Bids	**16:00 Hrs (IST) on *05.07.2021***
Date and Time of Opening Bids (Outer Envelope & Envelope-1)	**16:30 Hrs (IST) on *05.07.2021***
Presentation of the Applicants	**Will be intimated to the applicants meeting the criteria given in the RFP**
Opening of Envelope II (Financial Proposal)	**Will be intimated to the qualified applicants only**

DISCLAIMER

1. The information contained in this Request for Proposal document ("RFP") or subsequently provided to Applicants (Firms), whether verbally or in documentary or any other form by or on behalf of Telangana State Tourism Development Corporation Ltd (TSTDC) (herein after referred to as TSTDC / The Authority) or any of its employees, 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.

2. This RFP is not an agreement or an offer by 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 & submission of their Proposals pursuant to this RFP.

3. This RFP includes statements, which reflect various assumptions and assessments arrived at by the Authority in relation to the Consultancy. Such assumptions, assessments and statements do not purport to contain all the information that each Applicant may require.

4. This RFP may not be appropriate for all persons, and it is not possible for the Authority and its employees 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 may be on a wide range of matters, some of which may depend upon interpretation of 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 law. The Authority accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.

5. The Authority and its employees/ advisors 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.

6. The Authority also accepts no liability of any nature whether resulting from negligence or otherwise however caused arising from reliance of any Applicant upon the statements contained in this RFP.

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

8. The issue of this RFP does not imply that the Authority is bound to select an Applicant or to appoint the Selected Applicant, as the case may be, for the Consultancy and the Authority reserves the right to reject all or any of the Proposals without assigning any reasons whatsoever.

DEFINITIONS

a) "Employer/Client" means Telangana State Tourism Development Corporation Ltd. (TSTDC) and its representatives.

b) "Consultant" means any entity or firm that may provide or provides the Services to the Client under the Contract.

c) "Data Sheet" means such part of the Instructions to Consultants used to reflect specific assignment conditions.

d) "Employer's Representative" means the person / personnel of consultant appointed by the client to act as the Employer's representative to oversee the activities of consultant from time to time and as directed by TSTDC

e) "Day" means calendar day.

f) "Government" means the Government of Telangana.

g) "Information to Consultants" means the document, which provides Consultants with all information needed to prepare their Proposals.

h) "LOI" means the Letter of Invitation extended by the Client to the prospective Bidders.

i) "Personnel" means professionals and support staff provided by the Consultant, assigned to perform the Services or any part thereof. "Local Personnel" means such professionals and support staff who at the time of being so provided had their domicile inside the Government's country.

j) "RFP" means the 'Request for Proposal' prepared by the Client for the selection of consultants.

k) "Services" means the work to be performed by the Consultant pursuant to the Contract.

l) "Associate(s)" means any person(s) or entity with whom the Consultant delivers/provides any part of the Services.

m) "Terms of Reference" (ToR) means the section included in the RFP which explains the objectives, scope of work, activities, tasks to be performed, respective responsibilities of the Client and the Consultant, and expected results and deliverables of the assignment.

1. LETTER OF INVITATION

1. LETTER OF INVITATION

1.1 Lower Manair Dam (LMD), constructed across River Manair, is one of the most attractive location with serene waters and mesmerizing landscapes offering delightful treat to the tourists. Located adjacent to Karimnagar town in Karimnagar district, Telangana state, the dam is the water gateway to the district, inviting tourists to experience its flavor. It is already a tourist destination attracting good number of visitors during monsoon season. Year-round availability of water in the reservoir makes it a vantage point to unwind and relish water sports and various other activities.

1.2 Keeping in view the picturesque view of natural blue waters blended with scenic surroundings, vast green pastures, **Telangana State Tourism Development Corporation Ltd. (TSTDC)** intends to **develop Lower Manair Dam Reservoir as a LEISURE & ENTERTAINMENT HUB** with state of art facilities.

1.3 As part of the development process, TSTDC intends to procure a **"MASTER PLANNING, ARCHITECTURAL & ENGINEERING CONSULTANT"** for preparation of an "Integrated Master Plan and Infrastructure Design" for proposed Greenfield Riverfront development with Tourism Facilities Project spread about 10 km downstream of Lower Manair Dam including the river banks upto 150 m on the either side of the river integrating the government lands available for development. More details on the services required are provided in the Terms of Reference (TOR) of this Request for Proposal (RFP).

1.4 Proposal submissions must be received not later than the due date specified in the **"Schedule of Tender Process"** in the manner specified in the RFP document at the address given below.

The Executive Director
Telangana State Tourism Development Corporation Ltd.
Tourism House, No.3-5-891
Himayat Nagar
Hyderabad – 500029
Ph: +91 99660 00393, e-mail: edprojects@tstdc.in

1.5 This RFP has following sections:

Section – 1	Letter of Invitation
Section – 2	Instructions to Applicants
Section – 3	Data Sheet

Section – 4	Preparation, Submission and Evaluation of Proposals
Section – 5	Terms of Reference
Section – 6	Formats for Proposal Submission (Annexures)

1.6 The Consultant Firm will be selected through Competitive Bidding under Quality & Cost Based Selection (QCBS) method as described in this RFP. The Technical Proposals would be evaluated based on the qualification criteria set forth in the RFP. Financial Proposals (Price Bids) of only those firms, whose Technical Proposals qualify, will be opened and evaluated.

1.7 The Proposals shall be filled in English and all entries must be typed and written in blue/black ink. Initials of the Authorised representative of the applicant must attest all erasures and alterations made while filing the proposal. Over writing of figures in the Price Proposal is not permitted. Failure to comply with any of these conditions may render the Proposal invalid.

1.8 TSTDC shall not be responsible for any costs or expenses incurred by the applicant in connection with the preparation and delivery of Proposals, including costs and expenses related to visit to the site. TSTDC reserves the rights to cancel, terminate, change or modify this procurement /Proposal Process and /or requirements of proposal stated in the RFP, without assigning any reason or providing any notice and without accepting any liability for the same.

1.9 The Proposal shall be valid for a period of not less than 180 days from the Proposal Due Date (the "PDD"). In exceptional circumstances, prior to the expiry of the original proposal validity period, the authority may request the firms to extend the period of validity for a specified additional period. The request for the extension shall be made in writing. However, Firms will not be permitted to modify their submitted proposals.

Date: 21.06.2021

Managing Director

Telangana State Tourism Development Corporation

2. INSTRUCTIONS TO APPLICANTS

2. INSTRUCTIONS TO APPLICANTS

2.1 Applicants are encouraged to inform themselves fully about the assignment and the local conditions before submitting the Proposal.

2.2 Broad description of the objectives, scope of services, deliverables, and other requirements relating to this Consultancy are specified in this RFP. The applicant firm with requisite experience and capabilities is invited to participate in the Selection Process individually (the "Sole Firm"). **No Consortiums are allowed for bidding the project**.

2.3 Proposals shall be prepared and submitted in the manner elaborated in this RFP as per the formats / annexures provided.

2.4 No Applicant or its Associate shall submit more than one Application for the Consultancy. In case the Applicant does not possess the Qualifications / Experience specified as Minimum Eligibility Criteria / Experience Criteria in Para 6 (ii) b. of DATA SHEET, it may associate with Sub-Consultant(s) fulfilling the specified Minimum Eligibility Criteria / Experience Criteria. However, in such case an MoU between the Applicant and the Sub-Consultant(s) will need to be submitted along with the Proposal, confirming the willingness and availability of the Sub-Consultant(s) to work as Sub-Consultant to the Applicant, for the assignment. Applicants shall not be permitted to change/replace the Sub-Consultant(s), unless the new Sub-Consultant(s) proposed, fulfills the specified Minimum Eligibility Criteria / Experience Criteria and are acceptable to the TSTDC (The TSTDC reserves its right not to permit the replacement of Sub-Consultant(s)).

2.5 Any entity which has been barred by any agency of the Central Government, any State Government, any Statutory Authority or any public sector undertaking, as the case may be, from participating in any project, and the bar subsists as on the date of the Proposal, would not be eligible to submit a Proposal either by itself or through its Associate nor participate as Sub-Consultant(s) in the assignment.

2.6 TSTDC reserves the right to terminate a firm's participation in the tender process at any time, without the prior consent, in case TSTDC consider that a firm or any of its Sub-Consultant(s) have failed to comply with any of the procedures and requirements prescribed in the RFP.

2.7 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 Authority;
c. accepted the risk of inadequacy, error or mistake in the information provided in the RFP or furnished by or on behalf of the Authority or relating to any of the matters referred in the RFP;

d. satisfied itself about all matters, things and information, including matters referred herein, necessary and required for submitting an informed Application and performance of all of its obligations there under;
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.

2.8 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 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 Authority.

2.9 The Proposal of a firm shall be liable for disqualification in the event of the following:

a. If the firm refuses to accept the correction of errors in its proposal, (or)

b. If the Firm submits a conditional Proposal which would affect unfairly the competitive provision of other firms who submitted substantially responsive proposal and/or is not accepted by TSTDC.

2.10 AMENDMENT TO RFP

a. At any time prior to the due date for submission of Proposal, the Authority may, for any reason, whether at its own initiative or otherwise, modify the RFP document by issuing Addendum/ Amendment.

b. In order to provide the Applicants with reasonable time for taking an amendment into account, or for any other reason, the Authority may, in its sole discretion, extend the Due Date of Bid submission.

c. The above changes & amendments, if any, will be notified only in our website i.e., www.tstdc.in / https://tourism.telangana.gov.in/tenders.

2.11 CONFLICT OF INTEREST

a. The Authority expects that the Consultant provides professional, objective, and impartial advice and at all times hold the Authority's interests paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The Consultant 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 Authority.

b. An Applicant shall not have a conflict of interest that may affect the Selection Process or the Consultancy (the "Conflict of Interest"). Any Applicant found to have a Conflict of Interest shall be disqualified.

c. An Applicant shall be deemed to have a Conflict of Interest affecting the Selection Process, if:

i. a constituent of such Applicant is also a constituent of another Applicant; (or)
ii. such Applicant or its Associate receives or has received any direct or indirect subsidy or grant from any other Applicant or its Associate; (or)
iii. such Applicant has the same legal representative for purposes of this Application as any other Applicant; (or)
iv. if a firm is engaged by the Authority to provide goods or works or services and if the Associate/s of such firm is engaged for providing consulting services for the same project and vice versa.

2.12 Right to terminate the process

a. TSTDC may terminate the RFP process at any time and without assigning any reason. TSTDC makes no commitments, express or implied, that this process will result in a business transaction with anyone; and

b. This RFP does not constitute an offer by TSTDC. The Bidder's participation in this process may result in TSTDC selecting the Bidder to engage towards execution of the contract.

2.13 RFP Document

a. The Bidder shall download the RFP documents from the website www.tstdc.in / https://tourism.telangana.gov.in/tenders.

2.14 Earnest Money Deposit

a. Bidders shall submit, along with their Bids, EMD of INR 1,00,000/- (INR One Lakh only), in the form of a Demand Draft issued by any Nationalized/ Scheduled Bank in favor of the "TSTDC Ltd". and payable at Hyderabad.

b. EMD of all unsuccessful Bidders would be refunded by TSTDC within 30 days of the bidder being notified as being unsuccessful. The EMD, for the amount mentioned above, of Successful Bidder would be returned upon submission of Performance Bank Guarantee as per the bank guarantee format provided;

c. The EMD amount is interest free and will be refundable to the unsuccessful Bidders without any accrued interest on it;

d. The Bid / Proposal submitted without EMD, mentioned above, will be summarily rejected; and

e. The EMD may be forfeited:

   i. If a Bidder withdraws its bid during the period of bid validity; and
   ii. In case of a successful Bidder, if the Bidder fails to sign the contract in accordance with this RFP.

f. The corrigendum (if any) & clarifications to the queries from all Bidders will be posted only on the website www.tstdc.in / https://tourism.telangana.gov.in/tenders.

g. Any such corrigendum shall be deemed to be incorporated into this RFP; and

h. In order to provide prospective Bidders reasonable time for taking the corrigendum into account, TSTDC may, at its discretion, extend the last date for the receipt/ submission of Proposals.

3. DATA SHEET

3. DATA SHEET

S.No.	Key Information	Details
	RFP Details	
1.	**Project**	Selection of Master Planning, Architectural and Engineering Consultant for Riverfront Development with Tourism Facilities at Lower Manair Dam in Karimnagar District, Telangana as a Leisure & Entertainment Hub.
2.	**Authority**	Telangana State Tourism Development Corporation Ltd (TSTDC)
3.	**Earnest Money Deposit**	INR 1,00,000/- (INR One Lakh only), in the form of a Pay Order / Demand Draft issued by any Nationalized/ Scheduled Bank in favor of "TSTDC Ltd" and payable at Hyderabad
	Proposal Conditions and Evaluation	
4.	**Proposal Validity**	180 days from the Proposal Due Date (PDD)
5.	**Minimum Eligibility Criteria** The consultancy firms shall meet all the following eligibility criteria (i), (ii), (iii):	
(i)	**General**	1) The Applicant Consultancy Firm to be in the business of Consultancy Services for a minimum of 10 (ten) years, prior to the Proposal Due Date
(ii)	**Technical Criteria**	**(a) Master Planning Experience** • The Applicant should have provided consultancy services for preparation of Master Plan for at least two (2) *"Waterfront (along river, lake or coast) Development Projects"* with Project Cost of minimum INR 50.0 Cr each, within the past 10 years. **(b) Infrastructure Design Experience** • The applicant should have provided consultancy services for preparation of Infrastructure Design including detail engineering for at least two (2) *"Waterfront (along river, lake or coast) Development Projects"* with Project Cost (infrastructure components) of minimum INR 50.0 Cr each, within the past 10 years
(iii)	**Financial Criteria**	• Minimum Average Annual turnover of applicant shall be equivalent to INR 10.0 Cr from Architectural / Engineering /Design Consultancy Services in the three financial years (2017-18, 2018-19 & 2019-20 or 2018-19, 2019-20 & 2020-21) as Certified by the Statutory

S.No.	Key Information	Details
		Auditors / Registered Chartered Account Firm.
6.	**Proposal Evaluation**	• Technical and Financial Evaluation of applicants that meets the minimum eligibility criteria will only be undertaken. Applicants not meeting the minimum eligibility criteria are deemed to be disqualified from further tender evaluation process. • Technical Evaluation: Minimum score required for technical qualification is 80 marks (max. marks = 100). • Financial Evaluation: Price bids of technically qualified firms will only be opened. Lowest Price Quote will be awarded 100 marks and remaining proposals will be marked proportionately in reference to lowest quote. • Combined Evaluation (Technical & Financial): Quality and Cost Based System (QCBS) evaluation criteria in the ratio of 80: 20 (80% technical and 20% financial weightage) as detailed in RFP. • The Technical Proposal evaluation criteria is detailed in clause 4.8 of this RFP. • **The Applicant shall make available all Key Personnel meeting the requirements specified in Clause 4.8.2**
7.	**Presentation**	• At the time of technical proposal evaluation, the Consultants may be called by TSTDC for presentation on their experience, proposed approach and methodology, work Plan and the experience of Key personnel. The date and time for the presentation shall be communicated by TSTDC only to the Consultant fulfilling the Minimum Eligibility Criteria. • The applicant shall bear all costs pertaining to the preparation of the sample master plan and the presentation. • The Consultant along with its Team Leader shall be required to attend the same. In case the Consultant remains absent for the same, TSTDC reserves the right to proceed with the evaluation of the Proposal by considering the consultant as absent.
8.	**Criteria for selection of**	• The sole criterion for selection of consultant is the combined highest score of technical and financial proposals in the ratio of 80:20.

S.No.	Key Information	Details
	Consultant	
	Proposal Submissions	
9.	**Outer Envelope**	• Covering Letter ~ Annexure 1 • Bid Security • Envelope 1 & Envelope 2 as detailed in Section 4
10.	**Envelope 1:** **Technical Proposal**	• Signed RFP document along with Addendums/ Corrigendum • Checklist of Submissions ~ Annexure 1 • Covering Letter - Technical Proposal - Annexure 2 • Financial Details ~ Annexure 3 • Power of Authority to Bid Signatory ~ Annexure 4 • Similar Experience ~ Annexure 5 • Team Composition as required by RFP ~ Annexure 6 • MoU with Sub-Consultant(s), if applicable • ***Above documents needs to be submitted with binding and proper numbering of pages with initials of authorised signatory in each page.***
11.	**Envelope 2:** **Fee Proposal**	The Applicants shall be required to submit their Fee Proposals in the format (Annexure 7) as provided in the RFP duly filled and signed.
12.	**Performance Security**	The selected Consultant need to submit a performance security of 5% of the estimated fee of the assignment to TSTDC in the form of Bank Guarantee, before signing the consultancy agreement. Validity of the Bank Guarantee shall be 36 months.

4. PREPARATION, SUBMISSION AND EVALUATION OF PROPOSALS

4. PREPARATION, SUBMISSION AND EVALUATION OF PROPOSALS

4.1 GENERAL

a. The applicant firms shall bear all the costs associated with the preparation and submission of its proposal, including any site visits, field investigations, data collection, analysis, etc. as also any discussions/negotiations. The authority shall not be responsible or liable for any such costs incurred.

b. Adherence to formats, wherever prescribed, is required. Non-adherence to formats might be a ground for declaring a proposal non-responsive.

c. All communication and information shall be provided in writing and in English language only.

d. All communication and information provided should be legible, and wherever the information is given in figures, the same should also be mentioned in words. In case of conflict between amounts stated in figures and words, the amount stated in words will be taken as correct and final.

4.2 PREPARATION AND SUBMISSION OF PROPOSALS

a. The Proposals shall be prepared in separate envelopes as under.

   i. OUTER ENVELOPE: Covering Letter, Bid Security, Envelope I and Envelope II

   ii. ENVELOPE I: Technical Proposal

   iii. ENVELOPE II: Price Proposal

b. Covering Letter, Bid Security, Envelopes I and II shall be sealed, signed and placed in the Outer Envelope. The Outer Envelope, shall be properly sealed and labelled as

"PROPOSAL FOR MASTER PLANNING, ARCHITECTURAL & ENGINEERING CONSULTANT FOR RIVERFRONT DEVELOPMENT ALONG WITH TOURISM FACILITIES AT LMD, KARIMNAGAR DISTRICT, TELANGANA"

4.3 SUBMISSIONS IN ENVELOPE I (TECHNICAL PROPOSAL)

The Envelope I shall contain the following documents.

a. Signed RFP document

b. Checklist of Submissions as per **Annexure 1**

c. Covering Letter - Technical Proposal as per **Annexure 2**

d. Financial details of the applicant (Minimum average annual turnover from consultancy services in the past three (3) financial years as Certified by Chartered Accountant) **Annexure 3**.

e. Clause deleted

f. Proof of applicant showing that the firm is in the business of Consultancy Services for a minimum of 10 (ten) years, prior to the Proposal Due Date.

g. Power of Authority to Bid Signatory. **Annexure 4**

h. **Experience of the Applicant:** Details of experience of the firm shall be submitted in the format enclosed as **Annexure 5.** Experience of Associate Firms / Individuals are not allowed. In case of experience of Sub-Consultant(s) is drawn for meeting the Qualifications / Experience specified as Minimum Eligibility Criteria / Experience Criteria in para 6.(ii) b. of DATA SHEET, an MoU with Sub-Consultant(s) shall be submitted, failing which the experience shall not be considered.

Experience of completed services will only be considered. Ongoing project experience will not be considered.

i. **Team Composition:** Details of key personnel for engagement in this assignment in the format enclosed as **Annexure 6**.

j. Pen Drive comprising of entire technical proposal

Envelope I (Technical Proposal) shall be sealed, labelled as ***"TECHNICAL PROPOSAL FOR MASTER PLANNING, ARCHITECTURAL & ENGINEERING CONSULTANT FOR RIVERFRONT DEVELOPMENT ALONG WITH TOURISM FACILITIES AT LMD, KARIMNAGAR DISTRICT, TELANGANA"***

4.4 SUBMISSIONS IN ENVELOPE II (FINANCIAL PROPOSAL)

The financial proposal shall contain the Professional Fee quoted that is inclusive of transport, printing and stationery and all other out of pocket expenses except service tax. The fee proposal shall be submitted in the format enclosed as **Annexure 7.**

Envelope II (Financial Proposal) shall be sealed, labelled as ***"FINANCIAL PROPOSAL FOR MASTER PLANNING, ARCHITECTURAL & ENGINEERING CONSULTANT FOR RIVERFRONT***

DEVELOPMENT ALONG WITH TOURISM FACILITIES AT LMD, KARIMNAGAR DISTRICT, TELANGANA"

4.5 SIGNING OF PROPOSALS

The Authorized Signatory shall sign or initial each page of the proposal documents along with the stamp of the firm. They should also number, sign & stamp each page of the RFP, Corrigenda/addenda, if any & return the same along with proposal (spiral bounded) to TSTDC.

4.6 OPENING OF PROPOSALS

a. Proposals received by the due date and time and in sealed condition will only be considered for opening and evaluation. Proposals other than the above will be summarily rejected.

b. Authorised representatives of the participating firms are requested to be present during proposal opening.

c. The details of the authorised representatives (who choose to attend) present will be recorded.

d. Name of the firms that submitted the proposals will be read aloud in the presence of firm's representatives and will be recorded.

e. Each proposal will be given a number in the ascending order and will be recorded against total number of proposals. For instance, if the total number of proposals received is five, the first proposal will be recorded as 1/5, the second as 2/5 and so on.

4.7 OPENING AND EVALUATION OF OUTER ENVELOPE

a. Outer Envelope shall be opened and checked for the following and will be recorded accordingly.

   i. Covering Letter. (Annexure A)

   ii. Bid Security

   iii. Sealed Envelope I (Technical Cover).

   iv. Sealed Envelope II (Financial Cover) ~ sealed and stamped

b. Opening of Envelope-I shall be undertaken only if all the documents are submitted as above.

4.8 OPENING AND EVALUATION OF ENVELOPE I (TECHNICAL PROPOSAL)

4.8.1 Opening of Envelope I (Technical Proposal)

a. The Envelope I of the eligible proposals will be opened in the ascending order (1/5, 2/5, etc.) and checked for all the mandatory documents duly signed as per the list provided above and in the prescribed formats. TSTDC shall take a decision at its sole discretion with regard to proposals without any of the said documents or documents submitted in any other format other than the prescribed.

b. Submissions as per Annexures and supporting documents will be evaluated for Minimum Eligibility Criteria as per the Data Sheet in terms with this RFP.

c. Proposals meeting the Minimum Eligibility Criteria (Paras 6 (i), (ii) and (iii) of DATA SHEET) will only be considered for further evaluation of the Proposals.

d. Applicants not meeting any of the Minimum Eligibility Criteria (Paras 6 (i), (ii) and (iii) of DATA SHEET) as above are deemed to be disqualified and will be barred from further evaluation of their tender. No correspondence or representation will be entertained and TSTDC's decision will be final in this regard.

e. Detailed Evaluation of Technical Proposal will be taken up only if the applicant meets the Minimum Eligibility Criteria (Para 6 (i), (ii) and (iii) of DATA SHEET) as mentioned in the data sheet.

4.8.2 Evaluation of Envelope I (Technical Proposal)

In the first stage, the Technical Proposal will be evaluated on the basis of Applicant's experience, proposed methodology and Work Plan, and the experience of Key Personnel. The Applicants will be invited to make presentation on the above. The presentation shall also comprise of their understanding on the objectives of the client on the proposed project, their approach and methodology for the proposed project, their previous similar experience etc.

Only those Applicants whose Technical Proposals score more than 50 points out of 75 shall be ranked as per score achieved by them, from highest to the lowest technical score (S_T) and are invited for presentations.

The scoring criteria to be used for evaluation shall be as follows:

Sr. No.	Particulars	Marks	Criteria
1	Presentation on similar experience of the firm	**25**	Marks shall be awarded based on the quality of approach and methodology proposed by the Applicant, their previous experience and other parameters as defined in Clause 4.8.2 above.
2	Relevant Experience of Applicant	**35**	Marks will be awarded based on the overall capability of the firm, experience of similar assignments
2a	Master Planning for waterfront (along river, lake or coast) Development Projects with Project Cost of minimum INR 50.00 Cr	20	10 (Ten) marks for each waterfront (along river, lake or coast) Development Project, up to a maximum of Twenty (20) marks. No sub-consultant experience will be counted
2b	Infrastructure Design including detail engineering for waterfront (along river, lake or coast) Development Project with Project Cost (infrastructure components) of minimum INR 50.00 cr each	10	5 (five) marks for each waterfront (along river, lake or coast) Development Project up to a maximum of Ten (10) marks. In case of Sub-Consultants possessing the Experience, 2.5 (Two point five) marks for each Assignment, up to a maximum of Ten (10) marks.
2c	Average Annual Turnover (3 years) of the firm in consultancy	5	• Rs. 10 Crore or more but less than 15 Crore = 3 (three) Marks • More than Rs. 15 Crore = 5 (five) Marks

3.	Relevant Experience of the Key Personnel	**40**	Key Personnel having desired Educational qualification and No. of years' experience shall be considered. Each Key Personnel will be eligible for marking (as below) only if each of them meets the Minimum Specific Experience for Eligibility stipulated in Clause 5.4.
3a.	Team Leader	20	The CVs of the staff members qualifying minimum criteria shall be evaluated as per General Qualification such as Education (25%), Professional Experience (15%) and Project related Experience (60%)
3b.	Urban and Regional Planner	10	
3c.	Infrastructure Planning Expert	05	
3d.	Infrastructure Design Expert	05	
	Grand Total (1 +2 +3)	**100**	

The technical proposals shall be evaluated by TSTDC and marks will be awarded based on TSTDC's evaluation. TSTDC's decision is final and no negotiations/ clarifications/ queries/ etc. shall be entertained in this regard.

It is clarified that while for the purpose of evaluation of this proposal, marks would be provided to only the above team members, however for providing the services, the Consultant shall bring in the additional experts as may be required for providing the specified services.

4.9 OPENING AND EVALUATION OF ENVELOPE II (FINANCIAL PROPOSAL)

a. The Envelope II of those Firms that scored a minimum of Eighty (80) marks in the technical proposal (Envelope I) will only be opened.

b. The Price / Fee proposals shall be checked for substantial compliance. If the submission is in substantial compliance with the Price / Fee Proposal format, then the review and evaluation of the same would be undertaken. If the submission does not satisfy the criteria, the submission will be rejected and such firm will be eliminated from further evaluation process.

c. The Fees shall be computed and paid by TSTDC only in INDIAN RUPEES.

d. The proposal shall be inclusive of all taxes applicable, except applicable GST, which shall be paid extra by TSTDC, as applicable.

e. Requirements for Substantial Compliance: Prior to the detailed evaluation of the Price Proposal, it would be determined whether each Price Proposal:

i. Has been properly signed and contains the required representations or commitments;

ii. Is presented in a manner that conforms with the requirements of the RFP including the specified format;

f. Material Deviation: A material deviation or reservation is one

i. Which affects in any substantial way the requirements of the RFP and performance of the Project; or

ii. Which is substantially inconsistent with the requirements of the RFP.

iii. Whose rectification would affect unfairly the competitive provision of other competing firms presenting substantially responsive proposals.

g. **Evaluation:**

Only for the purpose of evaluation, the % Fee quoted for the Infrastructure Design shall be converted into absolute value (assuming the cost of infrastructure to be INR 100 Crores) and added to the Lumpsum Fee quoted for the Master Planning services.

The Bidder that has the lowest number (L1) among all the other Fee proposals opened shall be given one hundred (100) marks. The remaining (L2, L3, L4, etc.) will be marked in reference to L1. For Example, if L1's quote / absolute number is 'A' and L2 is 'B', then L1 = 100 marks and L2 = A/B*100 marks).

4.10 COMBINED EVALUATION OF TECHNICAL AND FINANCIAL PROPOSALS UNDER QCBS

This is the final stage of proposal evaluation. As per the predefined QCBS evaluation criteria, 80% weightage will be given to technical score and 20% to the financial score. Accordingly, 80% of the technical marks and 20% of the financial marks will be combined/ summed up to arrive at the final marking. For example, if the technical score of a particular firm is 80 marks and financial score is 90 marks, then the combined technical and financial score in the ratio of 80:20 will be as computed below.

- 80 percent of technical score = 0.8 * 80 = 64 marks
- 20 percent of financial score = 0.2 * 90 = 18 marks
- **Total combined score = 82 marks**

4.11 CRITERIA FOR SELECTION OF CONSULTANT

The sole criterion for selection of the consultant is the highest combined technical and financial scores in the ratio of 80:20 respectively (80% technical score and 20% financial score). In the event of more than one firm score the same highest marks, TSTDC may call those firms (limited to only such firms) for negotiation/ resubmission of the financial proposal. In such a case, firm that offers the lowest price quote will be the selected as the consultant.

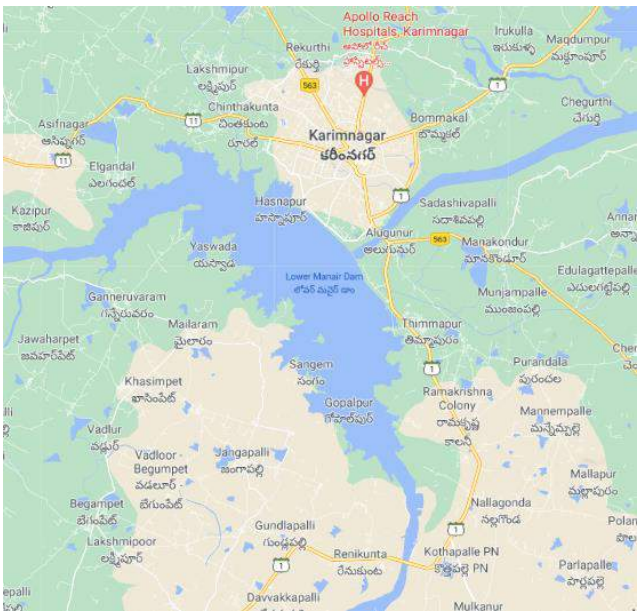
5. TERMS OF REFERENCE

5. TERMS OF REFERENCE

5.1 PROJECT CONTEXT

5.1.1 Background

Lower Manair Dam (LMD), constructed across River Manair, is one of the most attractive destinations with serene waters and mesmerizing landscapes offering delightful treat to the tourists. Located adjacent to Karimnagar town in Karimnagar district, Telangana state, the dam is the water gateway to the district, inviting tourists to experience its flavor. It is already a tourist destination attracting good number of tourists during monsoon season. Year round availability of water in the reservoir makes it a vantage point to unwind and relish water sports and various other activities.



Keeping in view the picturesque view of natural blue waters blended with scenic surroundings, vast green pastures, **"Telangana State Tourism Development Corporation Ltd. (TSTDC)"** intends to **develop Lower Manair Dam Reservoir as a LEISURE & ENTERTAINMENT HUB** with state of art facilities.

The Scope of Services envisages the following:

i. Master Planning of 10 km stretch at the downstream of Lower Manair Dam including the river banks upto 150 m on the either side of the river integrating the government lands available for development.



ii. Preparation of an Infrastructure Master Plan for a stretch of 3.75 km (Phase-I) stretch at the

downstream of Lower Manair Dam, comprising Design of Urban Infrastructure including Trunk & internal Roads, water supply, Storm water drainage & management, Sewerage, Solid Waste Management & disposal, Rain water harvesting, Electrical system, ICT network, Fire Fighting, smart street lighting & illumination, Surveillance & safety, Public Address system, Landscape design, City entry- exit schemes, Public Mobility plan, crowd management and other Modern infrastructure.

iii. Detailed Engineering Design services for a stretch of 3.75 km for the implementation of Infrastructure Components at the downstream of Lower Manair Dam.

The said project would require Architecture conceptualization, preparation of Master Plans, presentation drawings, statuary submission drawings (wherever applicable), working drawings, Good for Construction drawings, BOQs etc. for implementation of specific Project components. In this regard, through this RFP, TSTDC has invited proposals from reputed firms to provide **Master Planning, Architectural and Engineering Consultancy Services for Riverfront development along with Tourism Facilities at the downstream of LMD, Karimnagar**.

In response to this RFP, it is expected that a reputed firms having similar experience, know-how of the local conditions, bye-laws, laws, ground conditions, laws, etc. would participate in the bidding process.

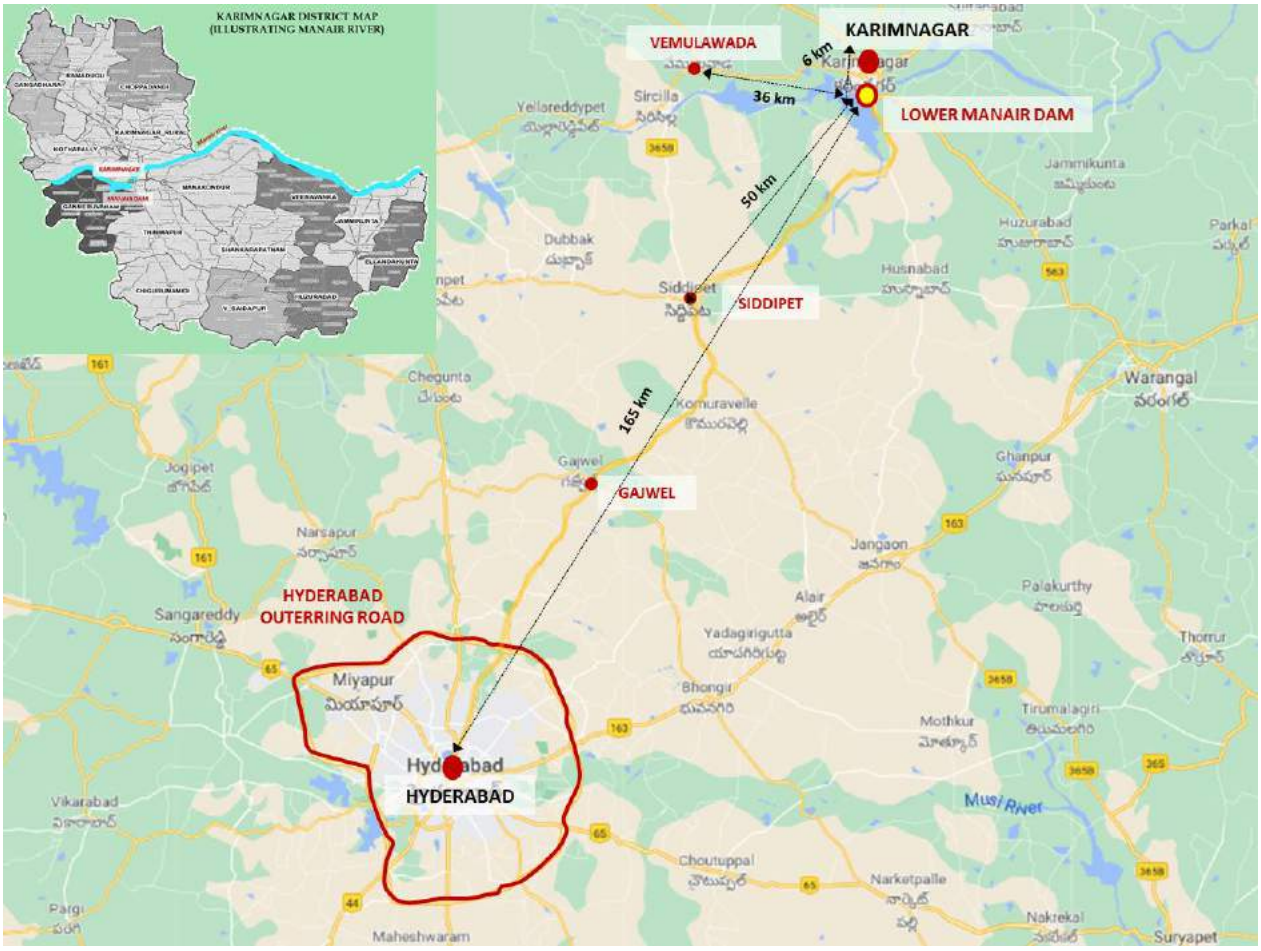
The detailed services of the selected firm shall, as such, not be limited to preparation of detailed designs, presentation drawings, statuary submission drawings, tender drawings, tender documents, BOQs as per CPWD & State Schedule of Rates, Structural / RCC Designs & Drawing (wherever applicable), Item specifications and good for construction drawings for implementation of specific components and site inspections during the implementation of works.

The Consultant shall prepare design solution that is visually pleasing and brings a long term value for the investment made. All the landscape elements proposed shall be integrated with tourism interventions, ecology and local economy.

5.1.2 Project Location and Connectivity

i. Location

Project site is located in Karimnagar District at a distance of approximately ~6 km from Karimnagar Town and about 165 km from Hyderabad. Location of project site depicted in the map below:



(Indicative site Coordinates: 18^{0}23′56.00″ N and 79^{0}07′46.00″E)

Salient Features of Lower Manair Dam

- Length of LMD Spillway/Earth Bund: 363 m (Over flow), 278 m (Non Over Flow) 10.00 km
- Gross Storage Capacity of the Dam : 24.065 TMC / 680.458 MCM
- Live Storage Capacity of the Dam : 21.938 TMC / 620.995 MCM
- No. of Radial Gates / Size : 20 Nos of size 50′ x 24′ Each
- Designed Flood Discharge : 5 Lakhs cusecs
- Observed Max. Flood : 3.50 Lakhs cusecs
- Top Bund Level (TBL) of Dam : 933′ / 284.378 M
- Full Reservoir Level of Dam : 920′ / 280.416 M
- Max. Water Level of Dam : 922′ / 281.016 M
- MDDL : 905.65′ / 276.042 M
- Sill Level : 875′ / 266.70 M
- Crest Level : 896′ / 273.080 M
- Average River Bed Level : 832′ / 253.581 M

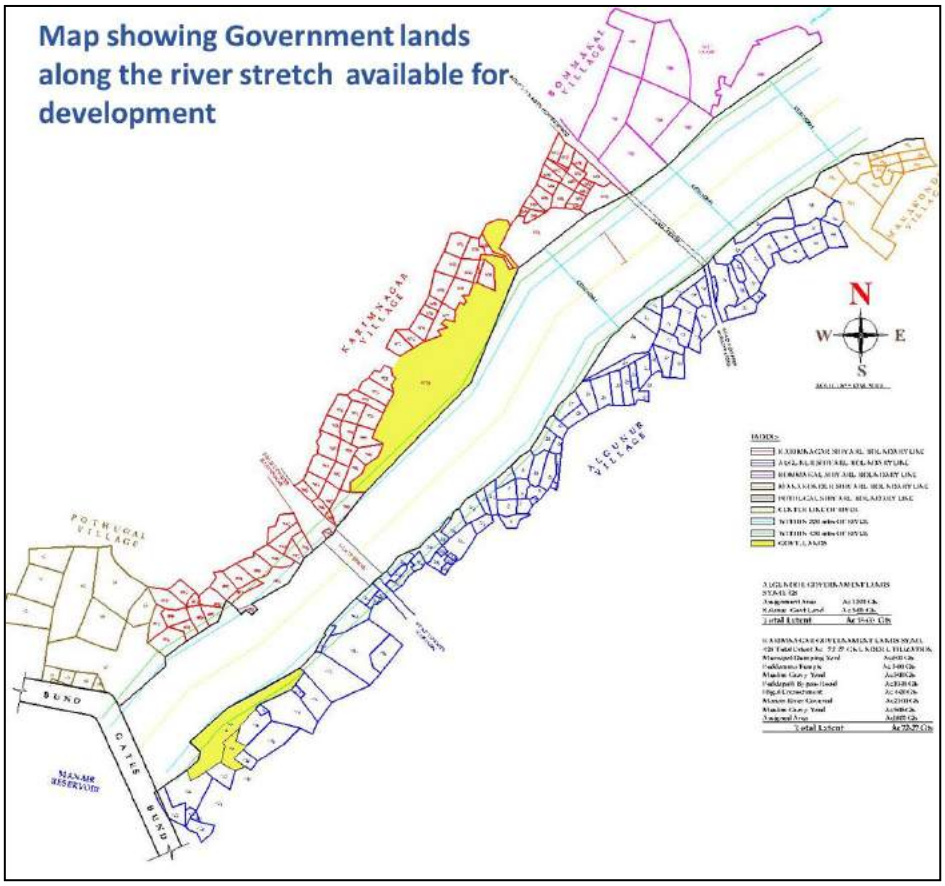
ii. Project Area Details

TSTDC intends to develop 10 km stretch at the downstream of Lower Manair Dam including the river banks upto 150 m on the either side of the river integrating the existing government lands available for development. Initially a stretch of 3.75 km is proposed for development under Phase I and the balance 6.25 km shall be developed under phase II.

5.2 SCOPE OF SERVICES FOR THE CONSULTANT

The Consultant shall provide Master Planning, Architectural and Engineering Consultancy services for Project Area spread about 10 km downstream of Lower Manair Dam including the river banks upto 150 m on both sides in general, considering Government land parcels available along the 10 km stretch in particular, as demarcated by the client. The consultant shall initially prepare Master Plan for the entire 10 km stretch downstream of Lower Manair Dam including the river banks upto 150 m on both sides duly integrating the government lands and detailed designs for development of 3.75 km stretch under Phase I. Consultant shall subsequently take up balance 6.25 km under Phase II.

About 200 acres of government lands (may increase or decrease during the assignment period) are available along the 3.75 km stretch on the downstream of the dam and these lands shall be integrated with the Master Plan by conceptualizing various tourism projects such as resorts, hotels, convention centers, amphi theatres, mela grounds, party zones etc. In case Client intends to develop these parcels on their



own, the Consultant shall prepare detailed plans and drawings and assist the client during project implementation.

The Consultant's objective shall be to create and envision a master plan with a distinct identity for Manair Riverfront development. Additionally, develop a design solution that is visually pleasing and functional for the people and generate long term value for investment in the city of Karimnagar, Telangana.

Consultancy services shall broadly include:

(i) Conceptual and detailed Master plan for the entire 10 km stretch downstream of Lower Manair Dam including the River banks of upto 150 m on both sides integrating the government land parcels available for development

(ii) Planning and design of basic infrastructure for 3.75 km stretch (as Phase-I) including the River banks of upto 150 m on both sides including but not limited internal Roads, water supply, Storm water drainage & management, Sewerage, Solid Waste Management & disposal, Rain water harvesting, Electrical system, ICT network, smart street lighting & illumination, Surveillance & safety, Public Address system, Landscape design, Public Mobility plan, crowd management and other Modern infrastructure components as may be required.

The scope of work under the RFP includes

- **Stage 1**: Situation Analysis and review of existing structures
- **Stage 2**: Conceptual Master plan for the 10 km stretch of Manair Riverfront
- **Stage 3**: Detailed Master Plan for Focus Area of 3.75 km stretch
- **Stage 4**: Detailed Engineering design for basic infrastructure for 3.75 km stretch
- **Stage 5:** Detailed Cost Estimates, BOQs & Technical Specifications for 3.75 km stretch
- **Stage 6**: Construction Stage supervision
- **Stage 7**: Completion Stage

The detailed Scope of Services is as given below:

STAGE 1: SITUATIONAL ANALYSIS & INFRASTRUCTURE ASSESSMENT

This stage is a high-level analysis and strategy study which identifies the overall design and landscape principles, and a design theme/s for the entire stretch of 10 kms downstream of Lower Manair Dam including



the river banks upto 150 m on both sides, duly integrating the government lands along the stretch. It shall guide and inform the master plan process, with inputs on site planning, waterfront activation, connections, nodes and integration of sustainable design.

A. Site Visits, Data Collection and Stakeholder Consultations

a. The Consultant Team shall make field visits to the project area and carry out a reconnaissance survey to ascertain the physical aspects of the Site, settings, characteristics, terrain, etc. including the government lands available for development. (The site reconnaissance and review has been envisaged to gain complete understanding of the subject site and conditions so as to ensure that the recommendations of the Consultants are practical and implementable. Also, the Consultant, may identify certain limitations / special characteristics of the land / area, that could be capitalized for design and cost efficiencies, etc).
b. Undertake detailed site analysis of the project area in terms of access to the riverfront, existing activities along the river bed and existing structures /landmarks (residential areas, irrigation fields, check dams, bridges, factories etc), to ascertain the existing condition/situation of downstream of Lower Manair Dam.
c. Carry out detailed survey to catalog major problems and identify potential opportunities, which includes
    - landmarks, urban nodes and transport connections, activity corridors, underutilized public land use.
    - Connectivity to hinterland and major activity nodes.
    - Assessment of the existing infrastructure available at the site.
    - Development proposals of local authorities
d. Review of Master Plans/Development plans, Vision documents etc. if any, along the 10 km stretch of riverfront on either sides of river banks to assess the existing situation
e. The Consultant shall collect all necessary secondary data to carry out the Study. The Client shall provide necessary assistance to obtain the necessary data.
f. The Consultant Team shall carry out Stakeholder Consultations (Client and other Stakeholders) to understand Client's Vision, Expectations and priorities for the project, understand the budget and brainstorm initial ideas.
g. Analyse the existing infrastructure status – covering water supply, power supply, storm water drainage, connectivity links, solid waste management, wastewater management etc.
h. Assess the environmental and social aspects of the Site that would have a bearing on the project planning, implementation and operation.
i. Study of existing land use in and around the project area.
j. Study of contextual issues, socio-cultural aspects, landscape features and built form etc. i.e. rehabilitation and resettlement requirements at broader level.

k. Prepare report on site evaluation, state of existing buildings, if any; and analysis with basic approach to circulation, activity distribution, interconnectivity and external linkages including rough estimate of project cost based on allowable FAR/ re-development objectives.
l. Assessment of impact of development plan on the project area and its immediate environs.
m. Review of prevailing legal and statutory framework and Government policies
n. Furnish report on measures required to be taken to mitigate the adverse impact, if any, of the existing and/ or proposed development on its immediate environs.
o. Carry out benchmarking study covering 2-3 relevant case samples from India and around the world, highlighting the key features of each.

B. Field Surveys & Investigations

a. Demarcation of Project Area which is spread about 10 km downstream of Lower Manair Dam including the River banks on both sides and the government lands available for development.
b. Carry out Topographical Surveys of the site, if not available with the concerned authorities, using Electronic Total Station and prepare existing Land Use maps for the length of around 10 Km (+ or – of 10%) downstream of Lower Mid Manair and width of 150 m on either side of the river (including the existing government lands) to generate contour plan of 0.5 m interval and geotechnical investigation and analysis of existing profile, flow characteristics, river bed characteristics and hydraulics of the river to ascertain the proposed width of river, alignment of banks, construction of retaining structure to retain the river bank along the entire stretch of the proposed study area.
c. The consultant shall evaluate the requirement of geo-technical investigations and assist the client in procuring a specialized agency for carrying out the geo-technical investigations to evaluate various soil/rock parameters which will help in design of foundations for the proposed components such as REE walls, Stop dam. The Consultant shall co-ordinate with the agency appointed for ensuring timely completions of the investigations;
d. Carry out River Hydraulic Study to understand the design flood and suggest parameters for river channelization by optimizing the space creation for River front Development. The variation in flow and hydraulic components must be studied due to this proposed developments;
e. Based on the survey, the consultant shall prepare Existing Land Use Maps
f. Carry out Environmental Impact Assessment to identify any critical/potential environmental aspects and their sensitivity due to the proposed project.
g. Obtain all necessary clearances, approvals required for this task.

C. Preparation of Base Map

Base Map for the Project Site shall be prepared (CAD and GIS formats) showing the

(i) Site boundary as obtained from the Topographic Survey and co-related with the Cadastral Maps of the Site,

(ii) Existing settlements in the vicinity and within the Site (if any),

(iii) Existing road network within and in the vicinity of the Site, if any,

(iv) Existing physical features such as site features, tree locations, spot levels, drains, sewer lines, power utilities, structures, bunds, bridges etc. water bodies, streams, hills/hillocks, rocky areas, Forests etc.,

(v) Administrative boundaries of villages that fall within the Site

(vi) Built up features, if any.

A summary of site particulars, planning and design principles, development strategies, and most importantly "lessons learned" from the benchmarking studies will be incorporated in the base map.

STAGE 2: CONCEPT MASTER PLAN FOR THE 10 KM STRETCH OF MANAIR RIVERFRONT

The Consultant shall prepare the Conceptual Master Plan considering the Vision for the project, client requirements, best planning principles, the project needs and the project setting / environment, etc. The Conceptual Master Plan shall address the needs of the various project components both in terms of access to physical/social infrastructure, as well as the physical environment needs.

a. Formulate Project Concept for development of 10 km riverfront stretch from the downstream of Lower Manair Dam upto 150 mts on both sides of the river integrating the government lands along the stretch, large part of which is presently inaccessible for public use. The proposed development shall bring a unique and distinct identity to the region, improves aesthetics and boost its Tourism Potential.

b. Consultant shall focus on the following areas while preparing Conceptual Master Plan:

- Preliminary hydraulic study and calculations for fixing the conceptual design and sizing of structures.
- Riverbed levels, riverbank area, the protection study of existing structures and effected localities
- Dredging or excavation of riverbed levels based on the survey and hydraulic flow requirements to fulfil the needs of riverfront development.

- Hydraulic flow levels in steady still condition and maximum flood condition to design the river bunds.
- Sizing of various structures in the proposed riverfront development for detailed design.
- Flood calculation to meet the requirement of CDO, Irrigation department of Government of Telangana.

c. The Consultant shall prepare at least 3 Conceptual Site Master Plan options, each of which shall constitute following:

- Landuse zoning plan, Amenity zones, Utility zones, Green areas, and other tourism and hospitality components such as resorts, hotels, convention centers, exhibition centres, amphi theatres, event grounds, party zones etc.
- improved road network/accessibility to riverfront through various modes (motorized track, cycle track, pedestrian track etc.)
- people-centric network of parks, waterside promenades with boating stations, markets, cultural and recreational facilities, riverfront market, plaza, public convenience facilities etc.
- general landscape framework for open spaces, public realm etc and preservation of natural areas;
- amenities and utilities such as water, drainage, storm water, STP's, electricity
- Proposed external linkages covering – road, water, power etc.
- area showing circulation pattern, zoning of various land uses and relevant details, development/re-development strategy.
- measures for flood control, prevention of air and water pollution, disposal of garbage and general environmental control.
- programs for rehabilitation/relocation of those who are economically dependent on the riverbed.

The salient features of each of the options shall be listed out, to differentiate / compare the options with objectivity. The Client shall select one preferred option out of three options for further detailing or may require to prepare fourth option in case three options are not deemed fit by government.

d. Consultant shall finalise the spatial arrangements, landscape materials and overall appearance of the landscape works in consultation with the client.

e. The consultant shall further improve upon this selected option with requisite details. The Master Plan options shall also incorporate principles of water conservation, use of non-conventional energy sources, energy conservation and efficiency, low pollution, water recycling, zero discharge, hazard / disaster mitigation integrated into master planning.

f. Infrastructure demand assessments shall be carried out for all identified infrastructure components such as resorts, hotels, convention centers, exhibition centres, amphi theatres, event grounds, party zones etc.

g. Carry out preliminary planning and sizing of identified external infrastructure links/components

h. Carry out broad internal infrastructure planning for identified infrastructure components. The consultant shall phase out the development so as to optimize the investment requirement for the development of the area

i. Prepare block cost estimates for project development covering internal and external infrastructure.

j. The Consultant shall hold discussions with Client to freeze the preferred Conceptual Master Plan for further detailing in the next stage

k. Provide necessary project drawings, presentations and other details to the Client for Brochures, meetings, road shows, etc.

l. Assist the client in preparation of walk through presentation, etc.

STAGE 3: DETAILED MASTER PLAN FOR 3.75 KM STRETCH

The objective of this Stage is: (i) to prepare the Detailed Site Master Plan and the Detailed Infrastructure Designs and Cost Estimates for 3.75 km downstream of LMD to enable the Client to proceed with physical development of the Site w.r.t project implementation; (ii) to provide necessary details that will enable the Client to bid out various project development packages; (iii) to provide necessary drawings / details to enable the Client to commence the land allotment process.

A. Preparation of Detailed Master Plan for 3.75 km downstream of LMD

Consultant shall prepare the Detailed Site Master Plan for the Conceptual Site Master Plan covering the following

a. Preparation of Detailed Master Plan for 3.75 km stretch downstream of LMD including the River banks upto 150 m on both sides, duly integrating the existing vacant Government lands and earmarking appropriate spaces for various common/support facilities and Project Components identified by the Client. All drawings for this stage will be in digital format.
b. Based on detailed topographic survey and hydraulic design report, detailed structural components shall be designed which includes hydraulic structures, retailing walls, abutments for river guide bunds, protection works for banks, embankments, slope protection and finishing works for riverbed protection.
c. The design team shall coordinate closely with the Structural and MEP consultants to determine utility sizing, project requirements, and structure coordination where

applicable.

d. The Consultant shall develop urban design and landscape design guidelines and strategies for integrating amenities, public infrastructure, and services provision with in different public spaces like riverfront, commercial, residential, other zones etc
e. The consultant shall develop tourism strategy which shall include but is not limited to the following:
    - different types of activities that are acceptable to tourists
    - recreational carrying capacity of the site, i.e. the number of people that the site can absorb at different times of the year.
    - Strategy for parking vehicles
    - Eco-mobility corridor linking vantage points with dedicated biking/walking tracks complemented with green areas/landscaping utilizing River fronts, and aesthetic bridges across road crossings.
    - Nature spaces: Learning centres, viewing galleries and watch towers
    - Guided tours, self-guiding tours etc.
    - Any other options for tourist attraction.
    - Suggest on revenue raising mechanisms
f. The broad design for the proposed external linkages (External road links, Power feeder lines, Water sourcing, Storm water disposal etc.), shall be prepared and submitted along with block estimate of cost. (*The detailed designs, engineering drawings for execution (GFC), BoQs, Detailed Estimates, Technical specifications shall be prepared by the concerned line department. The Consultant shall effectively coordinate /assist the Client in getting the external infrastructure done by the concerned line department*).
g. Land use Plan covering various developments such as tourism Infrastructure, Utilities, green areas (green belts, green buffers etc.), tourism /hospitality / recreational zones, primary/ secondary road network and other project components.
h. Detailed Road Network Map showing the alternative city entry / exit roads, ring round, primary, secondary and tertiary roads
i. Preparation of infrastructure map and drawings showing schematic network of services – water supply, sewerage, storm water drainage, power, internal roads, smart street lighting, illumination schemes, ICT network, Surveillance & safety, rain water harvesting, electrical system, entry-exit plans, landscape design, public mobility plan, and other specialized services as per the requirement and compliance with national and local standards.
j. Prepare disaster management plan for the Hazards to which project may be exposed to such as rain, flood etc.
k. Furnish urban design report including implementation strategy.
l. An external linkages map showing all the identified external links for the entire project

B. Support the Client in Environmental Clearances & Other GoI Approvals

The Consultant shall provide all the necessary details related to the Project Planning & design and support ESIA Consultant appointed by Client towards getting expeditious Environmental Clearances from Statutory Authorities. The consultant shall also coordinate with ESIA Consultant, attend expert appraisal committee meetings (ToR, EC, Public Hearing etc.,) Provide clarifications on Planning & Design Related aspects of the project to statutory authorities while getting the clearances.

STAGE 4: DETAILED ENGINEERING DESIGNS FOR BASIC INFRASTRUCTURE FOR 3.75 KM STRETCH

- The Consultant's design team shall prepare detailed engineering designs and drawings which represent and further describe the expected dimensions, character and details of the proposed infrastructure components such as,.
  - Entrance Plaza(s)
  - Waterside promenades with boating stations, markets, cultural and recreational facilities, riverfront market, plaza, event grounds, public convenience facilities etc.
  - Tourism and hospitality interventions such as resorts, hotels, convention centers, exhibition centres, amphi theatres, event grounds, party zones etc.
  - Parks, gardens, plazas, landscaping, street furniture and graphic signage.
  - Road Network, water supply, waste water, storm water, power supply etc. supported with cross sections and design specifications, detailed drawings.
  - Pavements, utility ducts, street lighting, street furniture, ICT, etc.

  These documents shall have enough information for civil and structural, MEP design by engineers as well as cost estimation by the quantity surveyors.
- The Consultant shall furnish line estimates of cost for all the identified infrastructure components
- Preparation of Design Basis Report (DBR) for all utility services and road according to best practices and standards/ guidelines provided by the state or central government.
- The detailed designs for each component shall be supported with Good for Construction Drawings along with detailed Technical specifications.
- CAD files of the base plans shall be provided in a CD ROM and other documents in PDF format and hard/printed copies.

STAGE 5 : DETAILED COST ESTIMATES & TECHNICAL SPECIFICATIONS FOR 3.75 KM STRETCH

- The Consultant shall prepare Detailed BoQs, Cost Estimates for all the basic infrastructure components covering civil, electrical, mechanical items and landscaping.
- Carry out Rate Analysis and prepare detailed cost estimates as per prevailing Standard Schedule of Rates (SSR) and Standard data of GoTS. Comparative quotes (at least 3) shall be provided for the items those are not available in the SSR.
- Detailed technical specifications shall be prepared and the consultant shall provide assistance to client while preparation of tender Documents for works
- Preparation of Detail design for all Infrastructure services like Sewerage system, water supply, Storm water system, High Side (HT) Electrical system, ICT Data Network/ Broadband Connectivity, Fire Fighting, Irrigation etc. and shall be submitted to vetting agencies for their approvals.
- The consultant shall attend meetings with Client, Government, Stakeholders etc. and make presentation(s) on the above as required by the Client. The consultant shall also provide all the necessary assistance to client while getting the requisite approvals from the concerned authorities/departments for timely implementation of the project.
- Assisting the client to invite, receive and analyse tenders; advise the client on appointment of contractors. Assistance during the tender phase shall include:
    - Floating of tenders for appointment of the contractor
    - Respond to queries and clarifications raised by contractor.
    - Review and take appropriate action on requests for additional information, clarification and interpretations of the drawings and documentation during the bidding phase.
    - Assist in the evaluation of the bid and submit a tender evaluation report with recommendation of award.
    - Assist as requested in evaluating the impact of proposed value engineering, scope reductions and substitution requests in relationship to maintaining the objectives of the program.

STAGE 6: CONSTRUCTION STAGE SUPERVISION

- Prepare detailed working drawings / Good for Construction (GFC) drawings that may be required during construction stage.
- The Consultant shall advise the client regarding the work under execution during visits to the site and submit reports on their observations.
- Any deviation from the approved drawings or specifications that may be observed by the Consultants shall be given in writing by them to the client who shall issue, necessary

instructions to the executing agencies.

- Approve samples of various elements and components.
- Check and approve shop drawings submitted by the contractor/ vendors.
- The consultant, till the completion of the project, visit the site of work, at intervals as per requirement , to inspect and evaluate the Construction Works and where necessary clarify any decision, offer interpretation of the drawings/specifications, attend conferences and meetings to ensure that the project proceeds generally in accordance with the conditions of contract and keep the client informed and render advice on actions, if required. *However the day to day supervision, quality maintenance, bill checking are not included in the scope of services of the Consultant and shall be the role of TSTDC or its PMC.*
- The Consultant shall attend all the review meetings conducted by the client from time to time and shall also be available for any clarifications and bring out any issues related to construction which may lead to difficulties, litigation, delays etc.
- Issue Certificate of Virtual Completion of works.

STAGE 7: COMPLETION STAGE

- On completion of the project, the consultant shall prepare and submit five sets of all as built drawings along with one set of reproduction prints and a soft copy.
- The Consultants shall prepare and provide operation & maintenance manuals for all services as per standard practice.

Operations, Maintenance& Management Plan

The consultants shall prepare an O&M protocol / maintenance plan for the routine maintenance of the entire project area and also suggest institutional structures for such maintenance. The plan shall consist of-

- Organization chart for O&M, Staffing requirements / skills
- Routine / Regular / Periodical schedule of maintenance's to be done
- Detailed annual O&M costing
- In house Vs outsourcing arrangements possible for O&M

The consultant shall formulate a management plan including

- Waterway maintenance guidelines.
- Landscaping maintenance, including water supply, pest control, etc.
- Conservancy plan for waste collection along the River.

- Interaction with adjacent communities on garbage disposal methods and defecation practices to facilitate upkeep of the River.
- Staffing plan for management activities.

5.3 CONSULTANCY PERIOD:

The period of consultancy is initially for **24 Months.**

5.4 TEAM COMPOSITION

a. The scope of services would require a multi-disciplinary team having similar experiences

b. Each Key Staff proposed shall be associated with only one consultant and if the same member is proposed by two firms, the CV of the person so proposed will not be considered for evaluation in both the firms

c. Estimated number of professional person-months required for the assignment shall be estimated by the consultant

d. The team estimation by the consultant shall be done in a manner which adequately meets the project requirements across all phases.

e. The consultant's team engaged in this assignment shall comprise *minimum of the following key personnel*. Each of the key personnel shall have prior experience delivering the expected output.

Team Leader	
Educational Qualification	Architect with Masters in Planning
Essential Experience	• Minimum 15 years working experience in the field of Planning • Minimum 3 years working experience (as on Proposal Due Date) with the Applicant firm as a fulltime permanent rolls basis • Should have experience as Team Leader (Master Planning) in at least One 1 waterfront (along river, lake or coast) Development Project with project cost of atleast INR 50.0 Cr
Job responsibilities	He will lead, coordinate and supervise the Team for delivering the assignment in a timely manner as envisaged in this RFP. He shall attend all meetings with the Client and shall not delegate his responsibilities except with the prior written approval of the Authority.

Urban and Regional Planner	
Educational	Masters in Urban / Regional Planning
Essential Experience	• Minimum 10 years in the field of Urban/ Regional Planning • Should have working experience in at least one (1) waterfront (along river, lake or coast) Development Project with project cost of atleast INR 25.00 Cr
Job responsibilities	He will be responsible for assisting the Team Leader in overall planning of the proposed waterfront development
Infrastructure Planning Expert	
Educational Qualification	Civil Engineer with Masters in Infrastructure Planning/ Engineering
Essential Experience	• 15 years in the field of Infrastructure planning • Should have experience of infrastructure planning of atleast two (2) large tourism infrastructure project with Project cost of atleast INR 50.0 Cr each
Job responsibilities	He will prepare the site and infrastructure plans for the Project
Infrastructure Design Expert	
Educational Qualification	Masters in Civil Engineering
Essential Experience	• 10 years of experience as an Expert in designing of Infrastructure Projects such as Roads / Water Supply / Sewerage Projects • Should have experience as an Infrastructure design expert in atleast one (1) large infrastructure project with Project cost of atleast INR 50.0 Cr
Job responsibilities	Responsible for Engineering Design of Infrastructure Components of the project

5.5 ADDITIONAL NOTES ON PROJECT TEAM

A. The above is the minimum team requirement and the bidder needs to propose a team with right skill sets and numbers to address the RFP requirements, so that timelines and deliverables are met.

B. Support Team Members / Consultants: In addition to the above key personnel in the team, the Consultants are expected to deploy adequate number of support technical staff from various disciplines such as architecture, urban planning, landscape, horticulture, environment planning, infrastructure planning, quantity surveying, CAD engineers, Water Expert, Environmental Expert, etc as required to perform the scope of services defined in the TOR for

all activities. The consultant should propose an indicative list and numbers of such support consultants in the proposal (CVs not required).

C. Additional Experts: Certain components of the project may require specialized expertise and the consultant would have to provide such additional experts as required or as requested by TSTDC if project team's skills need to be complemented on the project.

D. In the technical proposal, the details of support technical staff proposed for the assignment shall be provided in a statement format with name, expertise and their role in the assignment. This supporting/ additional staff will not be considered for technical proposal evaluation

E. Need based resources would have to be deployed by the consultant based on the project requirement or as and when TSTDC/Project requires services for this project

5.6 SCHEDULE OF SERVICES

S. No.	Details	Time Duration (in Months)
1	• Reconnaissance Survey Report • Base Map	D*+1.0
2	Conceptual Master Plan (10 Km)	D+2.0
3	Draft Detailed Master Plan (3.75 Km) including Infrastructure Plan	D+3.0
4	• Submission of Final Master Plan and Infrastructure Plan Report after presentation to Client (3.75 Km) • Design Basis Report for Infrastructure (3.75 Km)	D+3.5
5	• Basic infrastructure planning & designs (3.75 Km) • Cost estimates and technical specifications	D+5.0
6	Construction stage (3.75 Km)	D+6 to 20
7	Completion stage	D+21-24
Deliverables shall be in the form of 5 hard +2 soft copy MS Word & PDF format for Reports and AUTOCAD DWG & PDF formats for drawings/plans; Shape file format (GIS format) for spatial database		

*D- Start Date of Assignment- Date of signing for the agreement / Issue of LOA

For each of the aforementioned deliverables, the Consultant shall be required to make a presentation to the Authority and its designated representatives.

5.7 PAYMENTS TO CONSULTANT

A) For rendering the above services,

a. For **Preparation of Detailed Master Plan**, the Authority shall pay the Lumpsum fee in Rupees (as per the financial bid quoted by the selected bidder for the services) plus service tax as applicable.

TSTDC shall make payment to the Consultant based on the following payment schedule.

S.No.	Payment Milestones	% of Professional Fee
1	Selection of Conceptual Master Plan option (10 km stretch)	10%
2	Approval of Draft Detailed Master Plan including Infrastructure Plan Report (3.75 Km stretch)	50%
3	Submission of Final Master Plan and Infrastructure Plan Report (3.75 Km stretch)	40%
	Total	**100%**

The consultant shall raise the invoices for each of the aforementioned deliverable/ stage upon completion and approval by the Authority thereof.

b. For rendering the services pertaining to **Infrastructure Design**, the Authority shall pay the fee in terms of % on the total actual executed cost of the Infrastructure components including external developmental works (as per financial bid quoted by the selected bidder for services) plus service tax as applicable . The above fee shall be worked out initially assuming the Cost of the Infrastructure components as INR 100.00 Crores, which shall also form basis of payment in the event of non-execution of work or termination of consultancy prior to commencement of work or termination of contract. The final fees shall be worked out on the actual executed cost of project components.

TSTDC shall make payment to the Consultant based on the following payment schedule.

S.No.	Payment Milestones	% of Professional Fee
1	Approval of Design Basis Report	5%

2	Approval of draft Detailed Project Report for each infrastructure components comprising infrastructure planning and designs Cost estimates and technical specifications	10%
3	Submission of Final Detailed Project Report for each infrastructure components comprising infrastructure planning and designs Cost estimates and technical specifications	10%
4	Approval of Tender Drawings, Tender Documents & Selection of Contractor(s)	15%
5	Construction stage (pro-rata to financial progress of work, i.e. disbursement to Contractor)	55%
6	Completion stage	5%
	Total	**100%**

The consultant shall raise the invoices for each of the aforementioned deliverable/ stage upon completion and approval by the Authority thereof.

B) The fee is inclusive of all taxes and levies (but excluding GST as applicable from time to time which shall be paid extra). The statutory taxes and other levy deductions as per income tax and relevant Acts will be made by the Authority out of the payments to be made to the Consultants.

C) The Consultants fee shall include periodic inspection of works by their Architects, and Engineers to apprise themselves of proper interpretation of designs, drawings and their implementation by the construction agency.

6. FORMATS FOR SUBMISSION OF PROPOSAL

(Annexures)

Annexure A

Format for

COVERING LETTER (LETTER OF PROPOSAL)

(On Consultancy Firm's Letter Head)

To, Date:

The Managing Director
Telangana State Tourism Development Corporation Ltd.
Tourism House, No.3-5-891
Himayat Nagar
Hyderabad – 500029

Sub: Selection of Master Planning, Architectural and Engineering Consultant at Riverfront Development along with Tourism Facilities at LMD, Karimnagar, Telangana - Reg

1. With reference to your RFP Document dated _____, I / We (name of Sole Firm) having examined all relevant documents and understood their contents, hereby submit our Proposal for selection as Consultant (the "Consultant") for the subject project. The proposal is unconditional and unqualified.

2. I/We acknowledge that the Authority will be relying on the information provided in the Proposal and the documents accompanying the Proposal for selection of the Consultant, and we certify that all information provided in the Proposal and in the Appendices are true and correct, nothing has been omitted which renders such information misleading; and all documents accompanying such Proposal are true copies of their respective originals.
3. This statement is made for the purpose of appointment as the Consultant for the aforesaid Project.
4. I / We shall make available to 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 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 have neither failed to perform 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) We have examined and have no reservations to the RFP Documents, including any Addendum issued by the Authority;

(b) I / We do not have any conflict of interest as mentioned in 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 in respect of any tender or request for proposal issued by or any agreement entered into with 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 this 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 Consultant, without incurring any liability to the Applicants in accordance with the RFP document.
9. 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 Consultancy for the Project or which relates to a grave offence that outrages the moral sense of the community.
10. 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.
11. 1/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 Authority (and/ or the Government of India) in connection with the selection of Consultant or in connection with the Selection Process itself in respect of the above mentioned Project.
12. 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 Consultancy for the Project is not awarded to me/us or our proposal is not opened or rejected.
13. I / We agree to keep this offer valid for 180 (One hundred and eighty) days from the PDD specified in the RFP.
14. In the event of our firm being selected as the Consultant, I/we agree and undertake to provide the services of the Consultant in accordance with the provisions of the RFP and that the Team Leader shall be responsible for providing the agreed services himself and not through any other person or Associate.
15. I/We have studied RFP and all other documents carefully. We understand that we shall have no claim, right or title arising out of any documents or information provided to us by the Authority or in respect of any matter arising out of or concerning or relating to the Selection Process including the award of Consultancy.

16. The Technical and Financial Proposals are being submitted in separate covers along with the Bid Security, Cost of RFP Document (if applicable). The contents provided in this Letter and Envelopes I & II shall constitute the Application which shall be binding on us.
17. 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 authorized signatory)

(Name and seal of the Sole Firm)

Bidder Details

(To be submitted on letter head by sole bidder)

(Same format shall be used for the information of any sub- consultant)

1 (a) Name:

(b) Address of the Corporate Headquarters and its Branch Office(s), if any, in India:

(c) Date of Incorporation and/ or Commencement of Business:

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 Authority:

(a) Name:

(b) Designation:

(c) Company:

(d) Address:

(e) Telephone Number:

(f) E-Mail Address:

4 Particulars of the Authorized Signatory of the Applicant:

(a) Name:

(b) Designation:

(c) Address:

(d) Phone Number:

e) Email ID:

5 The following information shall be provided by the Applicant and the sub – consultant (if any):

Sr. No.	Criteria	Yes	No
1.	Has the Applicant been barred by the Central/ State Government, or any entity controlled by them, from participating in any Project		
2.	If the answer to 1 is yes, does the bar subsist as on the date of Application?		
3.	Has the Applicant paid liquidated damages of more than 5% 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?		

6 A statement by the Applicant disclosing material non-performance or contractual noncompliance in past projects, contractual disputes and litigation/ arbitration in the recent past is given below (Attach extra sheets, if necessary):

Annexure 1

Format for

CHECKLIST OF SUBMISSIONS IN ENVELOPE I

Sl. No.	Enclosures to the Proposal	Status (Submitted / Not Submitted)	Remarks
1.	Signed RFP document		
2.	Covering Letter (Annexure 2)		
3.	Financial Details (Annexure 3)		
4.	Power of Authority to Bid Signatory (Annexure 4)		
5.	Experience Details (Annexure 5)		
6.	Team Composition (Annexure 6)		
7.	MoU with Sub-Consultant(s), if applicable		

Annexure 2

Format for

COVERING LETTER (TECHNICAL PROPOSAL)

((On Consultancy Firm's Letter Head)

To,
The Managing Director
Telangana State Tourism Development Corporation Ltd.
Tourism House, No.3-5-891
Himayat Nagar
Hyderabad – 500029

Sub: Technical Proposal for Selection of Master Planning, Architectural and Engineering Consultant at Riverfront Development along with Tourism Facilities at LMD, Karimnagar, Telangana - Reg

1. With reference to your RFP Document dated _____, I / We (name of Firm), having examined all relevant documents and understood their contents, hereby submit our Technical Proposal for selection as Consultant (the "Consultant") for the subject project. The proposal is unconditional and unqualified.

2. I/We acknowledge that the Authority will be relying on the information provided in the Technical Proposal and the documents accompanying the Proposal for selection of the Consultant, and we certify that all information provided in the Technical Proposal and in the Appendices are true and correct, nothing has been omitted which renders such information misleading; and all documents accompanying such Proposal are true copies of their respective originals.
3. I / We shall make available to the Authority any additional information it may deem necessary or require for supplementing or authenticating the Proposal.
4. I / We acknowledge the right of 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.
5. I / We agree to keep this offer valid for 180 (One hundred and eighty) days from the PDD specified in the RFP.
6. This Technical Proposal shall be binding on us.

Yours faithfully,

(Signature, name and designation of the authorized signatory)

(Name and seal of the Firm)

Annexure 3

FORMAT FOR FINANCIAL DETAILS

TURNOVER RELATED DATA (*All figures in INR Crore)*

Description	Three Financial Years		
	2017-18 / 2018-19	**2018-19 / 2019-20**	**2019-20 / 2020-21**
Project Consultancy Revenue			
(add) Other Revenue			
Total Turnover			

Note:

1. The applicant shall submit Audited Balance Sheets/ Annual Reports of the above years
2. The annual Turnover worth data should be certified by a practising Charted Accountant and the same should be accompanied with this certificate

SIGNATURE _____
NAME _____
DESIGNATION _____
COMPANY SEAL COMPANY _____
DATE _____

Signature of the Charted Account

with name & registration number

Annexure 4

Format for

Power of Authority to Bid Signatory

(On a Non-Judicial Stamp Paper of Rs. 100 duly attested by notary public)

Know all men by these presents, We, _____, a company / firm registered under _____ and having its Registered Office at _____ do hereby constitute, nominate, appoint and authorize _____ and presently residing at _____ 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 _____ including but not limited to signing and submission of all applications, proposals and other documents and writings, participating in conferences and providing information/ responses to the TSTDC, representing us in all matters before the TSTDC, signing and execution of all contracts and undertakings consequent to acceptance of our proposal and generally dealing with the TSTDC 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 Agreement with the TSTDC.

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……., 2021

For…….

(Signature, name, designation and address)

Witnesses:

1.
2.
Notarised

Accepted

……

(Signature, name destination and address of the Attorney)

Notes:

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/-(one hundred) and duly notarized by a notary public.

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.

For a Power of Attorney executed and issued overseas, the documents will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Applicants from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Appostile certificate.

Annexure 5

Format for Applicant's Experience

CONSULTANCY SERVICES EXPERIENCE IN MASTER PLAN FOR ATLEAST TWO (2) "WATERFRONT (RIVER, LAKE OR COAST) DEVELOPMENT PROJECTS" WITH PROJECT COST OF MINIMUM INR 50.00 CR WITHIN THE PAST 10 YEARS

S#	Name of Project	Client Details	Project Location	Project Description & Components	Details of Services Provided	Project Area (Acres or length)	Project Cost (INR in Cr)	Document Enclosed as Proof of Experience*
1								
2								
3								
4								
5								

CONSULTANCY SERVICES EXPERIENCE IN PREPARATION OF INFRASTRUCTURE DESIGN INCLUDING (DETAIL ENGINEERING) FOR AT LEAST TWO (2) "WATERFRONT (RIVER, LAKE OR COAST) DEVELOPMENT PROJECTS" WITH PROJECT COST (INFRASTRUCTURE COMPONENTS) OF MINIMUM INR 50.00 CR EACH WITHIN THE PAST 10 YEARS

S#	Name of Project	Client Details	Project Location	Project Description & Components	Details of Services Provided	Project Area (Acres/Length)	Project Cost (INR in Cr)	Document Enclosed as Proof of Experience*
1								
2								
3								
4								
5								

Signature _____
Name _____
Designation_____
Company _____
Date _____
Notes:

**** The claimed experience shall be supported by project completion certificates issued by the clients towards documentary evidence. Only completed projects will be considered for evaluation.***

Detailed Experience Descriptions

(to be submitted for all similar projects)

Name of the Assignment	
Name of the Client (with contact person and details)	
Location of the Project and the country	
Start date and End Date	
Current Status of operations	
Name of the associated consultants, if any	
Number of staff and the duration of the project in man months	
Approximate value of services (Total Contract Value and Value of services provided by the consultant)	
Names of the Senior staff involved and function performed	
Narrative Description of the Project	
InnovativeTechnologies used if any	
Other Project Details (Broad details)	
Contact Person (Client)	
Designation	
Phone No	

Annexure 6

Format for

TEAM COMPOSITION ~ DETAILS OF KEY EXPERT

TEAM COMPOSITION

Name of Staff	Firm	Area of Expertise	Total relevant experience (years)	Names of relevant projects (with role in project and time spent on the project)	Qualifications	Position Assigned in this project	Tasks Assigned

DETAILS OF KEY EXPERT

1 Proposed Designation of Key Expert:

2 Name :

3 Date of Birth:

4 Nationality:

5 Education: [Indicate college/university and other relevant specialized education of staff member, giving names of institutions, degrees obtained, and dates of obtainment]

6 Membership of Professional Associations:

7 Other Training:

8 Countries of Work Experience:

9 Languages: [For each language indicate proficiency: good, fair, or poor in speaking, reading, and writing]:

10 Key Expertise:

11 Proposed Role/ Responsibilities:

12 Educational Qualifications (including Year of Completion):

13 No. of Years of Professional Experience:

Organisation	Designation	Period starting from (dd/mm/yyyy)	Ending date (dd/mm/yyyy)	Duration of Experience (Years Months)

14 Experience in Similar Projects:

Project Name	Year of Completion	Project Cost	Scope of Services	Project Description &	Client	Project Location	Role of Key Expert

		(Rs. Cr.)		**Components**			

15 Staff is Resident / Native of:

Certification:

1. I am willing to work on the Project and I will be available for entire duration of the Project assignment as required.

2. I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes my qualifications, my experience and me.

(Signature of the Key Expert / Authorised Signatory)

Place----------

Note:

1. The Key personnel's profile shall be restricted to above details only.
2. Use separate form for each Key Personnel

Annexure 7

Format for

FINANCIAL PROPOSAL

[On the Letter head]

Date:

To,
The Managing Director
Telangana State Tourism Development Corporation Ltd.
Tourism House, No.3-5-891
Himayat Nagar
Hyderabad – 500029

Sub: Financial Proposal for Selection of Master Planning, Architectural and Engineering Consultant at Riverfront Development along with Tourism Facilities at LMD, Karimnagar, Telangana - Reg.

Sir,

As a part of the Proposal for providing consultancy services for the subject Project, we hereby submit the following Professional Fee quotation to the TSTDC.

We quote,

a. **For Preparation of Master Plan**, a lumpsum amount of Rs. _____ (Rupees in words) plus applicable GST towards our Professional fee to be paid as per payment schedule specified in the RFP.

b. **For Infrastructure Design**, ____%) (_____)(in words) on the total actual executed cost of the Infrastructure components including external developmental works inclusive of all taxes, other statutory levies and such other direct & indirect expenses to be incurred for the project. Fee is inclusive of all taxes but except the GST

We abide by the above quote, terms and conditions of the RFP, if TSTDC selects us as the consultant for this particular project.

We also understand that, in case any difference between the quote in words and figures, the quote in words will be taken as final.

We agree that this offer shall remain valid for a period of one hundred and eighty (180 days) from the Proposal Due Date or such further period as may be mutually agreed upon.

Yours faithfully,

_____

(Signature of Authorised Signatory)
(Name and seal of the Sole Firm)

Note: The financial proposal to be submitted strictly as per the above format. Non compliance to the above format shall disqualify the firm's proposal

Annexure 8

DRAFT CONTRACT FOR CONSULTANTS' SERVICES

by & between

_____

(TSTDC)

and

_____

('**Consultant**')

__ _____, 2021

[*On a Non-judicial stamp paper of appropriate value***]**

This CONTRACT (hereinafter referred to as the "**Contract**") is made at_____ on this the _____ day of _____, 2021

by & between

TELANGANA STATE TOURISM DEVELOPMENT CORPORATION LTD. (TSTDC), a Special Development Authority constituted by Government of Telangana and having its Office at Tourism House, No.3-5-891, Himayat Nagar, Hyderabad – 500029", represented herein by its Managing Director (hereinafter referred to as **"TSTDC/Authority"** which expression, shall unless repugnant to the context or the meaning thereof, include its successors and assigns) of the **ONE PART**

and

_____, a company duly incorporated under the Companies Act, 1956 [I of 1956] / _____, and having its registered office at _____ (hereinafter referred to as the **"Consultant"** which expression shall, unless repugnant to the context or meaning thereof, include its affiliates, associates, successors, substitutes and permitted assigns) of the **SECOND PART**.

WHEREAS

(a) The Authority has requested the Consultant to provide certain consultancy services as defined in this Contract (hereinafter referred to as the "**Services**").

(b) The Consultant, having represented to the Authority that it has the required professional skills, and personnel and technical resources & expertise, has agreed to provide the Services on the terms and conditions set forth in this Contract.

NOW THEREFORE the parties hereto hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:

   (a) The General Conditions of Contract;

   (b) The Special Conditions of Contract;

   (c) The following Appendices:

   Appendix A: Services

Appendix B: Key Personnel of the Consultants

Appendix C: Form of Performance Guarantee

Appendix D: **- Deleted**

Appendix E: Facilities to be provided by the Authority

(d) RFP issued by the Authority along with its addenda/ corrigendum/ response to queries if any

(e) Proposal submitted by the consultant

2. The mutual rights and obligations of the Authority and the Consultant shall be as set forth in the Contract, in particular:

(a) the Consultants shall carry out the Services in accordance with the provisions of the Contract; and

(b) the Authority shall make payments to the Consultants in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

For and on behalf of TSTDC ('Authority')

_____

(Authorized Signatory)

For and on behalf of _____ ('Consultant')

_____

(Authorized Signatory)

I. General Conditions of Contract

1. GENERAL PROVISIONS

1.1 Definitions Unless the context otherwise requires, the following terms & expressions, whenever used in this Contract, shall have the following meanings hereinafter respectively ascribed to them:

(a) Deleted

(b) "Applicable Law" shall mean and include any law, rule, regulation, ordinance, order, treaty, judgment, notification, decree, bye-law, governmental approval, directive, guideline, requirement or other governmental restriction, or any similar form of decision of, or determination by, or any interpretation, policy or administration, having the force of law and shall include any of the foregoing, injunction, permit or decision of any central, state or local, municipal government, Corporation, agency, court having jurisdiction over the matter in question, whether in effect as on the date of this Contract or thereafter, in any jurisdiction.

(c) "Consultant" shall mean and refer to _____[1] that will provide the Services to the Authority under the Contract.

(d) "Contract" means the Contract signed by the Parties and all the attached documents listed in its Clause 1 hereto, that is General Conditions (GC), the Special Conditions (SC), and the Appendices, as of the date hereof, and as amended or supplemented, from time to time, in accordance with the provisions hereto.

(e) "Contract Price" means the price to be paid for the performance of the Services, in accordance with Clause GC 6;

(f) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause GC 2.1.

(g) "GC" means these General Conditions of Contract.

(h) "Government" means the State Government of Telangana.

(i) "Local Currency" means the currency of the Authority's country.

(j) "Material Adverse Effect" means circumstances which may or do **(i)** render any right vested in a Party by the terms of this Contract ineffective; or **(ii)** adversely affect or restrict or frustrate the ability of any Party to observe and perform in a timely manner its obligations under this Contract; or **(iii)** adversely affects the legality, validity, binding nature or enforceability of this Contract

(k) Deleted

[1] Sole Bidder or the Consortium

(l) "Party" means the Authority or the Consultant, as the case may be, and "Parties" means both of them.

(m) "Performance Security" shall mean performance security to be furnished by Consultant by way of bank guarantee in terms of this Contract and Appendix C

(n) "Personnel" means persons hired by the Consultant or by any Sub-Consultants and assigned to the performance of the Services or any part thereof.

(o) "SC" means the Special Conditions of Contract by which the GC may be amended or supplemented.

(p) "Services" means the work to be performed by the Consultant pursuant to this Contract, as described in Appendix A hereto.

(q) "Sub-Consultants" means any person or entity to whom/which the Consultant subcontracts any part of the Services.

(r) "Total Fee" means the net fee payable to the Consultant as described in Clause SC 6.2.

(s) "In writing," means communicated in written form with proof of receipt.

1.2 Law Governing Contract

This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.

1.2.1 Relation between the Parties

Nothing contained herein shall be construed as establishing a relation of master and servant or of agent and principal as between the Authority and the Consultant or Personnel. The Consultant, subject to this Contract, have complete charge of Personnel performing the Services and shall be fully responsible for the Services performed by them or on their behalf hereunder.

1.2.2 Language

This Contract has been executed in the language specified in the SC, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.

1.2.3 Heading

The headings shall not limit, alter or affect the meaning of this Contract.

1.3 Notices

1.3.1 Any notice, request or consent required or permitted to be given or made pursuant to this Contract shall be in writing. Any such notice, request or consent shall be deemed to have been given or made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent to such Party at the address specified in the SC.

1.3.2 A Party may change its address for notice hereunder by giving the other Party notice in writing of such change to the address specified in the SC.

1.3.3 Notice will be deemed to be effective as specified in the SC.

1.4 Location The Services shall be performed at such locations as are specified in work order.

1.5 Authorized Representatives Any action required or permitted to be taken, and any document required or permitted to be executed under this Contract by the Authority or the Consultant may be taken or executed by the officials specified in the SC.

1.5.1 Deleted

1.6 Taxes and Duties The Consultant, Sub-Consultants, and their Personnel shall pay all such indirect taxes, duties, fees, and other impositions levied under the Applicable Law. The amount of which is deemed to have been included in the Contract Price.

2. COMMENCEMENT, COMPLETION, MODIFICATION AND TERMINATION OF CONTRACT

2.1 Effectiveness of Contract This Contract shall come into effect on the date the Contract is signed by both Parties or such other later date as may be stated in the SC. The date the Contract comes into effect is defined as the Effective Date.

2.2 Commencement of Services The Consultant shall commence the Services as specified in the SC Clause 2.2.

2.3 Expiration of Contract Unless terminated earlier pursuant to Clause GC 2.6 hereof, this Contract shall expire at the end of such time period after the Effective Date as specified in the SC.

2.4 Modifications or Variations Any modification or variation of the terms and conditions of this Contract, including any modification or variation of the scope of the Services, can only be made by written agreement between the Parties. However, each Party shall give due consideration to any proposals for modification or variation made by the other Party.

2.5 Force Majeure

2.5.1 Definition

(a) For the purposes of this Contract, "Force Majeure" means an event or circumstance or combination of events or circumstances which prevents the Party claiming Force Majeure (the '**Affected Party**') from performing its obligations under this Contract and which event or circumstance **(i)**which is beyond the reasonable control and not arising out of the default of the Affected Party; **(ii)** the Affected Party has been unable to overcome such circumstance or event by the exercise of due diligence and reasonable efforts, skill and care; and **(iii)** which has a Material Adverse Effect on the subsistence of this Contract. Such events or circumstances shall include, without limitation, the effect of any natural element or other acts of State or God, including but not limited to, fire, flood, earthquake, lightning, cyclone, landslides or other natural disasters, strikes or other industrial disturbances, war, riots, civil commotion, terrorist attacks, embargoes, blockades, governmental restriction, intervention of civil, naval or military authorities, change in Applicable Law

(b) Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's sub consultants or agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected to, both

(A) take into account at the time of the conclusion of this Contract; and

(B) avoid or overcome in the carrying out of its obligations

hereunder.

(c) Force Majuere shall not include insufficiency of funds or personnel or failure to make any payment required hereunder.

2.5.2 ***No Breach of Contract***

The failure of a Party to fulfill any of its obligations under the contract shall not be considered to be a breach of, or default under, this Contract in sofar as such inability arises from an event of Force Majeure, provided that **(a)** the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract; and **(b)** has informed the other Party as soon as possible, but not later than 2 (two) days from such event, about the occurrence of such an event.

2.5.3 Measures to be taken

(a) A Party affected by an event of Force Majeure shall take all reasonable measures to remove such Party's inability to fulfill its obligations hereunder with a minimum of delay.

(b) A party affected by an event of Force Majuere shall notify the other Party of such event as soon as possible, and in any event not later than seven (7) days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give notice of the restoration of normal conditions as soon as possible.

(c) The Parties shall take all reasonable measures to minimize the consequences of any event of Force Majeure.

2.5.4 Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

2.5.5 Payments

During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultant shall be entitled to the payment accrued to it till date as per the payment schedule set forth as GC clause 6.3.

Not later than thirty (30) days after the Consultant, as the result of

2.5.6 Consultation an event of Force Majeure, have become unable to perform a material portion of the Services or in case the Authority is not able to perform any of its obligations, the Parties shall consult with each other with a view to agreeing on appropriate measures to be taken in the circumstances.

2.6 Termination

2.6.1 By the Authority

The Authority may terminate this Contract in case of the occurrence of any of the events specified in paragraphs (a) through (f) of this Clause GC 2.6.1. In such an occurrence the Authority shall give, not less than thirty (30) days' written notice of termination, to the Consultant, and sixty (60) days' in the case of the event referred to in (e).

(a) If the Consultant does not remedy a failure in the performance of their obligations under the Contract, within thirty (30) days after being notified or within any further period as the Authority may have subsequently approved in writing.
(b) If the Consultant becomes insolvent or bankrupt.
(c) If the Consultant, in the judgment of the Authority has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
(d) If, as the result of Force Majeure, the Consultant are unable to perform a material portion of the Services for a period of not less than sixty (60) days.
(e) If the Authority, in its sole discretion and for any reason whatsoever, decides to terminate this Contract.
(f) If the Consultant fails to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause GC 8 hereof.

2.6.2 By the Consultant

The Consultants may terminate this Contract, by not less than thirty (30) days' written notice to the Authority, such notice to be given after the occurrence of any of the events specified in paragraphs (a) through (c) of this Clause GC 2.6.2:

(a) If the Authority fails to pay any money due to the Consultant pursuant to this Contract and not subject to dispute pursuant to Clause GC 7 hereof within sixty (60) days after receiving written notice from the Consultant that such payment is overdue.

(b) If, as the result of Force Majeure, the Consultant is unable to perform a material portion of the Services for a period of not less than sixty (60) days.

(c) If the Authority fails to comply with any final decision reached as a result of arbitration pursuant to Clause GC 8 hereof.

2.6.3 Payment upon Termination

Upon termination of this Contract pursuant to Clauses GC 2.6.1 or GC 2.6.2, the Authority shall make the following payments to the Consultant (after offsetting against these payments any amount that may be due from the Consultant to the Authority):

(a) payment pursuant to Clause GC 6 for Services satisfactorily performed prior to the effective date of termination;

Upon early termination by the Consultant not pursuant to above Clauses GC 2.6.1 or GC 2.6.2, the Client shall retain the Bank Guarantee in lieu of Performance Security and the Retention Money as specified in Clause GC 6.5 below

2.7 Suspension

The Authority may, by written notice of suspension to the Consultant, suspend all payments to the Consultant hereunder if the Consultant fail to perform any of their obligations under this Contract, including the carrying out of the Services, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall request the Consultant to remedy such failure within a period not exceeding thirty (30) days after receipt by the Consultant of such notice of suspension.

2.8 Cessation of Rights and obligations

Cessation of Rights and Obligations

Upon termination of this Contract pursuant to Clauses 2.6 or 2.7 hereof, or upon expiration of this Contract pursuant to Clause 2.3 hereof, all rights and obligations of the Parties hereunder shall cease, except (i) such rights and obligations as may have accrued on the date of termination or expiration, (ii) the obligation of confidentiality set forth in Clause 3.3 hereof, and (iii) any right which a Party may have under the Applicable Law.

3. OBLIGATIONS OF THE CONSULTANT

3.1 General

3.1.1 Standard of Performance / Performance Security / Advance Payment Guarantee

The Consultant shall perform the Services and carry out their obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted professional standards and practices, and shall observe sound management practices, and employ appropriate technology and safe and effective equipment, machinery, materials and methods. The Consultant shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Authority, and shall at all times support and safeguard the Authority's legitimate interests in any dealings with Sub-Consultants or third Parties.

3.1.2 Performance Guarantee

The Consultant shall as security for the due and faithful performance and discharge of all its Consultants obligations in terms of the provisions of this Contract, procure and furnish to the Authority a Performance Guarantee from a scheduled bank acceptable to the Authority for an amount equivalent to '……' , and shall be valid for the period stated in the SC Clause 2.1 (b). Such guarantee shall be in the form set forth in Appendix C hereto, or in such other form, as the Authority shall have approved in writing.

3.1.3 Advance Payment Guarantee **- Deleted**

3.2 Prohibition of Conflicting Activities

The Consultant shall not engage, and shall cause their Personnel as well as their Sub-Consultants and their Personnel not to engage, either directly or indirectly, in any business or professional activities which would conflict with the activities assigned to them under this Contract.

3.3 Confidentiality

Except with the prior written consent of the Authority, the Consultant and the Personnel shall not at any time communicate to any person or entity any confidential information acquired in the course of the Services, nor shall the Consultant and the Personnel make public the recommendations formulated in the course of, or as a result of, the Services.

3.4 Insurance to be Taken Out by

The Consultant (a) shall take out and maintain, and shall cause any Sub-Consultants to take out and maintain, at their (or the Sub-

the Consultant Consultants', as the case may be) own cost but on terms and conditions approved by the Authority, insurance against the risks, and for the coverage, as shall be specified in the SC; and (b) at the Authority's request, shall provide evidence to the Authority showing that such insurance has been taken out and maintained and that the current premiums have been paid.

3.5 Consultant's Actions Requiring Authority's Prior Approval

The Consultant shall obtain the Authority's prior approval in writing before taking any of the following actions:

(a) entering into a subcontract with the Sub-Contractors for the performance of any part of the Services,

(b) appointing such members of the Personnel not listed by name in Appendix B, and

(c) any other action that may be specified in the SC.

3.6 Reporting Obligations

(a) The Consultant shall submit to the Authority the reports and documents specified in SC hereto, in the form, in the numbers and within the time periods set forth in the said SC.

(b) Final reports shall be delivered in CD ROM in addition to the hard copies specified in said SC

3.7 Documents Prepared by the Consultant to be the Property of the Authority

(a) All plans, drawings, specifications, designs, reports, other documents and software submitted by the Consultant under this Contract shall become and remain the property of the Authority, and the Consultant shall, not later than upon termination or expiration of this Contract, deliver all such documents to the Authority, together with a detailed inventory thereof.

(b) The Consultant may retain a copy of such documents and software. The consult will not use these documents for their future use except, with the written consent of the Authority.

3.8 **Law Governing services**

Primary responsibility of complying with all the requirements of the Applicable Laws/ local customs and practices shall be of the Consultant and the Consultant shall keep the Authority (including its Directors, employees, agents and representatives) fully indemnified against all cost's, charges, damages, penalties or litigation that may arise on account of any contravention or violation thereof.

3.9 Compliances of Labour Laws

(a) The Consultant shall employ its own competent, experienced staff/employees/personnel for the purpose of providing the Services

(b) This Agreement does not and shall not be construed to create any employer-employee or principal–agent relationship between Authority and any employees, contract labour, representatives and personnel engaged by the Consultant in the performance of Services.

(c) The Consultant, inter alia, agrees that the Services shall be rendered in strict compliance with the provisions of all Applicable Laws. The Consultant shall make statutory payments / remittances, applicable tax deductions including service taxes etc as are required to be made under labour related and other Applicable Laws. The Authority reserves the right to recover from the Consultant or withhold any amounts payable to the Consultant towards discharge of any claim or statutory obligations arising out of the breach of any of the contract labour laws or other Applicable Laws by the Consultant, without prejudice to any of its rights and other remedies herein stated or available under other Applicable Laws.

(d) The contract labour, if any, engaged by the Consultant shall be at their own risk and cost. The contract labour employed to render the Services in terms of these present shall be paid by the Consultant, the wages in conformity with the applicable wages notified by the respective State Government/ authorities from time to time. The Consultant shall be solely responsible for payment of all wages, salaries and any expenses of the personnel employed including, without limitation, all amounts payable towards State employee insurance, provident fund, pension, or employment compensation, or any other payment to be made under the Applicable Law and/or otherwise to the professionals, technicians or workmen employed and/or contracted in relation to the provision of Services under this Agreement.

(e) The Consultant shall, in timely manner, obtain and / or maintain the licenses, registrations, employment records, registers, certificates and other records and file returns as are required under various Act/ Rules / Regulations of the State Government in force or as amended from time to time and furnish proof of the same to the Authority on demand. The Consultant shall abide by and comply with all the statutory requirements under the existing Central, State and

local body regulations, laws or those made applicable from time to time, such as the Contract Labour (Regulations and Abolition) Act 1965, the Employees Provident Fund and (Miscellaneous Provisions) Act, 1952 and Payment of Gratuity Act, 1972, Employees State Insurance Act, 1948, Minimum Wages Act 1949, Payment of Wages Act 1936, Payment of Bonus Act 1965, Public Liability Insurance Act, 1991, respective State Shops and Establishments Act, and other the labour related laws and regulations as are applicable and in force from time to time and all lawful orders made by the Competent Authority/authorities under the aforesaid Acts. The Consultant shall obtain requisite registrations, statutory permissions, licenses from concerned authorities and furnish proof of the same to the Authority on demand. The Consultant shall have the absolute control and /or supervision on its employees / staff / contract labour there being no nexus of employment between the Consultant and the Authority. The Authority shall not be liable for any dispute, which may arise between the Consultant and its employees / contract labour. The Consultant shall itself regulate the engagement of its workers and their working conditions, providing statutory benefits, uniform, food etc at its sole discretion in accordance with Applicable Law.

(f) During the validity of this Agreement, the Consultant shall be solely responsible for:

(i) All acts and/or omissions by the workmen, technicians, contract-labor, contractors and other personnel engaged in the performance of the Services as set forth in this Agreement;

(ii) Health, safety and security of the workmen, technicians, contract-labor, contractors and other personnel engaged in the performance of the Services as set forth in this Agreement;

(g) The Consultant shall maintain proper books of accounts, registers, records, bills, invoices, receipts, vouchers etc in respect of the Services carried on by the Consultant and shall regularly cause proper entries to be made therein and of all other particulars and matters necessary thereto and furnish a certification of compliance thereof on demand by the Authority. The Consultant shall make available such information and documents as may be required by the authorized representatives of the Authority for verification.

3.10 Indemnification

The Consultant hereby agrees to indemnify and defend the Authority and its representatives and employees, and hold the Authority, its representatives, employees harmless from:

(a) Against all and any claims or other lawsuits or proceedings, that may arise on account of breach of any of the applicable labour and other related laws and / or that may arise out of breach of any covenants of this Agreement including those arising out of any accident that may occur during or in relation to the Services as may be proceeded against the Authority for any reason whatsoever and assume full responsibility for whatsoever including the payment of indemnification, penalties, attorneys' fees, legal costs and other charges, if any;

(b) Damages and losses caused by its negligent or intentional act or omission or any damages and losses caused by the negligent act of any third party or sub-contractor or agency engaged by Consultant;

(c) Damages and losses resulting from the non-compliance with the obligations established hereunder;

(d) Any environmental damages caused by it and/or its representatives or employees or employees of any third party or sub-contractor or agency engaged by the Consultant;

(e) Breach (either directly by it or through its representatives and/or employees) of any representation and warranty declared herein by it;

(f) Any and all claims, actions, suits, proceedings, taxes, duties, levies, costs, expenses, damages and liabilities, including attorneys' fees, arising out of, connected with, or resulting from or arising in relation to this Agreement due to neglect, omission or intentional act of the Consultant.

4. CONSULTANT'S PERSONNEL

4.1 Description of Personnel

The Consultant shall employ and provide such qualified and experienced Personnel and Sub-Consultants as are required to carry out the Services. The titles, agreed job descriptions, minimum qualifications, and estimated periods of engagement in the carrying out of the Services of the Consultant's Key Personnel are described in Appendix to the contract.

4.2 Removal and/or Replacement of Personnel

(a) Except as the Authority may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Consultant, such as retirement, death, medical incapacity, among others, it becomes necessary to replace any of the Key Personnel, the Consultant shall provide as a replacement a person of equivalent or better qualifications. The bidder should bear in mind that the award of project has been based on a technical evaluation which in turn was greatly influenced by the CVs provided in the proposal. Hence, the bidder should be very careful about replacing proposed personnel. TSTDC considers all personnel key professional staff for the purpose of this engagement.

(b) Personnel replacement will be governed by following terms and conditions and will exclude additional experts and support consultants:

(i) No replacement is allowed in any personnel other than for reasons mentioned above in 4.2 (a). If the bidder chooses to replace a team member before project is completed, following penalties shall be charged:

Replacement of 1 Personnel = INR 1,00,000 per month for the remaining time period (months) of the project. For e.g. If the project schedule is of 10 months and a personnel is replace after 6 months, INR 1 lac will be charged for each of the remaining 4 months.

Replacement of more than 1 personnel: Authority reserves the right to impose a suitable penalty or in certain cases may invoke termination clause/ Liquidated damages clause based on which personnel is replaced at what stage and the envisaged impact of the same on the project.

(c) If the Authority finds that any of the Personnel have (i) committed serious misconduct or have been charged with having committed a criminal action, or (ii) have reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Consultant shall, at the Authority's written request specifying the grounds thereof, provide as a replacement a person with qualifications and experience acceptable to the Authority.

(d) The Consultant shall have no claim for additional costs arising

out of or incidental to any removal and/or replacement of Personnel. The remuneration to be paid for any of the Personnel provided as a replacement shall not exceed the remuneration which would have been payable to the personnel replaced.

5. OBLIGATIONS OF THE AUTHORITY

5.1 Assistance and Exemptions The Authority shall use its best efforts to ensure that the Government shall provide the Consultant such assistance and exemptions as specified in the SC.

5.3 Facilities The Authority shall make available free of charge to the Consultant the facilities listed under Appendix D.

5.4 Access to land Subject to Applicable Laws, the Authority warrants that the Consultant shall have, free of charge, unimpeded access to all land in the Government's country in respect of which access is required for the performance of the Services.

5.5 Change in applicable law If, after the date of this Contract, there is any change in the Applicable Law with respect to taxes and duties on the subject matter of this Contract or in relation thereto, which increases or decreases the cost or reimbursable expenses incurred by the Consultant in performing the Services, then the remuneration and reimbursable expenses otherwise payable to the Consultant under this Contract shall be increased or decreased accordingly by agreement between the Parties hereto, and corresponding adjustments shall be made to the ceiling amounts specified in Clause 6.2.

6. PAYMENTS TO THE CONSULTANT

6.1 Lump-Sum Payment (a)The total payment due to the Consultant shall not exceed the Total Fee for the Services described in Appendix A and subject to deduction of tax at source as per Applicable Laws.
(b) An abstract of the cost of the Services payable in **local currency (Indian Rupees)** is set forth in **Appendix E.**

6.2 Total Fee Total Fee payable to the Consultant shall be in terms of the provision of SC Clause 6.2.

6.3 Terms and Conditions of Payment (a) Payments will be made to the Consultant according to the payment schedule stated in the SC Clause 6.3.

(b) No payment shall become eligible for the next stage till the Consultant completes to the satisfaction of the Authority the work pertaining to the preceding stage.

6.4 Responsibility for Accuracy of Project Documents

6.4.1 Notwithstanding Clause 6.3, the Consultant shall be responsible for accuracy of the data collected, by him directly or procured from other agencies/authorities, the designs, drawings, estimates and all other details prepared by him as part of these services. It shall indemnify the Authority or other agencies/authorities against any inaccuracy in the work which might surface during implementation of the project. The Consultant will also be responsible for correcting, at his own cost and risk, the drawings including any re-survey / investigations and correcting layout etc. if required during the execution of the Services.

6.4.2 Notwithstanding Clause 6.3, the Consultant shall be fully responsible for the accuracy of design and drawings of the structures. All the designs and drawings for structures including all their components shall be fully checked by a Senior Engineer after completion of the designs. All drawings for structures shall be duly signed by the (a) Designer, (b) Senior Checking Engineer, and (c) Senior Structure Expert. The designs and drawings not signed by the three persons mentioned above shall not be accepted. The Consultant shall indemnify the Authority against any inaccuracy / deficiency in the designs and drawings of structures noticed during the construction and even thereafter and the Authority shall bear no responsibility for the accuracy of the designs and drawings submitted by the Consultant.

6.5 Retention An amount equivalent to 5% of the Contract Price shall be retained

Money at the end of the Contract for accuracy of design and quantities submitted and the same will be released after the completion of Services.

6.6 Penalty for delay In case of delay in completion of Services, a penalty equal to 0.05% of the contract price per day subject to a maximum 5% of the Contract Price will be imposed and shall be recovered from payments due/performance security. However in case of delay due to reasons beyond the control of the consultant, suitable extension of time will be granted.

7. GOOD FAITH

7.1 Good Faith The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.

8. SETTLEMENT OF DISPUTES

8.1 Amicable Settlement The Parties agree that early resolution of disputes is crucial for a smooth execution of the Contract and the success of the assignment. The Parties shall use their best efforts to settle amicably all disputes arising out of or in connection with this Contract or its interpretation.

8.2 Dispute Resolution Any dispute between the Parties as to matters arising pursuant to this Contract that cannot be settled amicably within thirty (30) days after receipt by one Party of the other Party's request for such amicable settlement may be submitted by either Party for settlement in accordance with the provisions specified in the SC.

II SPECIAL CONDITIONS OF CONTRACT

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
1.2.2	The English language shall be the official language for all purposes; and English language may be changed to any other language with the agreement of both the parties
1.3	The addresses are: **Authority** : _____ Attention: _____ Facsimile : E-mail: _____ **Consultant**: _____ Attention: _____ _____ Facsimile: _____ E-mail: _____
1.3.3	Notice will be deemed to be effective as follows: (a) in the case of personal delivery or registered mail, on delivery; (b) in the case of telexes, 24 (twenty four) hours following confirmed transmission. (c) In the case of telegrams, 24 (twenty four) hours following confirmed transmission; and (d) In the case of facsimiles, 24 (twenty four) hours following confirmed transmission.
1.5	The Authorized Representatives are: **For the Authority**: _____ **For the Consultant**: _____
2.2	The date for the commencement of Services shall be from _____ which is the date of issue of the work order (herein referred to as the '**Work Order**'). The time period shall be fifteen (15) days or such other time period as the Parties may

	agree in writing.
2.3	This Contract shall be valid for a period of _____from the Effective Date or such other period as the parties may agree in writing.
3.1.2	The Consultant shall furnish within 7 (seven) days of the issue of work order, an unconditional Bank Guarantee from the Bank (ACCEPTABLE TO AUTHORITY) of an amount equivalent 10% of the total estimated Contract Price to be received by it towards Performance Security valid for a period of ***one (1) year*** beyond the date of completion of Services. The Bank Guarantee will be released by AUTHORITY upon expiry of 12 (twelve) months beyond the date of completion of Services. The Bank Guarantee shall be extendable till the completion of civil contract works and rectification of errors if any, found during implementation of Services**.** In the event the Bank Guarantee or any portion thereof, is en-cashed by the Authority, then immediately following such encashment, the Consultant shall replenish the Bank Guarantee to the original amount
3.1.3	Deleted
3.4	The risks and the coverage shall be as follows: (a) Third Party motor vehicle liability insurance in respect of motor vehicles operated in the Government's country by the Consultant or its Personnel or any Sub-Consultants or their Personnel, with a minimum coverage as per Motor Vehicles Act 1988; (b) Third Party liability insurance, with a minimum coverage of _____ for the period of consultancy. (c) Professional Liability Insurance, with a minimum coverage of _____**;** Consultants will maintain at its expense; Professional Liability Insurance including coverage for errors and omissions caused by Consultant's negligence, breach in the performance of its duties under this Contract from an insurance company permitted to offer such policies in India, for a period of 5 (five) years beyond completion of Services commencing from the Effective Date, (A) For an amount not exceeding total payments for Professional Fees and Reimbursable Expenditures made or expected to be made to the Consultants hereunder or (B) the proceeds, the Consultants may be entitled to receive from any insurance maintained by the Consultants to cover such a liability, whichever of (A) or (B) is higher with a minimum coverage of

	[insert amount and currency]. The indemnity limit in terms of "Any One Accident" (AOA) and "Aggregate limit on the policy period" (AOP) should not be less than the amount stated in the Contract. In case of joint venture or 'in association', the policy should be in the name of joint venture / in association entity and not by the individual partners of the joint venture/association. (d) Employer's liability and workers' compensation insurance in respect of the Personnel of the Consultant and of any Sub-Consultants, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate; and (e) insurance that may be necessary to protect the Authority ,its employees and assests including rioting and all force majeure events that are insurable. (f) any other insurance against loss of or damage to (i) equipment purchased in whole or in part with funds provided under this Contract, (ii) the Consultant's property used in the performance of the Services, and (iii) any documents prepared by the Consultant in the performance of the Services. ***All insurances and policies should start from the date of commencement of services and remain effective as per relevant requirements of Contract Agreement***
3.6	The schedule of deliverable is as per the section 5.6 of RFP The starting date shall be the date as mutually agreed by the Parties in writing. The delivery schedule must be adhered to by the Consultant.
3.7	*The Consultant shall, as a consideration for the services rendered towards the Assignment, be entitled to an agreed fees (hereinafter referred to as the "**Consultancy Fees**"), plus applicable Service Tax as may be levied under the laws of India (subject to tax deduction at source as per Applicable Law).* *The Consultancy Fee, as and when becoming payable as per terms hereof, shall be inclusive of all out of pocket expenses including manpower costs, and costs of deliverables.* The Consultant shall, while raising the invoice for the payments, provide the breakup of service tax, surcharge, cess and any other applicable tax as included in the payment for which invoice is being raised. The Consultant shall also quote the service tax registration number, nature of service for which registration is obtained and it's PAN No. on all the invoices raised for the payment.
6.3	**<u>Payment Schedule:</u>** Payments will be made according to Section 5.7 of RFP

Annexure 9

BANK GUARANTEE FOR PERFORMANCE SECURITY

[To be stamped in accordance with Stamp Act, if any, of the Country of Issuing Bank]

To

_____

In consideration of "TSTDC" (hereinafter referred as the "**Employer/ Client/ Authority**", which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s_____ having its Registered office at _____ (Hereinafter referred to as the "**Consultant**" which expression shall repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a contract by issue of Authority's Work Order dated _____ and the same having been unequivocally accepted by the Consultant, resulting in a Contract valued at _____ excluding Service Tax for Consultancy Services for the _____(Hereinafter called the "**Contract**"), and the Consultant having agreed to furnish a Bank Guarantee to the Authority as "Performance Security to secure the due , faithful and punctual discharge of and compliance with all the Consultants obligations and responsibilities in terms of and as stipulated by the Authority in the said contract for performance of the above Contract amounting to _____.

We, ……..having registered office at …….., a body registered/constituted under the …….(hereinafter referred to as the Bank), which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee the due and punctual performance & discharge by the Consultant of all its obligations under the Contract and undertake to pay the Authority immediately on demand, without any deductions, set-off or counterclaim whatsoever, any or, all money demanded by the Authority to the extent of _____as aforesaid at any time up to _____, without any demur, reservation, contest, recourse, cavil, arguments or protest and/or without any reference to or enquiry from the Consultant and without your needing to prove or show grounds or reasons for your demand for the sum specified therein. Any such demand made by the Authority on the bank shall be conclusive and binding notwithstanding any difference between the Authority and the Consultant or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority. We agree that the Guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Authority discharges this guarantee.

The Authority shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee, from time to time to vary or to extend the time for performance of the contract by the Consultant. The Authority shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Consultant and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Authority and the Consultant any other course or remedy or security available to the Authority. The Bank shall not be relieved of its obligations under these presents by any exercise by the Authority of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Authority or any other indulgence shown by the Authority or by any other matter or thing whatsoever which under law would but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Authority at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Consultant and notwithstanding any security or other guarantee that the Authority may have in relation to the Consultant's liabilities.

The Authority shall be entitled to make unlimited number of demands under this Bank Guarantee. Any demand shall be deemed to be served, if delivered by hand, when left at the property address for service; and if given or made by pre-paid registered post or facsimile transmission, on receipt.

Any waivers, extensions of time or other forbearance given or variations required under the Contract or any invalidity, unenforceability or illegality of the whole or any part of the Contract or rights or any Party thereto or amendment or other modifications of the Contract, or any other fact, circumstances, provision of statute of law which might entitle the Bank to be released in whole or in part from its undertaking, whether in the knowledge of the Bank or not or whether notified to the Bank or not, shall not in any way release the Bank from its obligations under this Bank Guarantee.

(Signature of the Authorized Official)

GOVERNMENT OF TELANGANA
IRRIGATION & CAD DEPARTMENT



FROM:
Sri.P.SHIVA KUMAR, B.E.,
Superintending Engineer,
Irrigation Circle No.2.
L.M.D. Colony – 505 527,
KARIMNAGAR DISTRICT.

TO:
The District Collector
Karimnagar,
Karimnagar District.

Lr.No.SE/IC.2/LMD/DEE-1/TS/T1/ M1278 **Date:** 04-05-2024

Sir,

Sub: - I&CAD Dept –OA No.136 of 2023(SZ) titled as M.Venkata Reddy Vs State of Telangana – pending before the NGT,SZ,Chennai-Scientist from MOEFCC requested to arrange for site inspection and factual report-proposal to form a committee with all the stake holders-Req- Reg.

Ref: - 1. Scientist –D (Infra-II) MOEFCC letter addressed to the Deputy Director General of Forests(C),MOEFCC,Dt:03.04.2024
2.Lr.No.EE/Divn.5/I.C-2/TS/T1/SE/836,Dt:27.04.2024

***

With reference to the subject and reference 1st cited, Sri M.Venkata Reddy filed a case on Manair River front development project before NGT, alleging that the project was initiated without obtaining Environmental Clearance. The Scientist of Ministry of Environment, Forest & Climate change is requested to arrange for a site inspection of the project and also requested to provide factual report including total project area, built up are etc which are essential for determining the eligibility of any project for grant of Environmental Clearance and other related issues as mentioned in the application of Sri M.Venkata Reddy.

The Executive Engineer, Irrigation Division No.5,LMD Colony has reported vide reference 2nd cited that the Manair River front Development project is a collaborative project between I&CAD and Tourism department. The factual report of the project can not be prepared and submitted by any individual department and the site inspection date shall be communicated after mutual meeting with the Tourism department.

In this regard, the District Collector, Karimnagar is requested to convene a meeting with Tourism Department to prepare and submit a factual report and arranging a date for site inspection of the MOEFCC officials.

Sd/-
Superintending Engineer,
Irrigation Circle No.2, LMD Colony

Copy forwarding to the Executive Engineer, Irrigation Division No.5, LMD Colony for information.

Sd/-
Superintending Engineer,
Irrigation Circle No.2, LMD Colony

// **Attested** //

4/5/24
Dy Executive Engineer (Tech).,
Irrigation Circle No.2, LMD Colony.
04/05/24

GOVERNMENT OF TELANGANA
IRRIGATION & CAD DEPARTMENT

FROM:
Sri. P. Nagabhushana Rao B. Tech,
Executive Engineer,
Division.No.5, Irrigation Circle-2
LMD Colony, Karimnagar.

TO:
The Superintending Engineer,
Irrigation Circle No.2 of
ENC(I) Karimnagar,
LMD Colony

DT:22-04-2024

Lr.No.EE/Divn.5/I.C-2/TS/T1/SE/836

Sir,

Sub:- I&CAD Dept. – OA No.136 of 2023 (SZ) titled as M.Venkata Reddy Vs. State of Telangana & Ors pending before the NGT, SZ, Chennai – Scientist from MOEFCC requested to arrange for site inspection and factual report – Proposal to form a committee with all stake holders – Req. – Reg.

Ref:- 1. Scientist-D (Infra-II) MOEFCC Lr addressed to Deputy Director General of Forests (C) MOEFCC, Dt:03.04.2024

*****

Anent to the subject cited it is to submit that Sri. M. Venkata Reddy has filed an application in National Green Tribunal alleging that the Manair Riverfront Development Project was initiated without obtaining Environmental Clearance (EC) from the statutory authorities. In this connection, the Scientist from Ministry of Environment, Forest and Climate Change (MOEFCC) opined that area of the project site or proposed built up area are essential for determining the eligibility of any project for grant of EC and requested to arrange for a site inspection of the project and also to provide factual report including project area, built up area etc and other related issues as mentioned in the application filed by Sri. M. Venkata Reddy.

It is to submit that the Manair River Front Development Project is a collaborative effort between the Departments of Tourism and Irrigation & CAD and requires close coordination and information sharing with the department of Revenue. As such, a factual report of the project can't be prepared and submitted by any individual department alone, but requires collective inputs from all stakeholder departments. Also, a date mutually agreed upon by all the departments shall be communicated for site inspection.

In this regard, the Superintending Engineer, Irrigation Circle No.2, LMD Colony is requested to kindly address the District Collector, Karimnagar to convene a meeting with members of all stakeholder departments and form a committee so that a collective factual report of Manair River Front Development Project may be submitted. Also, a date can be agreed upon for arranging the site inspection for the officials from MOEFCC. Also, it is requested to appraise that formation of this committee shall not only facilitate in addressing

any legal concerns collectively but shall also facilitate and ease the process of decision making in various aspects involved in the project which will in turn expedite the project.

This is submitted for favour of information and further necessary action.

Yours faithfully,

Executive Engineer,
Irrigation Division.No.5 of IC-2,
LMD Colony Karimnagar.

F. No. IA-3-3/3/2024-IA-III
Government of India
Ministry of Environment, Forest & Climate Change
(IA-III Division-Infrastructure)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi-110 003
Dated: 03.04.2024

To,

The Deputy Director General of Forests (C)
Ministry of Environment, Forest and Climate Change,
Regional Office, Istand IInd Floor,
Handloom Export Promotion Council,
34, Cathedral Garden Road, Nungambakkam, Chennai – 34.
Email: ro.moefccc@gov.in

Sub.: OA No. 136 of 2023 (SZ) titled as M.Venkata Reddy Vs State of Telangana & ors pending before the NGT, SZ,Chennai-reg.

Sir,

Please refer to a court case (copy enclosed), filed by M.Venkata Reddy against the unauthorized construction of "Manair River Front Development Project" at Karimnagar of Telangana State. It is alleged that the aforesaid River Front Development Project was initiated on River Manair adjacent to the Lower Maneru Dam (LMD) without obtaining EC from the statutory authorities.However, further details regarding area of the project site or proposed built up area are not mentioned, which are essential for determining the eligibility of any project for grant of Environmental Clearance as per provisions mentioned in the EIA Notification, 2006 as amended.

2. In view of above, it is requested to arrange for a site inspection of the project in question and also provide factual report including total project area, built up area etc and other related issues as mentioned in the aforesaid application.

Yours Faithfully,

Encl: a/a

(Dr.S.Prabhu)
Scientist-D (Infra-II)
Email: p.subramani@gov.in

GOVERNMENT OF TELANGANA

IRRIGATION AND COMMAND AREA DEVELOPMENT DEPARTMENT

NOTICE INVITING TENDERS (NIT)

*****

NIT.No. 3/SE/IC-2/2021-22 Date: 24.01.2022

1) Tenders for the work mentioned below are invited from the Contractors/Contracting firms/ Companies registered with Government of Telangana

a)	Name of the work	**Construction of Protection Wall along Manair River both sides on both Flanks between downstream of LMD and Check Dam No. II of Karimnagar Rural (M), Karimnagar District.** **(for the work of Protection wall, Half Weir and Half Barrage duly utilizing the intact portion of Check Dam-II, Improvements of Check Dam-II, Canal for feeding River Front).**
b)	Estimate Contract Value of the work put to tender	**Rs.264,24,29,950/-**
c)	Period of completion of work	**24 (Twenty Four) Months**
d)	Form of contract	LUMPSUM
e)	Class of Contractor Eligible	**Special Class (Civil)** Registration in accordance to 1) G.O.Ms.No.94, I&CAD(PW-COD)Dept., Dated: 01.07.2003 (Specify required class & Category) 2) G.O.Ms.No.130, I&CAD(PW reforms)Dept., Dated: 22.05.2007 3) G.O.Ms.No.66, I&CAD(reforms)Dept., Dated: 20.04.2015 4) G.O.Ms.No.67, I&CAD(reforms)Dept., Dated: 20.04.2015 5) G.O.Ms.No.140, I&CAD(reforms)Dept., Dated: 26.09.2015 6) G.O.Ms.No.21, I&CAD(reforms)Dept., Dated: 13.04.2017
f)	EMD to be paid in the shape of Demand draft / online payment in favour of P.A.O, LMD Colony, Karimnagar District or (unconditional irrevocable) Bank Guarantee drawn in favour of the Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar District obtained from any Nationalized/ Scheduled commercial Bank, @1% of the Estimate contract value of work valid for 3 months from the Date specified.	**Rs.2,64,24,300/-**
g)	Date and Time for download of Tender Schedules online	From **02.02.2022, 1.00 Pm** onwards to **17.02.2022 up to 3.00 pm**
h)	Last date and time for submission of required qualification Documents and Price Bid online	**17.02.2022 up to 5.00 Pm**
i)	Date and time of opening of tender a) Technical Bids b) Price Bids	 **18 .02.2022, @ 11 AM** **23.02.2022 @ 3.00 PM**

CONTRACTOR

1 SUPERINTENDING ENGINEER
IRRIGATION CIRCLE NO.2, LMD COLONY.

2)

a) The Bidders may contact the Tender inviting Authority for any information/ Clarifications required to submit their tenders on 'e' procurement market place.

The bidders need to register on the electronic procurement market place of Government of TS that is, www.tender.telangana.gov.in for obtaining digital signature certificate. The bidders may contact TSTS Unit, 4th Floor, BRKR Bhavan, Hyderabad. On registration of the e-procurement market place they will be provided with a user ID and password by the system, and only by using the same they can submit their tenders on line.

b) After registering on the e-procurement market place, bidders need to scan and upload the required documents as per the tender requirements.

c)The bidders shall authenticate the tender with their digital certificate for submitting the tender electronically on 'e'procurement platform and the tenders not authenticated by Digital certificate of the bidder will not be accepted on the 'e'procurement platform.

d) The bidder shall mandatorily pay the transaction fee to M/S TSTS UNIT, HYDERABAD through the electronic payment Gateway.

e) The bidders are advised not to wait till the last day of submission of tender to avoid uploading problem if any, on the web site.

3)

i) The bidders who are desirous of participating in 'e'procurement market place shall submit their technical bids, price bids etc., online, as prescribed in the NIT and tender documents, displayed at 'e' procurement market place. The bidders should upload the scanned copies of all the relevant and required certificates, documents etc., in the 'e' procurement market place in support of their technical bids. The bidders shall sign on all the statements, documents, certificates, uploaded by them, owning responsibility of the correctness/authenticity.

ii) All the bidders shall invariably upload the scanned copies of DD/BG towards EMD in e-procurement system and this will be the primary requirement to consider the bid as responsive.

iii) The bidders shall furnish a declaration online stating that the soft copies uploaded by them are genuine. Any incorrectness/deviation noticed will be viewed seriously and apart from cancelling of the Tender and forfeiting the EMD, criminal action will be initiated including suspension from business.

iv) If the tender inviting authority request the bidders for the submission of original of uploaded documents by written (written means communicated in writing and i.e., by e-mail, fax, Telex) demand in case of necessity during the technical bid evaluation, the same shall be produced by the bidders with in specified period.

v) The tenders will be opened online in e-procurement platform by the **Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar** of his nominee at his office on the date and time specified in the NIT. All the statements, documents, certificates, DD/BG etc., uploaded by the bidders will be downloaded for technical evaluation. The clarifications, particulars if any required from the bidders will be obtained by addressing the bidders. The technical bids will be evaluated against the specified parameters/criteria; same as in the case of conventional tenders and the technically qualified bidders will be identified. ***Clarification will be obtained in respect of uploaded documents only. No other document obtained/submitted will be taken in to consideration in evaluation process.***

vi.) **Competent Authority will carry out the technical bid evaluation solely based on the Uploaded Certificates/documents, DD/BG towards EMD in the e-procurement system and open the Price bids of the responsive bidders.**

vii) Any objections by the participating bidders on the technical bid evaluation/ disqualification made by the bid inviting authority shall be made within 10 days time from the date of opening of price

bids and proper acknowledgement shall be obtained invariably. The representation/ petition received after the specified time and date shall not be entertained.

viii) The price bids of such bidders, who are determined to have complied with the eligibility criteria i.e., qualified in the Technical Bid evaluation, will only be opened by the Tender inviting authority **Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar** of his nominee at his office, on the date and time specified in the NIT.

ix) If the office happens to be closed due to any reason on the dates specified in the NIT, the respective activity will be performed at the designated time on the next working day without any notification.

x) The tender inviting authority of an officer designated by him will notify the successful bidder and inform by Email/Under Certificate or posting at the address indicated in the tender for submission of original hard copies of all Uploaded documents, DD/BG towards EMD prior to entering in to Agreement within a stipulated time period.

xi) The successful bidder shall invariably furnish the original DD/BG towards EMD, certificates/ documents of the uploaded scanned copies, to the Agreement concluding authority before entering in to agreement either personally or through courier or post within the stipulated date and shall obtain the receipt of the same, which shall be the responsibility of the successful bidder. The department shall not take any responsibility for any delay in receipt of original DD/BG towards EMD, certificates/ documents from the successful bidder before the stipulated time. On receipt of documents, the Tender inviting authority shall ensure the verification of genuinity of the DD/BG towards EMD and all other certificates/documents uploaded by the bidder in e-procurement system in support of the qualification criteria before concluding the agreement.

xii) If any, successful bidder fails to submit the original hard copies of uploaded certificates/ documents, DD/BG towards EMD within the stipulated time or if any, variation is noticed between the uploaded documents and the original hard copies submitted by the bidder, the successful bidder will be suspended from participating in the tender s on e-Procurement platform for a period of 3 years. The e-Procurement system would deactivate the user ID of such defaulting successful bidder based on the trigger/ recommendation by the Tender inviting Authority in the system. The information to this extent will be displayed in the e-procurement platform website.

xiii) **Subsequent information in support of the documents specifically uploaded by the bidder shall be sought for submission before finalization of tender, which will be considered. Whereas the documents submitted by the bidders in the form of hard copy of the documents which are not uploaded shall not be considered for technical bid evaluation.**

4) **Any other details can be hard from the Office of the Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar Mobile No.7673905333, Phone No.0878- 2223221.**

5) **If any discrepancy / conflict between N. I. T. on line and Tender document, the tender Document is final.**

CONTRACTOR 3 SUPERINTENDING ENGINEER
IRRIGATION CIRCLE NO.2, LMD COLONY.

INSTRUCTIONS TO BIDDERS

A – GENERAL

Name of work : Construction of Protection Wall along Manair River both sides on both Flanks between downstream of LMD and Check Dam No. II of Karimnagar Rural (M), Karimnagar District (for the work of Protection wall, Half Weir and Half Barrage duly utilizing the intact portion of Check Dam-II, Improvements of Check Dam-II, Canal for feeding River Front).

Scope of work:- Construction of Protection Wall along Manair River both sides on both Flanks between downstream of LMD and Check Dam No. II of Karimnagar Rural (M), Karimnagar District (for the work of Protection wall, Half Weir and Half Barrage duly utilizing the intact portion of Check Dam-II, Improvements of Check Dam-II, Canal for feeding River Front).

Give brief description and location of work: from Lower Manair Dam towards Cable Suspension Bridge, Karimnagar(M), Karimnagar (Dist).

List out Principal Components of this work.		
A	**ECV put to tender**	**Rs.264,24,29,950/-**
B	Give breakup of Cost of major items covered in the ECV	
	1) Earth Work Excavation	Rs. 25,71,85,837/-
	2) Earth Work excavation requiring blasting	Rs. 14,27,60,842 /-
	3) Steel	Rs. 7,61,18,420/-
	4) Concrete	Rs. 152,39,84,520/-
	5) Embankment	Rs. 27,31,39,782/-
	6) Mechanical Works	Rs. 24,50,00,957/-
C	Period of completion of Work.	24 Months
D	S O R adopted.	SOR 2021-22
E	Rate adopted for Cement.	Rs:5500/MT
	Rate adopted for Steel	Rs:58000/MT
F	Details of provisions included in the Estimate put to tender	
	NAC	0.1% / as applicable from time to time
	Green Funds	0.01%
	Labour Cess	1% / as applicable from time to time
	GST	12% / as applicable from time to time
	DMFT (30%) and SMET(2%) on Seigniorage Charges	32% total on Seigniorage Charges
	Contractor profit & Over Head Charges.	13.615% (As per the Estimate).
	Seigniorage charges.	As per tender condition No 12.4 G.O.Ms.No.67 Dt:16.09.2015
	Other (Agency, Municipal, and Industrial) **if any.**	Municipal Allowance @ 25% extra over the basic rates of labour component.
	Other items if any	As applicable

The Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar invites tenders for the above work vide **N I T. No: Tender Notice No.3 /SE/IC-2/2021-22, Dt: 24.01.2022**

1. The Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar or his nominee at his office will open the tenders of the above work Online, on the dates mentioned in NIT. If the Office happens to be closed on the dates, the opening of tenders gets automatically postponed to the next working date, the time being unaltered, unless extended by a notification published Online through Corrigendum.

2. Bidders Eligible to Tender:

2.1 The bidders who

i) Possess the valid registration in the class and categories mentioned in the NIT and satisfy all the Conditions therein.

ii) Are not blacklisted or debarred by the Government of Telangana and any other Governments (State & Central) in India (or) suspended from the business by the Registering Authority for whatever the reason, prohibiting them not to continue in the contracting business

iii) Have complied with the eligibility criteria and other conditions specified in the NIT and tender document **are only eligible to participate in the tender**.

iv) The bidder should be cumulatively net profit making during the last Ten Financial Years. In case of JV, all members shall be cumulatively net profit making during the last Ten Financial Years.(i.e., the combined total profit and loss put together in the last Ten Financial Years should be in profit.)

2.2 Bidders Ineligible to Tender:

i) The Bidder / Firms applied for / availed Corporate Debt Restructuring (CDR) / Strategic Debt Restructuring (SDR) during last five (5) financial years and continuing to be under the same as on the date of tendering i.e., 24.01.2022 are not eligible to participate in the Bid.

ii) A retired employee of the Govt. of Telangana / erstwhile Govt. of AP or Govt. of India is disqualified from tendering for a period of two years from the date of retirement except with the prior permission of the Government.

iii) The Bidder who has employed any retired employee as mentioned above shall be considered as an ineligible bidder.

iv) The contractor himself or any of his employees is found to be an officer who retired from Government Service and had not obtained permission from the Government for accepting the contractor's employment within a period of 2 years from the date of his retirement.

v) The Contractor or any of his employees is found at any time after award of contract, to be such a person who had not obtained the permission of the Government as aforesaid before submission of the tender or engagement in the Contractor's service.

vi) Contractor shall not be eligible to tender for works in the division / circle where any of his near relatives are employed in the rank of Assistant Engineer or Assistant Executive Engineers and above on the Engineering side and Divisional Accounts Officer and above on the administrative side. The Contractor may intimate the names of persons who are working with him in any capacity or are subsequently employed. He may also furnish a list of Gazetted / Non-Gazetted, State Government Employees related to him.

vii) **Note: Near relatives include**

1. Sons, stepsons, daughters, and stepdaughters.
2. Son-in-law and daughter-in-law.
3. Brother-in-law and sister-in-law.
4. Brothers and Sisters.
5. Father and Mother.
6. Wife / Husband.
7. Father-in-law and Mother-in-law
8. Nephews, nieces, uncle and aunts
9. Cousins and
10. Any person residing with or dependent on the contractor.

3. QUALIFICATION DATA OF THE BIDDERS

3.1 The Bidder shall furnish the following particulars in the formats enclosed, supported by documentary evidence as specified in the formats. Failure to comply with the condition, the bid shall be considered incomplete and summarily rejected.

a) Check slip to accompany the tender (in Annexure-I).

b) Attested copies of documents relating to the Registration of the firm / company, Partnership deed / Articles of Association

Note: The Partnership firms, which are registered as Contractors shall intimate the change in partners if any, within one month of such change. Failure to notify the change to the registration authority in time will entail the firms to forfeit their registration and their tender will be rejected. It is the responsibility of the bidders to upload the proof of intimation of change of partners if any to the Registering authority within one month of such change along with the tender. The acceptance by the Registration authority if any may also be uploaded.

c) Details of value of **Civil** Engineering works executed in the last **10** financial years **(i.e. from 2011-12 to 2020-21)** by the Bidder in Statement-I with supporting certificates.

d) Details of similar works completed (not less than 90% of physical contract value) by the bidder during the last **ten** financial Years **(i.e. from 2011-12 to 2020-21)** in Statement-II with supporting certificates

e) Details of required physical Quantities of work executed by the bidder in the last 10 financial years **(i.e. from 2011-12 to 2020-21)** in Statement – III with supporting certificates. (This is not required for works costing upto **Rs. 10 crore**).

f) Details of existing commitments of the bidder i.e., works on hand in Statement-IV-(A) with Supporting Certificates and also details of tenders **Participated**/submitted in Statement – IV(B)

g) Availability of Key & critical construction and quality control equipments with the bidder in Statement - V

h) Availability of key personnel with the bidder for administration / site management and execution viz., technical personnel required for the work (Statement-VI)

i) Information regarding any litigation, with Government during the last five years, in which the Bidder is involved in (Statement-VII)

j) Availability of working capital for the work [Liquid assets, credit facility and availability of other financial resources].

k) Aadhar Card

l) **The bidders shall furnish a declaration online stating that the soft copies uploaded by them are genuine. Any incorrectness/ deviation noticed would be viewed seriously and apart from cancelling of the Tender and forfeiting EMD, criminal action would be initiated including suspension of Business.**

m) The proposed methodology and program of construction, backed with equipment planning and deployment, duly supported with broad calculations, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

n) The particulars of quality control testing Lab owned or proof of having tie-up with established quality control testing laboratories.

3.2 a) Tenders from Joint Ventures are not acceptable upto **Rs. 100 crores** unless Specifically stated otherwise (Joint ventures may be permitted in respect of the works combining Civil and Mechanical / Electrical works).

b) for works costing more than **Rs. 100 crores,** J.V's are allowed, JV partners/ Firms with maximum of three, including lead partner shall be allowed.

c) **Criterion for joint ventures:**

A) **General requirements:**

1) Individual / Firm/ Company registered as **Special Class Civil** with Government of Telangana / erstwhile Andhra Pradesh with valid Registration in terms of

(I) G.O.Ms.No.94, I&CAD(PW-COD) Dept., dt.1.7.2003 and
(II) G.O.Ms.No.130,I&CAD(PW-Reforms)Dept., dt. 22.05.2007
(III) G.O.Ms.No.66, I&CAD (Reforms) Dept.dt.20-4-2015
(IV) G.O.Ms.No.67, I&CAD (Reforms) Dept.dt.20-4-2015
(V) GO Ms No.140 I & CAD (Reforms) Dept, Dt 26-09-2015
(VI) GO Ms No.21 I & CAD (Reforms) Dept, 13-04-2017

2) In case of J.V, the partner of the J.V group should have a valid registration in appropriate class with the Government of Telangana / erstwhile Andhra Pradesh as on date of submission of bids.

3) Any member of JV who has applied for / availed corporate debt restructuring (CDR) / Strategic Debt Restructuring (SDR) during last five (5) financial years and continuing to be under the same as on the date of tendering i.e., Dt.24.01.2022. is not eligible to participate in the bid. A certificate from chartered accountant to the effect that CDR/SDR not applied / not availed/ not continuing under CDR/SDR shall be uploaded by the bidder.

4) In case of joint ventures, the eligibility criteria will be considered on the basis of combined resources of the JV members, subject to the provisions of the bid document.

5) The total members in the Joint venture shall not be more than 3 (Three)

6) In case of Joint Venture, the JV members should have entered into a legally valid Agreement for joint and several responsibilities and submit along with bid. The name of the Lead Member shall be defined. The Lead Member's share shall be not less than 51% in the joint venture. The other two members share shall not be less than 20%. The share of each member including lead Member shall be exhibited in the JV Agreement.

In case of JV for pump house packages the conditions of joint and several responsibilities is applicable to all the JV partners except the JV partner who is responsible for pump/motor components and the responsibility & liability of such JV partner shall be limited to his share. However, the lead partner of the JV shall be responsible and liable for all contractual obligations/ responsibilities for completion of entire work.

7) The JV Agreement should clearly exhibit the responsibilities of the JV members. The non lead members of the JV shall execute a Power of Attorney in favour of the Lead Member authorizing the Lead Member to conduct all business for and on behalf of the JV during (a) Tendering process and (b) execution and for successful performance of the work including the Defect Liability in case of award of work. The Lead Member shall execute a Power of Attorney in favour of one of its officers to be the Authorized Signatory for signing the Bid Documents and also to undertake all other acts and deeds on the behalf of the JV in connection with the Bid and the Contract.

8) The JV firm should furnish an undertaking from all the members that in case of award of work, the J.V Agreement deed is irrevocable by any one or all the members together until 3 months after the completion of the contract period including the defect liability period.

9) The JV Agreement should also include JV members to agree that the above undertaking to be without any prejudice to the various liabilities of the members of the JV (Bidder) including the performance security deposit as well as all the other obligations of the contract.

10) In case of J.Vs in meeting the requirement of eligibility criteria except "Available bid capacity", the experience of each of the members of J.V shall be added together to arrive the combined experience of the J.V to determine the tenderers compliance with eligibility criteria, subject to satisfying minimum criteria stipulated for members of the JV in the subsequent clauses.
Regarding available bid capacity, in case of joint venture the available bid capacity will be applied for each member to the extent of his participation in the execution of the works according to the J.V agreement.

11) The experience of the work for which bids are invited shall be shared among the members of J.V. in the same ratio of their JV participation in the work.

12) No member of Joint Venture shall be member of another Joint Venture for bidding the same work. All such bids in that particular work shall be disqualified.

3.3 QUALIFICATION CRITERIA FOR OPENING OF THE PRICE BID.

A) To qualify for opening the Price Bid each bidder in its name,_should have, during the last ten financial years including the current financial year in which tenders are invited**(i.e. from 2011-12 to 2020-21)** (specify the financial years; those immediately **preceding** the financial year in which the tenders are invited).

a) Satisfactorily completed**,** (not less than 90% of physical contract value) as a PRIME CONTRACTOR or as a sub-contractor (duly certified by the Executive Engineer and counter signed by Superintending Engineer) similar works (i.e construction of Barrage / Spillway works) of value not less than **Rs.66,06,07,488/-** (usually 50% of Estimate contract value of the work) in any one financial year, during last ten financial years as specified above updated to current price level giving a weightage of 10% per year.

b) Executed the following in any two financial years during the last ten financial year physical quantities. (Usually 50% of the expected peak quantities of construction per year).

Sl. No	Principal Items of Work	Minimum Required quantity
1	Earth Work Excavation	435718.23 Cum
2	Concrete	62798.68 Cum
3	Embankment	148949.42 Cum
4	Gates and allied Works	493.56 MT

Clause 3.3 A (c)

For Barrages / Dams:

The Bidder shall have executed the similar works with not less than minimum mentioned parameters in respect of the following relevant components of the work.

a)**Deleted**

b) Height of Dam / Reservoir/ Barrage: Shall be indicated as 25% of the height of proposed dam/Reservoir and 50% in case of barrages (i.e. 50% of 8.10M=4.05 M.)

(The Height should be measured from the foundation level to the FRL of the Dam/Reservoir/Barrage).

c) Discharge: Construction of Barrages/ Dams/ Spillways/Hydro Power Projects across any river in India with maximum flood more than 1.00 Lakh Cusecs.

Clause 3.3 A (d)

"The bidder should have successfully executed and completed/ commissioned "Barrages/Dams/ Spillways " in India as a prime Contractor or as a Member of Joint Venture in any one project within the present Bid time period during last 10 Financial years and the executed value of such project in any **one financial year shall not be less than 10% of ECV of present BID (i.e. 10% of 264,24,29,950= Rs.26,42,42,995/-).** The present worth of above completed work /works by bidder shall be calculated based on weightage at 10% per annum to the current financial year".

For the period of work up to 6 months, Qualification Criteria for 3.3 A shall be taken as half year and for more than 6 months and up to one year, Qualification Criteria for 3.3 A shall be taken as one year.

Note for the Tender Inviting Authority:

1. Only items which have 25% or more weightage shall be mentioned except in case of specialized items. In case of specialized items, the Tender document approving authority shall invariably justify the same. Generic item quantities can be clubbed.
2. The qualification criteria at clause 3.3 A will not made applicable for the works costing Rs 10.00 crores (ECV) and below.
3. In case the current financial year is claimed by the bidder, the last 10 ten financial years would be including the current financial year otherwise the last 10 ten financial years would be excluding the current financial year.

B). Net Liquid assets / credit facilities of not less than **Rs. 47,56,37,391/-** excluding the existing commitments from Banks issued in between 24.01.2022 and the date of tendering shall be equivalent to 3 months estimated cash flow in peak construction period in the form of Annexure –I(B). For works costing less than Rs. 2.00 Crores, the solvency certificate in the form of Annexure 1(A) may also be furnished.

C) Contractor Registration certificate of appropriate class in Government of Telangana / Erstwhile Andhra Pradesh.

D) Necessary D.D / B.G towards E.M.D. as per tender documents.

E) Transaction fee at 0.03% of ECV+18% GSTas applicable on 0.03% of ECV through the electronic payment Gateway subject to ceilings mentioned in clause 12.6.

F) **Bid capacity**

The bidders who meet the above qualification criteria and whose available bid capacity is more or equal to the estimated contract value will only be qualified for opening of Price bid. The available bid capacity will be calculated as under:

Available Bid Capacity: (3 * A * N – B)

Where,

A = Maximum value of **Civil** Engineering works executed / in progress in its name in any one financial year during the last ten financial years (updated to current Price level) taking into account the works completed as well as works in progress.

Attach certificate(s) issued by the Executive Engineer(s) concerned and counter signed by Superintending Engineer(s) or Equivalent Rank officer(s) showing work wise / year wise value of work done in respect of all the works executed / in progress by the bidder during last ten financial years as per statement-I.

OR

Certificate from Chartered Accountant financial year wise towards contracts of Civil engineering works executed, supported with P&L Account Statement.

N = Number of years prescribed for completion of the work for which Tenders are invited. **[Period upto 6 months to be taken as half year and more than 6 months upto one year as one year]**

B = Updated value (at current Price level), of all existing Commitments i.e., ongoing works to be executed during the Period of completion of the work for which Tenders are invited.

Annual turnover of the bidder based on Civil Engineering works executed and also the balance value of works on hand etc., shall be updated by giving weightage of 10% per year to bring them to current price level.

Note:

a) Sub-contractor's experience, in his name will be taken in to account in determining the Bidder's compliance to the Qualification criteria, duly certified by the Executive Engineer and countersigned by Superintending Engineer.

b) In case of Joint venture works, the experience gained to the extent of the bidder's share shall be taken in to account in determining the bidder's compliance with the qualification criteria.

c) The experience gained by the bidders by execution of private works & foreign works shall not be considered in determining the bidder's compliance to the qualification criteria.

If the prime contractor desires to sub-let a part of the work he should submit the same at the time of filing tenders or during execution, giving the name of the proposed Sub-Contractor, along with details of the qualification and experience. The Tender Accepting Authority will verify the experience of the proposed Sub-Contractor and if the Sub-Contractor satisfies the qualification criteria in proportion to the value of work proposed to be sub-let, he may permit the same. The total value of works to be awarded on sub-letting shall not exceed **45%** of contract value. The extent of subletting shall be added to the experience of the sub-contractor and to that extent deducted from that of the main contractor. **No qualification criteria shall be considered for sub-letting the works upto Rs 50 Crores for local entrepreneurs verified with Aadhar Card.** However, considering the annual turnover based on the certificate issued by chartered accountant as well as the income tax returns filed in the corresponding year and based on the valid registration in the class and categories mentioned in the NIT, works up to Rs 50 crores would be permitted to be sub-letted.

If the part of work is to be sublet during execution, i.e., within the agreement period or beyond the agreement period (EOT), the sub contractor shall satisfy the qualification criteria proportionate to proposed value of subletting according to the qualification prescribed in the tender document only**.**

G 1) Each bidder should demonstrate:

Availability (either owned (or) leased) of the following major key and critical equipments costing more than Rs 10.00 lakhs for this work

Sl.No	Equipment type and characteristics	Minimum Number Required
i)	Shovel (0.85 Cum Capacity)	8 Nos
ii)	Tippers/ Trucks (5 Cum)	30 Nos
iii)	Power Rollers 8/10T	10 Nos
iv)	Water Tankers (8000Lit)	10 Nos
v)	Angle Dozer (90Hp)	8 Nos
vi)	Air compressor 8.50cmm	4 Nos

vii)	Needle Vibrator 60/40 mm Dia	10 Nos
viii)	Batching plant with capacity of 60 Cum/hour	2 Nos
ix)	Transit Mixers 6 Cum	15 Nos
x)	Drilling jumbo(32 mm dia)	2 Nos
xi)	Grouting pump (2 psi)	2 Nos

In case of owned equipments, the bidder has to upload either a certificate issued by the Executive Engineer, with in the block period (or) a Declaration on non judicial stamp paper worth Rs 100/- as prescribed in Statement V along with sufficient proof of documents in support of owning key and critical equipments such as Invoice / certificate of registration by the competent authority.

In case of Leased equipments, the bidder shall invariably upload the lease agreement along with sufficient proof of documents in support of owning leased equipments by the leasee, such as certificate issued by the Executive Engineer, within the block period (or) Invoice / certificate of registration by the competent authority in proof of owning the key and critical equipment.

2) Quality control laboratory. For all works costing more than Rs. 200.00 Lakhs, the contractor shall show proof owning/leasing quality control testing equipment. The following equipments are required.

SL.No	Type of Equipment	No. Required
1	IS Sieve Sets (80mm to 75micron & 125mm Pan)	4
2	Digital Weight Balance 10Kg Capacity with LC 1Gram	4
3	Hot Plate	2
4	Compression Testing Machine	2
5	Standard Cube Moulds 150mm Size	90
6	Slump Cone Test Apparatus with Tamping Rod	4
7	Proctor density equipment/ Modified proctor density equipment	5
8	Core Cutter Test Apparatus with Collars/Sand Replacement Apparatus	4
9	Complete set of cement and concrete testing equipment	
10	Thermometer	4

Note: The bidder has to upload a certificate issued by the Executive Engineer with in the Block period towards owning Quality control laboratory equipment (or) proof of tie up with an established Quality control testing laboratory suitable for the tendered work. The bidders may also furnish a declaration on non judicial stamp paper worth Rs 100/- as prescribed in Statement V along with sufficient documentary proof in support of owning the Quality Control testing lab equipments such as Invoice / certificate of registration by the competent authority.

No payment shall be made by the Government as it is a part of the rate structure.

3) Availability of the Key personnel

Graduate Engineer (Civil/Mechanical) : 5 No. (Minimum experience of 10 years)

Diploma Holders / Graduate Engineer (Civil/Mechanical) : 5 No. (Minimum experience of 10 years)

No payment shall be made by the Government as it is a part of the rate structure.

The bidders shall also upload the consent letters of the technical personnel to work with the bidder during execution of the work along with qualification certificates of the proposed technical personnel. Failing to comply with the above, the bidder looses the opportunity of engaging the technical personnel and liable for penalty of (SSR x 3 times) shall be imposed for engaging technical personnel by the Engineer-in-Charge.

4) The bidder shall submit the copies of documents of: -

i. GST Registration and **latest valid** returns certificate in Government of Telangana.

ii. PAN Card and copy of latest I.T returns.

5) In case of execution of specialized nature of works such as……the bidder shall also furnish such documents ……..(As required by the tender inviting authority).

3.4 Even though the bidders meet the above qualifying criteria, the bidder will be disqualified duly forfeiting the EMD and also they will be suspended / blacklisted, if they have

a. Furnished false / fabricated particulars in the forms / statements / annexures submitted in proof of the qualification requirements and/or
b. Not turned up for entering into agreement, when called upon, and / or
c. Record of poor progress such as abandoning the work, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc. and/or
d. been found, while execution of the work, that, the work was awarded to the Contractor based on false / fake certificates of experience/ forms/ Statements/ annexure submitted in proof of the qualification requirement, the Contractor will be blacklisted and work will be taken over invoking clause 61 of PS to APSS.

3.5 Tenders with an excess of above 5 % of the estimated contract value shall summarily be rejected.

3.6 For tenders up to **5% less than the estimated contract value of work, no additional security deposit is required**. But for tenders **less by more than 5%** of the estimated Contract Value of work, the **difference between the tendered amount and 95% of the estimated contract value in shape of BG/DD shall be collected from the successful Bidder before concluding the agreement.**

4. ONE TENDER PER BIDDER:

4.1 Each bidder shall submit only one Tender for the work. A Bidder who submits more than one Tender **either in the form of individual or a partner in the firm** will cause dis-qualification of all the Tenders submitted by the Bidder.

5. COST OF TENDERING

5.1 The bidder shall bear all costs associated with the preparation and submission of his Tender and the tender inviting authority will in no case be responsible and liable for those costs.

6. SITE VISIT.

6.1 The Bidder, at the Bidder's own responsibility and risk is advised to visit and examine the Site of Work and its surroundings and obtain all information that may be necessary for preparing the Tender for entering into a contract, for construction of the work. The costs of visiting the site shall be at the Bidder's own expense.

B. TENDER DOCUMENT

7. CONTENTS OF TENDER DOCUMENT.

7.1 One set of Tender document, comprises of the following:

Technical bid

1) Notice Inviting Tenders (NIT)
2) Instruction to Bidders
3) Forms of Tender and qualification information
4) Conditions of Contract.
5) Specifications.
6) Drawings.
7) Forms of Securities, EMD, Additional Security etc.,

Price bid

1) Bill of Quantities and Price bid.

8. CLARIFICATION ON TENDER DOCUMENTS

8.1 A prospective bidder requiring any clarification on Tender documents may contact the Tender Inviting Officer at the address indicated in the NIT. The Tender Inviting Officer will also respond to any request sought for clarification, either received through post **or in person, should be before – (date to be specified).**

9. AMENDMENT TO TENDER DOCUMENTS

9.1 Before the last date for submission of Tenders, the Tender Inviting Authority may modify any of the Contents of the Tender Notice, Tender documents by issuing amendment / Addendum.

9.2 Any addendum / amendments issued by the Tender Inviting Authority shall be part of the Tender Document and it shall be notified in online through corrigendum.

9.3 To give prospective Bidders reasonable time to take an Addendum / Amendment into account in preparing their tenders, the Tender Inviting Authority invariably extend, the last date for submission of tenders by providing a minimum period of **7 days** between date of publication of such Addendum / Amendment and the last date for submission of tenders.

9.4 It is the responsibility of the bidders to take notice of such Addendums / Amendments till the last date / time stipulated for submission of tenders. No plea of the bidders, who fail to take note of such Addendums / Amendments, will be entertained.

C. PREPARATION OF TENDERS.

10. LANGUAGE OF THE TENDER.

10.1 All documents relating to the tender shall be in the English Language only.

11. DOCUMENTS COMPRISING OF THE TENDER.

1 After registering on the e-procurement market place, bidders need to scan and upload the required documents as per the tender requirements.

2 The Bidders shall authenticate the tender with their digital certificate for submitting the tender electronically on e-procurement Platform and the tenders not authenticated by Digital certificate of the bidder will not be accepted on the e-procurement platform.

3 The bidder shall mandatorily pay the transaction fee to M/s. TSTS, TELANGANA UNIT, HYDRABAD through the electronic payment Gateway.

11.1

i. The bidders who are desirous of participating in e-procurement market place shall submit their technical bids, price bids etc., online in the standard format prescribed in the NIT and tender documents as displayed at e -procurement market place. The bidders should upload the scanned copies of all the relevant and required certificates, documents etc., in the e-procurement market place in support of their technical bids. The bidders shall sign on all the statements, documents, certificates uploaded by them, owning responsibility for their correctness /authenticity.

ii. All the bidders shall invariably upload the scanned copies of DD / BG towards EMD in e-Procurement system and this shall be the primary requirement for Technical bid evaluation.

iii. The bidder shall furnish a declaration in online stating that the soft copies uploaded by them are genuine. Any incorrectness/deviation noticed will be viewed seriously and apart from canceling the work duly forfeiting the EMD, criminal action will be initiated including suspension from business.

iv. The successful bidder shall invariably furnish the original DD / BG towards EMD, certificates / documents of the uploaded scanned copies, to the Agreement concluding authority before entering into agreement either personally or through courier or post within the stipulated date and shall obtain the receipt of the same, which shall be the responsibility of the successful bidder. The Department shall not take any responsibility for any delay in receipt of original DD / BG towards EMD, certificates / documents from the successful bidder before the stipulated time. On receipt of documents, the Tender Inviting Authority shall ensure the verification of genuineness of the DD / BG towards EMD and all other certificates / documents uploaded by the bidder in e-procurement system in support of the qualification criteria before concluding the agreement.

v. The tenders will be opened online in e-procurement platform by the Tender Inviting Authority , Superintending Engineer, Irrigation Circle No.2, LMD colony, Karimnagar or his nominee at his office on the date and time specified in the NIT. All the statements, documents, certificates, DD / BG etc., uploaded by the bidders will be downloaded for technical bid evaluation. The clarifications, particulars if any required from the bidders will be obtained by addressing the bidders. The technical bids will be evaluated as per the specified parameters/ criteria will be determined.

vi. The Department shall carry out the technical bid evaluation solely based on the Uploaded Certificates / documents, DD / BG towards EMD in the e- procurement System. The result of technical bid evaluation will be displayed on the e-procurement market place, for the benefit by all the bidders participated in the tenders.

vii. The price-bids of such bidders, who are determined to have complied with the eligibility criteria, i.e., qualified in Technical bid evaluation will only be opened by the Tender Inviting Authority **Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar** or his nominee at his office, on the date and time specified in the NIT, or any other date postponed and notified in the e-procurement platform.

viii. If the office happens to be closed on the dates specified in the NIT, the respective activity will be performed at the designated time on the next working day without any notification.

ix. If any successful bidder fails to attend the office of the agreement concluding authority on or before the time specified will be suspended from participating in the tenders on e-Procurement platform for a period of 3 years besides forfeiting the EMD. The e-Procurement system would deactivate the user ID of such defaulting successful bidder based on the trigger / recommendation by the tender Inviting Authority in the system.

x. Any other details can be had from the Office of the Tender Inviting Authority, Superintending Engineer, Irrigation Circle No.2, LMD Colony, Karimnagar.

12. BID OFFER:

12.1 Bill of Quantities or Schedule "A" and the bid offer accompanies the tender document as Volume-II. It shall be explicitly understood that the Tender Inviting Officer does not accept any responsibility for the correctness or completeness of this schedule 'A' and this schedule 'A' is liable to alterations by omissions, deductions or additions at the discretion of the Superintending Engineer or as set forth in the conditions of the contract. The Schedule "A" shall contain the items of work indicated as part– I and LS provisions towards reimbursable items as part–II. The percentage quoted by the bidder shall be applicable only to part –I. However, the provisions contained in the part – II will be operable based on the conditions provided in the Tender Document. The bidders will have to state clearly their willingness to execute the work at certain specific percentage of excess or less or at par of the ECV indicated in Part-I at the space provided therein in Schedule 'A'. The L.S. amounts indicated in part-II are maximum reimbursable amounts. The bidder should however quote his lump sum tender based on this schedule of quantities. He should quote his offer as a overall tender percentage.

12.2 The Schedule –A (or Price-bid) contains not only the quantities but also the rates worked out by the Department and the amount for each item and total value of the estimated contract. The bidder should workout his own rates keeping in view the work, site conditions and quote his overall tender percentage with which he intends to execute the work.

12.3 The tender offer shall be for the whole work and not for individual items / part of the work.

12.4 i) GST, NAC, Green Fund, Seigniorage Charges and Labour cess are reimbursable as specified at Annexure II of Schedule A. **Any other statutory Taxes like Service Tax, Excise Duty, Customs Duty, Swatch Bharat and Krishi Kalyan etc., enforced by the Government from time to time shall be paid by the contractor to the concerned Department on demand and it will be reimbursed to him by the Engineer-in-Charge after satisfying that it has been actually and genuinely paid by the contractor.**

ii) All other duties, taxes and other levies payable by the contractor as per State / Central Government rules in vogue as on the last date of submission of price bid are deemed to have been included in the tender percentage quoted by the bidder.

iii) **Seigniorage Charges** : The Seigniorage charges shall be recovered from the bills of the contractor on the work done and measured quantities at the rates prescribed in **G.O.Ms.No.67 (INDUSTRIES AND COMMERCE (M.I) DEPARTMENT) Dated:26.09.2015** and same shall be reimbursed. The rates are liable to be revised and amended from time to time by the State Government. In case of revision, the revised rates as fixed by the State Government have to be adopted. The difference of the Seigniorage Charges adopted in the estimate and the revised rates amended from time to time by the State Government will be reimbursed to the Contractor.

(iv) DMF(30%) and SMET(2%) on Seigniorage Charges.

12.5 The tendered contract amount, as computed based on overall tender percentage, is subject to variation during the performance of the Contract in accordance with variation in quantities etc.

12.6 **Charges payable to M/s TSTS, HYDERABAD**.

The service charges payable to M/s TSTS, Hyderabad are as indicated below.

The participating bidders will pay transaction fee @ 0.03% of ECV (Estimated contract value) + 18% GST as applicable on 0.03% of ECV of Rs: 264,24,29,950/- (The ceiling amount of Transaction fee for works costing ECV upto Rs 50.00 Crores is Rs 10,000.00 + -------- % as applicable on Rs.10,000/- and for works costing with ECV above Rs 50.00 Crores, the ceiling amount of transaction fee is Rs 25,000.00+18% GST as applicable on Rs.25,000/-).

All the participating bidders shall electronically pay the transaction fee to the Service provider through Payment Gateway service on e-procurement platform. Payment of transaction fee by the participating bidders through the Electronic Payment Gateway is made mandatory for tenders.

Service tax as levied by the GOI on transaction fee; electronic payment gateway charges are to be borne by the bidders.

Charges Payable to M/s. TSTS /, HYDERABAD

The Successful bidder will pay further fee **@ 0.04% of ECV (Estimated contract value) of Rs:264,24,29,950/- payable to the Managing Director, APTS to create an e-Procurement fund to be administered by TSTS (The ceiling amount of the above fee for works costing ECV upto Rs 50.00 Crores is Rs 10,000.00 and for works costing with ECV above Rs 50.00 Crores is Rs 25,000.00).**

The above fee is payable by the successful bidder through a D.D. drawn in favour of Managing Director, TSTS Unit, Hyderabad at the time of conclusion of the agreement. The said DD shall be sent to Managing Director, TSTS / by the Superintending Engineer who is entering in to agreement with the successful bidder.

Validity of Tenders:

12.7 Tenders shall remain valid for a period of not less than 90 days from the last date of receipt of Tenders.

12.8 During the above-mentioned period no plea by the bidder to withdraw the tender or for any sort of modification of the tender based upon or arising out of any alleged misunderstanding or misconceptions or mistake or for any other reason, will be entertained. If the bidders withdraw their tender during validity period prior to award of the work, the bidder will be blacklisted duly forfeiting the EMD.

12.9 In exceptional circumstances, prior to expiry of the original validity period, the Tender Inviting Officer may request the bidders to extend the period of validity of the tender for a specified additional period. Such request to the Bidders shall be made in writing. A bidder may accept or refuse the request without forfeiting the E.M.D. A bidder agreeing to the request will not be permitted to modify his Tender, but will be required to extend the validity of his E.M.D. for a period of the extension of validity of the tender.

13. EARNEST MONEY DEPOSIT

All the bidders shall invariably upload the scanned copies of DD / BG towards EMD as indicated in the NIT along with the tender in e-Procurement system and this will be the primary requirement to consider the tender for technical bid evaluation.

13.1 The **DD** / BG shall be from a Nationalized Bank / Scheduled Commercial Bank valid for a period of 3 Months **from the date of issue of tender notice**. However, the validity of DD/BG shall be extended up to 90 days from the last date of bids requested by the Tender Inviting Authority. Xerox copy of the DD / BG towards EMD is to be scanned and uploaded along with the Bid. **Further, the 1% E.M.D. paid by the successful Bidder at the time of submission of hard copies of Tender documents in the shape of Demand Draft / Bank Guarantee will be discharged if the Bidder furnishes Bank Guarantee for the full EMD of 2½% at the time of concluding agreement.**

13.2 **This EMD can be in the form of:**

a) A bank demand draft on any Nationalized bank / Scheduled Commercial Bank
b) A bank guarantee in the form given in Section 8, from a Nationalized Bank / Scheduled Commercial Bank.

13.3 The earnest money deposited by the successful Bidder will not carry any interest and it will be dealt with as provided in the conditions stipulated in the tender. The E.M.D. given in the form of Bank Guarantee on a Nationalized Bank/Scheduled Commercial Bank shall be valid for the duration of contract period plus defect liability period of two years for Civil works and five years for Electro-Mechanical works and in case any valid extension of contract period is granted, the validity of BG shall also be extended for the corresponding period.

13.4 **The E.M.D. shall be forfeited.**

(a) If the Bidder withdraws the Tender during the validity period of Tender.
(b) In the case of a successful bidder, if he fails to sign the Agreement within the stipulated time for whatever the reason.

13.5 In case of the Executive Engineer/Superintending Engineer/Chief Engineer/ Commissionarate of Tenders undertake to investigate and to take into account each tender and in consideration of the work thereby involved, all earnest money deposited by the Bidder will be forfeited to the Government in the event of such Bidder either modifying or withdrawing his tender within the said validity period of 3 Months.

14. SIGNING OF TENDERS.

14.1 If an individual makes the tender, it shall be signed by him with his full name and his address. If it is made by a firm, it shall be signed with the co-partnership name by a member of the firm, who shall also sign and furnish his own name, and address of each member of the firm. If the tender is made by a corporation it shall be signed by a duly authorized officer who shall produce, with his tender, satisfactory evidence of his authorization. Such tendering corporation may be required before the contract is executed, to furnish evidence of its corporate existence. Tenders signed on behalf of G.P.A. holder will be rejected.

14.2 The Tender shall contain no alterations or additions, except those to comply with instructions issued by the Tender Inviting Officer, or as necessary to correct errors made by the Bidder, in which case all such corrections shall be initiated by the person signing the Tender.

No alteration which is made by the Bidder in the contract form, the conditions of the contract, the drawings, specifications or statements / formats or quantities accompanying the same will be recognized; and, if any such alterations are made the tender will be void.

D. SUBMISSION OF TENDERS.

15. SUBMISSION OF TENDERS:

15.1 **The bidders who participate in tenders online, shall submit the following invariably failure to comply with the condition the bid shall be considered incomplete and rejected.**

a) Check slip

b) Copy of contractor's registration certificate under appropriate class with Government of Telangana / erstwhile Andhra Pradesh.

c) The contractors shall furnish copy of permanent Account Number (PAN) Card and copy of Latest Income tax returns.

d) GST Registration Certificate of Government of Telangana.

e) Details of value of Civil Engineering works executed in the last **10** financial years **(i.e. from 2011-12 to 2020-21)** by the Bidder in Statement-I with supporting certificates.

f) Details of similar works completed (not less than 90% of contract value) by the bidder during the last **10** financial Years **(i.e. from 2011-12 to 2020-21)** in Statement-II with supporting certificates.

g) Details of required physical Quantities of work executed by the bidder in the last **10** financial years **(i.e. from 2011-12 to 2020-21)** in Statement – III with supporting certificates (not required for the works, costing upto Rs. 50 crore).

h) Details of existing commitments of the bidder i.e., works on hand in Statement-IV-A with Supporting Certificates and also details of tenders submitted in Statement-IV-(A)

i) Availability of Key & critical construction and quality control equipments with the bidder in Statement V

j) Availability of key personnel with the bidder for administration / site management and execution viz., technical personnel required for the work (Statement-VI)

k) Information regarding any litigation, with Government during the last Ten years, in which the Bidder is involved in Statement-VII.

l) Availability of working capital for the work: Net Liquid assets / credit facilities of not less than **Rs. 47,56,37,391/-** excluding the existing commitments from Banks issued in between the date of tendering shall be equivalent to 3 months estimated cash flow in peak construction period in the form of Annexure –I(B). For works costing less than Rs. 2.00 Crores, the solvency certificate in the form of Annexure 1(A) may also be furnished.

16. Aadhar Card (S) as per requirement in the tender document

17. LAST DATE / TIME FOR SUBMISSION OF THE TENDERS.

17.1 Tenders must be submitted not later than the date and time specified in NIT.

17.2 The Tender Inviting Authority may modify the dates for bid documents downloaded date / end date / last date for submission of tenders / date of opening of Technical bid / Date of opening

of Price bids by issuing an amendment in which case all rights and obligations of the Tender Inviting Authority will remain same.

18. LATE TENDERS.

18.1 Any Tender received after the last date / time prescribed in NIT will be summarily rejected.

19. MODIFICATION TO THE TENDER.

19.1 No Tender shall be modified after the last date /time of submission of Tenders.

E. TENDER OPENING AND EVALUATION

20. TENDER OPENING

20.1 The technical bid containing qualification requirements as per Annexure - I & II and Statement I to VII will be evaluated by the tender opening authority

21. CLARIFICATION ON THE TECHNICAL BID.

21.1 The tender opening authority may call upon any Bidder for clarification on the statements, documentary proof relating to the technical bid. The request for clarification and response thereto shall be in writing and it shall be only on the qualification information furnished by the bidder. The clarification called for from the bidders shall be furnished within the stipulated period, which shall not be more than a week.

21.2 The Bidder if so desires, shall agree in writing to furnish the clarification called for within the stipulated period and if he fails to do so, evaluation of the bid will be made based on the information available.

22. EXAMINATION OF TECHNICAL BIDS AND DETERMINATION OF RESPONSIVENESS

22.1 The Tender Opening Authority will evaluate the Technical bid and determines whether each Bidder is satisfying the eligibility criteria prescribed in the tender document and declares them as a qualified/ not qualified Bidder.

22.2 If the technical bid of a Bidder is not satisfying the eligibility criteria the Tender Opening Authority will reject it. However, the tender accepting authority detects any discrepancy in the evaluation of Tenders, the tender accepting authority while returning the tenders may direct the Superintending Engineer / Chief Engineer / Engineer-in- Chief as the case may be, to re-evaluate and re-submit the tenders.

23. PRICE BID OPENING:

23.1 The Price Bids of qualified Bidders whose technical Bids are found satisfying the eligibility criteria shall be opened on the date and time fixed.

23.2 The Price Bid of the Unqualified Bidders will not be opened.

23.3 Tenders shall be scrutinized in accordance with the conditions stipulated in the Tender document. In case of any discrepancy or non-adherence to Conditions the Tender accepting authority shall communicate the same which will be binding both on the tender Opening authority and the Bidder. In case of any ambiguity, the decision taken by the Tender Accepting Authority on tenders shall be final.

24. EVALUATION AND COMPARISON OF PRICE BIDS

24.1 The Tender Opening Authority will evaluate and compare the price bids of all the qualified Bidders.

24.2 Negotiations at any level are strictly prohibited. However, good gesture rebate, if offered by the lowest Bidder **voluntarily** prior to finalization of tenders may be accepted by the tender accepting authority.

24.3 Selection of Bidder among the lowest & equally quoted bidders will be in the following order

a) The bidder whose bid capacity is higher will be selected.
b) In case the bid capacity is also same the Bidder whose annual turnover is more will be preferred.
c) If the criteria mentioned above incidentally become the same, the turnover on similar works and thereafter machinery available for the work and then the clean track record respectively will be considered for selection.

25. DISCREPANCY IN TENDER PERCENTAGE QUOTED.

25.1 In case of any discrepancy between the overall tender percentage quoted in words and figures, the percentage quoted in words shall prevail.

26. PROCESS TO BE CONFIDENTIAL.

26.1 Information relating to the examination, clarification, evaluation and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the tender accepting authority has announced the award to the successful Bidder. Any effort by a Bidder to influence the processing of Tenders or award decisions may result in the rejection of his Tender.

The percentages quoted by the bidders shall be kept confidential and it shall not be disclosed till his / their price bid is opened by the competent authority. Violation of such confidentiality the bid /bids will be rejected and such bidder will be debarred from participation in tenders for a period of '1' year.

26.2 No Bidder shall contact the Tender Inviting Authority or any authority concerned with finalization of tenders on any matter relating to tender from the time of the Tender opening to the time the Contract is awarded

26.3 Before recommending / accepting the tender, the tender recommending / agreement concluding authority may verify the correctness of certificates submitted to meet the eligibility criteria and specifically experience.

26.4 **Tenders will be finalized by the Executive Engineers for the works costing ECV less than or equal to Rs.50.00 Lakhs, Superintending Engineers in between Rs.50.00 Lakhs to 200.00 Lakhs, Chief Engineers & Engineer-in- Chief in between Rs.200.00 Lakhs to 1000.00 Lakhs. The tenders for the works costing ECV more than Rs.10.00 Crores will be referred to COT along with technical bid evaluation for consideration.** The Commissionerate of tenders shall scrutinize the tenders submitted by Engineer-in-Chief / Chief Engineer / Project administrators in accordance with the conditions stipulated in the tender document and in case any discrepancy or non-adherence to the conditions, the same shall be communicated which will be binding both on the tender inviting authority and bidder. In case of any ambiguity the decision taken by the COT on tenders shall be final.

F. AWARD OF CONTRACT

27. AWARD CRITERIA

27.1 The Executive Engineer / Superintending Engineer / Chief Engineer or Engineer-in-Chief will award or recommend to the competent authority for award of the contract to the Bidder who is found technically qualified as per the Tender conditions and whose price bid is lowest.

27.2 The tender accepting authority reserves the right to accept or reject any Tender or all tenders and to cancel the Tendering process, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the reasons for such action.

28. NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT.

28.1 The Bidder whose Tender has been accepted will be notified of the award of the work by the Superintending Engineer/Executive Engineer, prior to expiry of the Tender validity period by registered letter. This letter (hereinafter and in the Conditions of Contract called "Letter of Acceptance") will indicate the sum that the Government will pay to the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Amount").

28.2 When a tender is accepted the concerned Bidder shall attend the office of the Superintending Engineer/Executive Engineer concerned on the date fixed in the Letter of acceptance. Upon intimation being given by the Superintending Engineer/Executive Engineer, of acceptance of his tender, the bidder shall make payment of the balance E.M.D., by way of Demand Draft or unconditional and irrevocable Bank Guarantee obtained from a Nationalized Bank/Scheduled Commercial Bank, with a validity period of Agreement period + Defect Liability period, and sign an agreement in the form prescribed by the department for the due fulfillment of the contract. Failure to attend the Superintending Engineer's / Executive Engineer's office on the date fixed, in the written intimation, to enter into the required agreement shall entail forfeiture of the Earnest Money besides taking action as specified in Clause 29.3. The written agreement to be entered into between the contractor and the Government shall be the foundation of the rights and obligations of both the parties and the contract shall not be deemed to be complete until the agreement has first been signed by the contractor and then by the proper officer authorized to enter into contract on behalf of the Government.

28.3 The successful Bidder has to sign an agreement within a stipulated time from the date of receipt of communication of acceptance of his tender. On failure to do so his tender will be cancelled duly forfeiting the E.M.D., without issuing any further notice and action will be initiated for black listing the bidder.

29. CORRUPT OR FRAUDULENT PRACTICES

29.1 The Government requires that the Bidder / suppliers / contractors under Government financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Government define for the purpose of the provisions as follows.

a) "Corrupt practices" means the offering, giving, receiving or soliciting of anything of value to influence the action of a Government official in procurement process or in contract execution: and

b) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Government and includes collusive practice among Bidders (prior to or after Tender submission) designed to establish in Tender prices at artificial non-competitive levels and to deprive the Government of the benefits of free and open competition.

c) Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

d) Will blacklist / or debar a firm, either indefinitely or for a stated period of time, if at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing a Government Contract.

e) Furthermore, Bidders shall be aware of the provisions stated in the General Conditions of Contract.

30. The A.P.S.S. shall form part of the contract. He shall also carefully study the drawing and additional specifications and all the documents which form part of the contract be entered into by the successful Bidder.

30.1) Bidders attention is directed to requirements of materials under the clause materials and "Workman ship" in the preliminary specifications. Material conforming to the Bureau of Indian Standards (BIS) only shall be used on the work and the Bids shall quote his bid accordingly.

30.2) The Bidder has to do his own testing of materials and satisfy himself that they confirm to the specifications of respective B.I.S. codes before Bidding.

30.3) The contractor shall himself procure the required construction materials of approved quality including the earth for formation of embankment and water from source of his choice.

30.4) The contractor shall himself procure all materials required for the work well in advance.

QUALIFICATION INFORMATION
Annexure –I
CHECKLIST TO ACOMPANY THE TENDER

Sl.No	Description	Uploaded	Page No. (see Note below)
1	2	3	4
A	Copy of Contractors valid Registration under appropriate Class with Government of Telangana / erstwhile Government of AP.	Yes / No	
B 2	Copy of DD / BG towards EMD The bidders shall furnish their copy of permanent Account Number (PAN) Card and copy of Latest Income tax returns submitted along with proof of receipt.	YES/ No Yes / No	
3	Copy of proof of registration of Government of Telangana under GST & shall upload the latest GST returns of the preceding Quarter i.e. three (3) months before the month of tendering shall be submitted by the prospective bidders.	Yes/No	
4	Details of value of CIVIL Engineering works executed in the last 10 financial years by the Bidder in Statement-I with supporting certificates.	Yes / No	
5	Details of similar works completed (not less than 90% of contract value) by the bidder during the last ten financial Years in Statement-II with supporting certificates.	Yes / No	
6	Quantities of work executed by the Bidder in the last 10 financial years - in Statement – III with supporting certificates.	Yes / No	
7	Details of existing commitments of the bidder i.e., works on hand in Statement-IV-A with Supporting Certificates and also details of tenders submitted in Statement -IV-(B)	Yes / No	
8	Availability of critical equipment with the bidder in Statement –V.	Yes / No	
9	Availability of Key personnel with the bidder in Statement.VI.	Yes / No	
10	Litigation history of the bidder in Statement –VII.	Yes / No	
11	Proof of liquid assets as per Annexure –I(B) / I(A)	Yes / No	
12	List of other certificates enclosed, if any.	Yes / No	

Signature of the bidder

Notes:-

1. All the statements copies of the certificates, documents etc., enclosed to the Technical bid shall be given page numbers on the right corner of each certificate, which will be indicated in column (4) above against each item. The statements furnished shall be in the formats appended to the tender document.

2. The information shall be filled-in by the Bidder in the checklist and statements- I to VII, shall be uploaded along with to the Technical bid for the purposes of verification as well as evaluation of the bidder's Compliance to the qualification criteria as provided in the Tender document.

DECLARATION

I / WE …… have gone through carefully all the Tender conditions and solemnly declare that I / we will abide by any penal action such as disqualification or black listing or determination of contract or any other action deemed fit, taken by, the Department against us, if it is found that the statements, documents, certificates produced by us are false / fabricated.

I / WE hereby declare that, I / WE have not been blacklisted / debarred / Suspended / demoted in any department in Telangana or in any State due to any reasons.

Signature of the Bidder

STATEMENT – I

Details of value of Civil Engineering works executed in each year during the last ten financial years by the Bidder**.**

Sl. No.	Financial Year	Value in Rs.
1		
2		
.		
.		
.		
9		
10		

Attach certificate(s) issued by the Executive Engineer (s) concerned and counter signed by Superintending Engineer (s) or Equivalent Rank officer (s) showing work wise / year wise value of work done in respect of all the works executed by the Bidder during last ten financial years.

OR

b) Certificate from Chartered Accountant financial year wise towards Civil Engineering works executed, supported with P&L Account**.**

Signature of the Bidder

STATEMENT – II

Details of similar works completed (not less than 90% of Physical contract value) in the Name of the Bidder during the last ten financial years.

Sl. No	Name of the work	Address of Tendering inviting Authority	Agreement No. & dated.	Value of Contract	Stipulated period of completion	Actual date of completion
1	2	3	4	5	6	7

Value of work done year wise during the last 'ten' financial years.										Total value of work done.
1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year	
8	9	10	11	12	13	14	15	16	17	18

Attach certificates issued by the Executive Engineer (s) concerned and countersigned by the Superintending Engineer (s) or Equivalent Rank officer (s)

Signature of the Bidder

STATEMENT – III

Physical quantities executed by the Bidder in the last ten financial years. [Work wise / year wise]

Sl. No.	Financial Year	Name of work	Agt. No	Quantities executed / Year wise.					Any other items.
1	2	3	4	5	6	7	8	9	10
1									
2									
.									
.									
.									
9									
10									

Attach certificates in support of the above quantities issued by the Executive Engineer(s) concerned and countersigned by the Superintending Engineer(s) or Equivalent Rank officer(s) duly showing the quantities executed year wise.

The bidders participating in the bid for the work, costing upto Rs. 10 Crore need not submit this particulars /statement for local entrepreneurs.

Signature of the Bidder

STATEMENT – IV

Details of Existing Commitments.

Details of works on hand and yet to be completed as on the date of submission of the Tender and works for which Tenders have been submitted are to be furnished.

A) Existing Commitments on ongoing works:

Sl. No	Name of work	Address of Tendering inviting 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 with current price level
1	2	3	4	5	6	7	8	9	10

Attach certificates issued by the Executive Engineer(s) concerned and countersigned by Superintending Engineer (s) or Equivalent Rank officer (s) indicating the balance work to be done, and likely period of completion or RA bills signed by EE's / payment made by PAO's / Presented to PAO's

Signature of the Bidder

A) Details of works for which Tenders are submitted / likely to be awarded

Sl. No.	Name of work	Address of Tendering inviting Authority	Estima-ted value of work	Stipulated period of comple-tion	Date on which tender was submitted	Present stage of Tender.
1	2	3	4	5	6	7

Signature of the Bidder

STATEMENT - V

Availability of Critical Equipment

The Bidder should furnish the information required below, regarding the availability of the equipments, required for construction / quality control.

Sl. No.	Details of Equipment	Number required	Number	
			Owned (Latest Certificate issued by E.E /Invoices/ registration certificate should be enclosed)	Leased (lease deed for the work tendered and proof of owning machinery of lessee should be enclosed)
1	2	3	4	5

Signature of the Bidder

The Bidders has to submit either a certificate issued by the Executive Engineer (or) a Declaration on non judicial stamp paper worth Rs 100/- as prescribed in statement-V given above along with sufficient proof of document in support of owning such as Invoice / Certificate of Registration by competent authority in support of the critical equipments.

STATEMENT – VI.

Availability of Key Personnel

Qualification and experience of Key Personnel proposed to be deployed for execution of the Contract.

Sl. No	Name	Designation	Qualification	Total Experience	Working with the Bidder since.
1	2	3	4	5	6

Attach qualification certificates along with consent letters of Key personnel to work with the bidder. Key personnel already employed in other ongoing works of the bidder and working in other firms/ companies shall not be considered

Signature of the Bidder

STATEMENT - VII

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

Signature of the Bidder

TENDER

Date: ……

To

The Superintending Engineer,
Irrigation Circle No.2, LMD Colony, Karimnagar

Sir,

I / We do hereby tender and if this tender be accepted, undertake to execute the following work viz)**, as shown in the drawings and described in the specifications deposited in the office of the Superintending Engineer, Irrigation Circle No.2, LMD colony, Karimnagar with such variations by way of alterations or additions to, and omissions from the said works and method of payment as provided for in the "conditions of the contract" for the sum of Rs.264,24,29,950/-or such other sum as may be arrived under the clause of the standard preliminary specifications relating to "Payment on lump-sum basis or by final measurement at unit rates"**

I/WE have also quoted percentage **(both in words and figures)** excess or less or at par on E.C.V., in Schedule 'A' Part-I, annexed for which I/We agree to execute the work when the lump sum payment under the terms of the agreement is varied by payment on measurement quantities.

I/WE have quoted Percentage excess or less or at par on E.C.V., in Schedule 'A' Part – I. In case of any discrepancy between the percentage excess or less or at par on E.C.V., the percentage quoted in words only shall prevail.

I/WE agreed to keep the offer in this tender valid for a period of Three months/ mentioned in the tender notice and not to modify the whole or any part of it for any reason within above period. If the tender is withdrawn by me/us for any reasons whatsoever, the earnest money paid by me/us will be forfeited to Government

I/WE hereby distinctly and expressly, declare and acknowledge that, before the submission of my/our tender I/We have carefully followed the instructions in the tender notice and have read the A.P.S.S. and the preliminary specifications therein and the A.P.S.S. addenda volume and that I/We have made such examination of the contract documents and the plans, specifications and quantities and amendments if any the location where the said work is to be done, and such investigation of the work required to be done, and in regard to the material required to be furnished as to enable me/us to thoroughly understand the intention of same and the requirements, covenants, agreements, stipulations and restrictions contained in the contract, and in the said plans and specifications and distinctly agree that I/We will not hereafter make any claim or demand upon the Government based upon or arising out of any alleged misunderstanding or misconception /or mistake on my / our part of the said requirement, covenants, agreements, stipulations, restrictions and conditions etc.

I / WE shall not assign the contract or sublet any portion of the same except the conditions in clause 5.1 of General conditions of contract. In case if it becomes necessary such subletting with the permission of the Executive Engineer shall be limited to (1) Labour contract, (2) Material contract, (3) Transport contract and (4) Engaging specialists for special item of work enjoined in A.P.S.S.

IF MY / OUR tender is not accepted the EMD shall be returned to me / us on application when intimation is sent to me/us of rejection or at the expiration of three Months from last date of receipt

of this tender, whichever is earlier. If my / our tender is accepted the earnest money shall be retained by the Government as security for the due fulfillment of this contract. If upon written intimation to me/us by the Superintending Engineer / Executive Engineer's Office, I / We fail to attend the said office on the date herein fixed or if upon intimation being given to me/us by the Superintending Engineer / Executive Engineer or acceptance of my/our tender, and if I / We fail to make the additional security deposit or to enter into the required agreement as defined in condition-3 of the tender notice, then I / We agree the forfeiture of the earnest money. Any notice required to be served on me/us here under shall be sufficiently served on me/us if delivered to me/us hereunder personally or forwarded to me/us by post to (registered or ordinary) or left at my/our address given herein. Such notice shall if sent by post be deemed to have been served on me/us at the time when in due course of post it would be delivered at the address to which it is sent.

I / WE fully understand that the written agreement to be entered into between me/us and the Government shall be the foundation of the rights of the both the parties and the contract shall not be deemed to be complete until the agreement has first been signed by me/us and then by the proper officer authorized to enter into contract on behalf of Government.

I AM/WE ARE professionally qualified and my/our qualifications are given below:

Name	**Qualification**

I / WE will employ the following technical staff for supervising the work and will see that all of them are always at site during working hours, personally checking all items of works and to pay extra attention to such works as required special attention (e.g.) Reinforced concrete work etc.

Name of members of technical staff proposed to be employed	**Qualification.**

I / WE declare that I/WE agree for recovery of the salaries of the technical staff actually engaged on the work by the department, from the work bills, if I/We fail to employ technical staff as per the tender condition.

BIDDERS / CONTRACTOR'S CERTIFICATE.

(1) I/WE hereby declare that I / We have perused in detail and examined closely the A.P Standard Specifications, all clauses of the preliminary specifications with all amendments and have either examined all the standards specifications or will examine all the standard specifications for items for which I/We tender, before I/We submit such tender and agree to be bound and comply with all such specifications for this agreement which I/We execute in the ----------Department.

(2) I / WE certify that I / we have inspected the site of the work and required quarries before quoting my / our Percentage excess or less or at par on ECV, I /we have satisfied about the quality, availability and transport facilities for stones, sand and other materials.

(3) I / WE am/are prepared to furnish detailed data in support of all my quoted percentage, if and when called upon to do so without any reservations.

(4) I / WE hereby declare that I / We will accept the recovery of further security deposit of 7 ½% from Running Account bills.

(5) I / WE hereby declare that I am / we are accepting to reject my tender in terms of condition 3.80 of instructions to bidders.

CONTRACTOR 25 SUPERINTENDING ENGINEER
IRRIGATION CIRCLE NO.2, LMD COLONY.

(6) I / WE hereby declare that I am / we are accepting for the defect liability period as prescribed.

(7) a) I / We declare that I / WE will procure the required construction materials including earth and use for the work after approval of the Engineer-in-Charge. The responsibility for arranging and obtaining the land for borrows and or exploration in any other way shall rest with me/us for the materials for construction, if not specified otherwise. I/We shall ensure smooth and un-interrupted supply of materials.

b) I/We declare that the responsibility for arranging and obtaining the land for disposal of spoil/soil not useful for construction purposes shall rest with me/us.

c) I/We declare that I/We shall not claim any compensation or any payment for the land so arranged for disposal of soil and the land for borrow area. My / our quoted percentage excess or less or at par on ECV., is inclusive of the land so arranged and I / We will hand over the land so arranged for disposal of soil to; the department after completion of work.

d) I/We declare that I/WE will not claim any extra amount towards any material used for the work other than the quoted items for respective schedule 'A' items.

e) I/We declare that I/WE will execute the work as per the mile stone programme, and if I/WE fail to complete the work as per the mile stone programme I / We abide by the condition to recover liquidated damages as per the tender conditions.

f) I/We declare that I/WE will abide for settlement of disputes as per the tender conditions.

DECLARATION OF THE BIDDER.

1) I/WE have not been black listed in any department in Telangana or in any State due to any reasons.

2) I/WE have not been demoted to the next lower category for not filing the tenders after buying the tender schedules in a whole year and my/our registration has not been cancelled for a similar default in two consecutive years.

3) I/WE agree to disqualify me/us for any wrong declaration in respect of the above and to summarily reject my/our tender.

4) I/WE agree to disqualify and blacklist me/us, if it comes to the notice of tender inviting authorities that the documents submitted by me /us are not genuine.

Address of the Bidder:

Phone No.:

Fax No.: **CONTRACTOR.**

A.GENERAL CONDITIONS OF CONTRACT

1. Interpretation:

1.1 In interpreting these Conditions of Contract, singular also means plural, male also means female, and vice-versa. Headings have no significance. Works have their normal meaning under the language of the contract unless specifically defined. The Engineers-in-charge will provide instructions clarifying queries about the conditions of Contract.

1.2 The documents forming the Contract shall be interpreted in the following order of priority:

1) Agreement
2) Letter of Acceptance, notice to proceed with the works
3) Contractor's Tender (Technical bid)
4) Conditions of contract
5) Specifications
6) Drawings
7) Bill of quantities (Price-bid)
8) Any other document listed as forming part of the Contract.

2 Engineer-in-Charge's Decisions:

2.1 Except where otherwise specifically stated, the Engineer-in-charge will decide the contractual matters between the Department and the Contractor in the role representing the Department.

3 Delegation:

3.1 The Engineer-in-charge may delegate any of his duties and responsibilities to other officers and may cancel any delegation by an official order issued.

4 Communications:

4.1 Communications between parties, which are referred to in the conditions, are effective only when it is in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

5 Sub-contracting:

5.1 If the prime contractor desires to sub-let a part of the work, he should submit the same at the time of filing tenders itself or during execution, giving the name of the proposed Sub-contractor, along with details of his qualification and experience. The Tender Accepting Authority should verify the experience of the Sub-contractor and if the Sub-contractor satisfies the qualification criteria in proportion to the value of work proposed to be sub-let, he may permit the same. The total value of works to be awarded on sub-letting shall not exceed 45% of contract value. The extent of subletting shall be added to the experience of the sub-contractor and to that extent deducted from that of the main contractor. <u>It is the responsibility of the main contractor to clear the liabilities if any that arise on the portion of the work executed by the sub contractor till the end of the defect liability period of the work.</u>

6 Other Contractors:

6.1 The Contractor shall cooperate and share the Site with other contractors, Public authorities, utilities, and the Department. The Contractor shall also provide facilities and services for them as directed by the Engineer-in-charge.

7 Personnel:

7.1 The Contractor shall employ the required Key Personnel named in the Schedule of Key Personnel to carry out the functions stated in the Schedule or other personnel approved by the Engineer-in-charge. The Engineer-in-charge will approve any proposed replacement of Key Personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

7.2 The technical personnel should be on full time and available at each work site whenever required by Engineer- in- Charge to take instructions.

7.3 The names of the technical personnel to be employed by the contractor should be furnished in the statement enclosed separately.

7.4 In case the contractor is already having more than one work on hand and has undertaken more than one work at the same time, he should employ separate technical personnel on each work.

7.5 If the contractor fails to employ technical personnel the work will be suspended or department will engage a technical personnel and recover the cost (SSR x 3 times) thereof from the contractor.

7.6 If the Engineer-in-charge asks the Contractor to remove a person who is a member of Contractor's staff or his work force stating the reasons, the Contractor shall ensure that the person leaves the site forthwith and has no further connection with the work in the contract.

8 Contractor's Risks:

8.1 All risks of loss or damage to physical property and of personnel injury and death, which arise during and in consequence of the performance of the Contract, are the responsibility of the Contractor.

9 **Insurance:**

9.1 **Workmen Compensation:** It shall be the contractor's sole responsibility to protect the public and all his employees (Skilled, Semi-skilled and Unskilled) against accident from a cause and he shall indemnify the government against any claim for damages or injury to person or property, resulting, from any such accidents and shall where the provision of the workmen's compensation Act apply, take steps to properly insure against any claims there under at his own cost and the bidder shall obtain appropriate insurance policy towards this.

Appropriate Insurance policy shall be submitted to Executive Engineer within 1st RA bill or within 2 months from the date of Agreement which ever is earlier.

10 Site Inspections:

10.1 The contractor should inspect the site and also proposed quarries of choice for materials, source of water and quote his percentage including quarrying, conveyance and all other **incidental** charges etc.

10.2 The responsibility for arranging the land for borrow area rests with the Contractor and no separate payment will be made for procurement or otherwise. The contractor's quoted percentage will be inclusive of land cost.

11 Contractor to Construct the Works:

11.1 The Contractor shall construct and Commission the Work in accordance with the specifications and Drawings.

12 Diversion of streams / Vagus / Drains.

12.1 The contractor shall at all times carry out construction of cross drainage works in a manner creating least interference to the natural flow of water while consistent with the satisfactory execution of work. The contractor at his cost shall form a temporary diversion wherever necessary. No extra payment shall be made for this work.

12.2 No separate payment for bailing out sub-soils, water drainage or locked up rain water for diversion, shoring, foundations, bailing or pumping water either from excavation of soils from foundations or such other incidental will be paid. The percentage to be quoted by the contractor is for the finished item of work in situ and including all the incidental charges. The borrow pits are also to be de-watered by the contractor himself at his expense, if that is found necessary.

12.3 The work of diversion arrangements should be carefully planned and prepared by the contractor and forwarded to the Executive Engineer technically substantiating the proposals and approval of the Executive Engineer obtained for execution.

12.4 The contractor has to arrange for bailing out water, protection to the work in progress and the portion of works already completed and safety measures for men and materials and all necessary arrangements to complete the work.

12.5 All the arrangements so required should be carried out and maintained at the cost of the contractor and no separate or additional payments are admissible.

12.6 Coffer Dams.

Necessary cofferdams and ring bunds have to be constructed at the cost of contractor and same are to be removed after the completion of the work. The contractor has to quote his percentage keeping the above in view.

13 Power Supply.

13.1 The contractor shall make his own arrangements for obtaining power from the Electricity dept., at his own cost. The contractor will pay the bills of Electricity Department for the cost of power consumed by him.

13.2 The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under Rule-45(I) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

13.3 The power shall be used for bonafide Departmental work only.

14 Temporary Diversions (Works on Highways)

14.1 The contractor shall at all times carryout work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the contractor shall in accordance with the directions of the Engineer-in-charge provide and maintain during the execution of the work a passage for traffic, either along a part of the existing carriage way under improvement or along a temporary diversion constructed close to the highway.

14.2 If in the opinion of the Engineer-in-Charge, it is not possible to pass the traffic on part-width of the carriageway for any reason, a temporary diversion close to the highway shall be constructed as directed. It shall be paved with the materials such as hard morum, gravel and stone, metal to the specified thickness as directed by the Engineer-in-Charge. In all cases, the alignment, gradients and surface type of the diversion including its junctions, shall be approved by the Engineer-in-charge before the highway is closed to traffic.

14.3 The contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer-in-charge.

14.4 The barricades erected on either side of the carriage way portion of the carriage way closed to traffic, shall be of strong design to resist violation and painted with alternative black and white stripe. Red lanterns or warnings lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

15. Ramps:

Ramps required during execution may be formed wherever necessary and same are to be removed after completion of the work. No separate payment will be made for this purpose.

16. Monsoon Damages:

Damages due to rain or flood either in cutting or in banks shall have to be made good by the contractor till the work is handed over to the Department. The responsibility of de-silting and making good the damages due to rain or flood rests with the contractor. No extra payment is payable for such operations and the contractor shall therefore, have to take all necessary precautions to protect the work done during the construction period.

17. The works to be Completed by the Intended Completion Date:

a. The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer-in-Charge, and complete the work by the Intended Completion Date.

18. Safety:

a. The Contractor shall be responsible for the safety of all activities on the Site.

19. Discoveries:

a. Anything of historical or other interest or of significant value discovered on the Site is the property of the Government. The Contractor is to notify the Engineer-in-charge of such discoveries and carry out the Engineer-in-Charge's instructions for dealing with them.

20. Possession of the Site.

a. The Department shall give possession of the site to the Contractor. If possession of a part site is given, the Department will ensure that the part site so handed over is amenable to carry out the work at site by the Contractor.

21. Access to the Site:

a. The Contractor shall provide the Engineer-in-Charge and any person authorized by the Engineer-in-Charge, access to the site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

22. Instructions:

a. The Contractor shall carry out all instructions of the Engineer-in-charge and comply with all the applicable local laws where the Site is located.

23. Settlement of disputes:

23.1 If any dispute of difference of any kind whatsoever arises between the department and the Contractor in connection with, or arising out of the Contract, whether during the progress of the works or after their completion and whether before or after the termination, abandonment or breach of the Contract, it shall in the first place, be referred to and settled by the Engineer-in-charge who shall, within a period of thirty days after being requested by the Contractor to do so, give written notice of his decision to the Contractor. Upon receipt of the written notice of the decision of the Engineer-in-Charge the Contractor shall promptly proceed without delay to comply with such notice of decision.

23.2 If the Engineer-in-Charge fails to give notice of his decision in writing within a period of thirty days after being requested or if the Contractor is dissatisfied with the notice of the decision of the Engineer-in-Charge, the Contractor may within thirty days after receiving the notice of decision, appeal to the agreement concluding authority who shall offer an opportunity to the contractor to be heard and to offer evidence in support of his appeal, the agreement concluding authority shall give notice of his decision within a period of thirty days after the Contractor has given the said evidence in support of his appeal, subject to arbitration, as hereinafter provided. Such decision of the agreement concluding authority in respect of every matter so referred shall be final and binding upon the Contractor and shall forthwith be given effect to by the Contractor, who shall proceed with the execution of the works with all due diligence whether he requires arbitration as hereinafter provided, or not. If the agreement concluding authority has given written notice of his decision to the Contractor and no claim to arbitration, has been communicated to him by the Contractor within a period of thirty days from receipt of such notice the said decision shall remain final and binding upon the Contractor. If the agreement concluding authority fail to give notice of his decision, as aforesaid within a period of thirty days after being requested, or if the Contractor be dissatisfied with any such decision, then and in any such case the contractor within thirty days after the expiration of the first named period of thirty days as the case may be, require that the matter or matters in dispute be referred to arbitration as detailed below:-

SETTLEMENT OF CLAIMS:

Settlement of claims for Rs.50, 000/- and below by Arbitration.

All disputes or difference arising out of or relating to the Contract shall be referred to the adjudication as follows:

a) Claims up to a value of Rupees 10,000/-. Superintending Engineer, ----------.

b) Claims above Rs.10,000/- and up to Rupees 50,000/-. Another Engineer - in - Chief / Chief Engineer ----------.

The arbitration shall be conducted in accordance with the provisions of Indian Arbitration and Conciliation Act 1996 or any statutory modification thereof.

The arbitrator shall state his reasons in passing the award.

c) Claims above Rs. 50, 000/-.

All claims of above Rs.50, 000/- are to be settled by a Civil Court of competent jurisdiction by way of civil suit and not by arbitration.

The contractor shall make a reference for adjudication under these clauses within six Months from the date of intimating the contractor of the preparation of final bill or his having accepted payment whichever is earlier.

A. TIME FOR COMPLETION

24. Program:

24.1. The total period of completion is **(24)** Months from the date of entering with agreement including Monsoon period. Keeping in view, the schedule for handing over of site of work should be programmed such as to achieve the milestones as in "Rate of progress statement" enclosed.

24.2. The attention of the Bidder is directed to the contract requirement at the time of beginning of the work, the rate of progress and the dates for the whole work and its several parts as per milestones. The following rate of progress and proportionate value of work done from time to time as will be indicated by the Executive Engineer's Certificate for the value of work done and completion of milestones will be required. Date of handing over of site and commencement of their programme will be the date of concluding agreement.

24.3. After signing the agreement, the contractor shall forthwith begin the work, and shall regularly and continuously proceed with them.

24.4. Rate of progress:

i) Work programme of achieving the milestones

Item No.	Description	Total Quantity	Rate of Progress							
			1st Mile Stone (3 Months)	2nd Mile Stone (6 Months)	3rd Mile Stone (9 Months)	4th Mile Stone (12 Months)	5th Mile Stone (15 Months)	6th Mile Stone (18 Months)	7th Mile Stone (21 Months)	8th Mile Stone (24 Months)
1	Excavation	1742873 Cum	400000	200000	150000	350000	400000	242873	0	0
2	Cement Concrete	263879 Cum	25000	25000	40000	50000	50000	40000	20000	13879
3	Embankment	595798 Cum	0	0	0	150000	200000	120000	100000	25798
4	Mechanical Items	1974 MT	0	0	0	300	500	500	500	174
	Financial	**2,64,24,29,950**	**317091594**	**237818696**	**237818696**	**475637391**	**475637391**	**317091594**	**317091594**	**264242994**

24.5. The contractor shall commence the works on site within the period specified under condition above after the receipt by him of a written order to this effect from the Engineer-in-charge and shall proceed with the same with due expedition and without delay, except as may be expressly sanctioned or ordered by the Engineer- in-charge, or be wholly beyond the contractor's control.

24.6. Save in so far as the contractor may prescribe, the extent of portions of the site of which the contractor is to be given possession from time to time and the order in which such portions shall be made available to him and, Subject to any requirement in the contract as to the order in which the works shall be executed, the Engineer-in-Charge will, with his written order to commence the works, give to the contractor possession of so much of the site as may be required to enable the contractor to commence and proceed with the execution of the works in accordance with the programme if any, and otherwise in accordance with such reasonable proposals of the contractor as he shall by written notice to the Engineer-in-Charge, may from time to time as the works proceed, give to the contractor possession of such further portions of the site as may be required to enable the contractor to proceed with the execution of the works with due dispatch in accordance with the said programme or proposals as the case maybe ; if the contractor suffers delay or incurs cost from failure on the part of the Engineer-in-charge to give possession in accordance with the terms of this clause, the Engineer-in-Charge / Competent Authority shall grant reasonable extension of time for the completion of works.

24.7. The contractor shall bear all costs and charges for special or temporary way required by him in connection with access to the site.

24.8. Subject to any requirement in the contract as to completion of any section of the works before completion of the whole of the works shall be completed in accordance with provisions of clauses in the Schedule within the time stated in the contract.

24.9. **Delays and extension of time**: No claim for compensation on account of delays or hindrances to the work from any cause whatever shall lie, except as hereafter defined. Reasonable extension of time will be allowed by the Engineer-in-Charge / Competent Authority for unavoidable delays, such as may result from causes, which in the opinion of the Engineer-in-charge, are undoubtedly beyond the control of the contract. The Engineer-in-charge shall assess the period of delay or hindrance caused by any written instructions issued by him, at twenty five percent in excess of the actual working period so lost. In the event of the Engineer-in-charge failing to issue necessary instructions and thereby causing delay and hindrance to the contractor, the later shall have the right to claim an assessment of such delay by the Superintending Engineer of the Circle whose decision will be final and binding. The contractor shall lodge in writing with the Engineer-in-charge a statement of claim for any delay or hindrance referred to above, within fourteen days from its commencement, otherwise no extension of time will be allowed.
Whenever authorized alterations or additions made during the progress of the work are of such a nature in the opinion of the Engineer-in-Charge as to justify an extension of time in consequence thereof, such extension will be granted in writing by the Engineer-in-charge / Competent Authority when ordering such alterations or additions.

Proposals for extension of time should be sent to the authority competent sufficiently in advance and in any case at least one month before the expiry of the contract period.

25. Construction Programme:

25.1. The Contractor shall furnish within one month of the order of the work a programme showing the sequence in which he proposed to carry out the work, monthly progress expected to be achieved, also indicating date of procurement of materials, plant and machinery. The schedule should be such that it is practicable to achieve completion of the whole work within the time limit fixed and in keeping with the Mile stone programme specified and shall obtain the approval of the Engineer-in-charge. Further, rate of the progress as per the program shall be kept upto date. In case it is subsequently found necessary to alter this program, the contractor shall submit sufficiently in advance the revised program incorporating necessary modifications and get the same approved by Engineer-in-Charge. No revised program shall be operative without approval. The Superintending Engineer shall have at all times, the right, without any way violating this contract, or forming grounds for any claim, to alter the order of progress of the works or any part thereof and the contractor shall after receiving such directions proceed in the order directed. The contractor shall also report the progress to the Superintending Engineer within 7 days of the Executive Engineer's direction to alter the order of progress of works.

25.2. The Contractor shall give written notice to the Engineer-in-Charge whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawings or order

including a direction, instruction or approval is issued by the Engineer-in-Charge within a reasonable time. The notice shall include details of the drawing or order required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

26. Speed of Work:

26.1. The Contractor shall at all times maintain the progress of work to conform to the latest operative progress schedule approved by the Engineer-in-Charge. The contractor should furnish progress report indicating the programme and progress once in a month. The Engineer-in-Charge may at any time in writing direct the contractor to slow down any part or whole of the work for any reason (which shall not be questioned) whatsoever, and the contractor shall comply with such orders of the Engineer-in-Charge. The compliance of such orders shall not entitle the contractor to any claim of compensation. Such orders of the Engineer-in-Charge for slowing down the work will however be duly taken into account while granting extension of time if asked by the contractor for which no extra payment will be entertained.

26.2 Delays in Commencement or progress or neglect of work and forfeiture of earnest money, Security deposit and withheld amounts:

If, at any time, the Engineer-in-Charge shall be of the opinion that the Contractor is delaying Commencement of the work or violating any of the provisions of the Contract, or is neglecting or delaying the progress of the work as defined by the tabular statement. "Rate of progress" in the Articles of Agreement", he shall so advise the Contractors in writing and at the same time demand compliance in accordance with conditions of Contract. If the Contractor neglects to comply with such demand within seven days after receipt of such notice, it shall then or at any time thereafter, be lawful for the Engineer-in-Charge to take suitable action in accordance with Clause.60 of APSS.

27. Suspension of works by the Contractor:

27.1. If the Contractor suspend the works, or sublet the work without sanction of the Engineer-in-Charge, or in the opinion of the Engineer-in-Charge shall neglect or fail to proceed with due diligence in the performance of his part of the Contract as laid down in the Schedule rate of progress, or if he shall continue to default or repeat such default in the respects mentioned in clause.27 of the APSS Engineer-in-Charge shall take action in accordance with Clause 61 of APSS.

27.2. If the Contractor stops work for 28 days and the Stoppage has not been authorized by the Engineer-in-Charge who shall take action as per Clause 61 of APSS.

27.3. If the Contractor has delayed the completion of works the Engineer-in-Charge shall take action as per Clause.61 of APSS.

28. Extension of the Intended Completion Date:

28.1. **Engineer-in-charge** shall extend the intended completion date for reasonable time, in accordance with the codal provisions, if a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

28.2. The Engineer-in-Charge shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

29. Delays Ordered by the Engineer-in-Charge:

29.1. The Engineer-in-Charge may instruct the Contractor to delay the start or progress of any activity within the Work, considering suitable extension of time.

30. Early Warning:

30.1. The contractor is to warn the Engineer-in-Charge at the earliest opportunity of specific likely future events or circumstances that may adversely affect the execution of works.

30.2. The Contractor shall cooperate with the Engineer-in-Charge in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by

anyone involved in the work and in carrying out any resulting instruction of the Engineer-in-Charge.

31. Management Meetings:

31.1 The Engineer-in-Charge may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the programme for remaining work and to deal with matters raised in accordance with the early warning procedure.

B. QUALITY CONTROL

32. Identifying Defects:

32.1. The Engineer-in-Charge shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer-in-Charge may instruct the Contractor to verify the Defect and to uncover and test any work that the Engineer considers may be a Defect.

32.2. Completion of outstanding work and Remedying Defects

In order that the works shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Liability Period or as soon as practicable thereafter, the contractor shall:

Complete any work which is outstanding on the date of start on takeover of the Site and Works, within such reasonable time as is instructed by the Engineer-in-charge and Execute all work required to remedy defects or damage, as may be notified by the Engineer-in-charge on or before the expiry date of the Defects Liability for the works (as the Case may be)

32.3 **Cost of Remedying Defects**

All work required to remedy defects shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

(a) the Design of the Works,

(b) Failure of the Contractor to comply with its obligations under the Contract.

33 Tests:

If the Engineer-in-Charge instructs the Contractor to carry out a test not specified in the specification to check whether any work has a Defect and the Contractor shall have to carry out such tests at no extra cost.

34 Correction of Defects:

34.1 The Engineer-in-Charge shall give notice to the Contractor of any Defects before the end of the Defects Liability period as specified, which begins on completion of construction work.

34.2 Every time, notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified in the notice of the Engineer-in-Charge.

35 Uncorrected Defects:

35.1 If the contractor has not corrected the defect within the time specified in the notice of the Engineer-in-Charge will assess the cost of having the defect corrected and the contractor shall pay this amount or it will be recovered from dues to Contractor.

35.2 The Engineer-in-Charge shall introduce O.K cards and prescribe the formats thereof, O.K cards shall relate to all major components of the work. The contractor / his authorized representative shall be required to initiate and fill in and present the O.K card to the construction staff that would check the respective items and send to Engineer-in-Charge or his representative for final check and clearance / O.K. Any defects pointed out by the supervision staff of department shall promptly be attended to by the Contractor and the fact of doing so be duly recorded on the back of O.K. card.

35.3 The Engineer-in-Charge may also introduce check lists which shall be kept in Bound registers by the construction supervision staff. The Contractor may be required to fill up these lists in the first instance and shall be subsequently checked by the Quality Control Engineers.

35.4 Further Tests

If the work of remedying of any defects or damage may affect the performance of the works, the Engineer-in-charge may require the repetition of any of the tests described in the Contract, including Tests on Completion and/or tests after completion. The requirement shall be made by notice within 28 days after the defect or damage is remedied. These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Contractor.

36 Quality Assurance:

The Contractor shall submit quality assurance plan within one month from the Commencement Date for approval of Engineer-in-charge. The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer-in-charge shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Engineer-in-charge for information before each design and execution stage is commenced.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

36.1 **Quality Control:**

Quality control monitoring reports, test results, reports of corrective action etc., shall be furnished to the Engineer-in-charge at regular intervals.

Quality Audit will be got conducted by the Engineer-in-Charge departmentally or by other organization and the contractor shall extend the testing facilities to them also at his cost.

The Contractor shall produce the Quality records maintained by him to the Engineer-in-charge for the quality audit. Certification of Quality Control Staff is not required for running account bills, however it is required for final bills.

36.2 The Contractor shall submit the Quality Management Plan for the Contract work indicating the following, with in one month from the Commencement Date for approval of Engineer-in-charge.

(a) The quantum of work to be done, quantities of various materials required and the electrical and mechanical equipment to be installed.

(b) The number of tests to be conducted for various materials, electrical and mechanical equipment and also for finished items of work as per the I.S Codes and other codes.

(c) The details field laboratories and testing facilities available for conducting the above tests.

(d) MOU with external laboratories approved by the Government for conducting required tests on equipment and materials.

(f) The personnel of contractor in-charge of quality management with their names, duties and authority. The qualifications of the persons in-charge of collecting samples, testing materials, testing equipment and finished item work, persons in-charge of quality assurance with powers to reject the defect work, the process of rectification of defects and deficiencies, the process of corrective actions for avoiding recurrence of defects.

(g) Any other information that may be required by the Engineer-in-charge.

(h) Copies of the quality management plan have to be furnished to the Engineer-in-Charge.

D. COST CONTROL

37 Bill of Quantities: The Bill of Quantities shall contain items for the construction work to be done by the Contractor.

37.1 The Contractor is paid for the quantity of the work done at the scheduled rate in the Bill of Quantities for each item plus or minus Tender percentage.

38 Changes in the Quantities:

38.1 The contractor is bound to execute all supplemental works that are found essential, incidental and inevitable during execution of main work.

38.2 The payment of rates for such supplemental items of work will be regulated as under;
Supplemental items directly deducible from similar items in the original agreement.

38.2.1 The rates shall be derived by adding to or subtracting from the agreement rate of such similar item the cost of the difference in the quantity of materials labour between the new items and similar items in the agreement worked out with reference to the Standard Schedule of Rates adopted in the sanctioned estimate with which the tenders are accepted plus or minus over all tender percentage.

38.2.1.1 (a) Similar items but the rates of which cannot be directly deduced from the original agreement.

(b) Purely new items, which do not correspond to any item in the agreement.

38.2.2 The rates of all such items shall be Estimated Rates plus or minus overall Tender premium.

39 Extra Items:

39.1 Extra items of work shall not vitiate the contract. The contractor shall be bound to execute extra items of work as directed by the Engineer-in-Charge. The Engineer-in-Charge shall work out the rates for extra items as per the conditions of the contract and the same are binding on the Contractor.

39.2 Entrustment of additional items:

39.2.1 Where ever additional items not contingent on the main work and outside the scope of original agreement are to be entrusted to the original contractor, if he is willing dispensing with bids and if the value of such items exceeds the limits up to which the officer is empowered to entrust works initially to contractor without calling for tenders, approval of competent authority shall be obtained.

39.2.2 Entrustment of the additional items contingent on the main work will be authorized by the officers up to the monetary limits up to which they are competent to accept items in the original agreement so long as the total amounts up to which they are competent to accept in an original agreement rates for such items shall be worked out in accordance with the procedure above. For all items of work in excess of the quantities shown in the Bill of Quantities of the Tenders, the rate payable for such items shall be scheduled rates for the items (+) or (-) over all tender percentage accepted by the competent authority.

39.2.3 A Competent Authority shall, subject to the provisions of the agreement, entrust either the additional or supplemental items after the tender is accepted. The Superintending Engineer (Employer) being the authority next higher to the Executive Engineer (Engineer-in-Charge) approves the rate for the items / variation in quantity in the current agreement. No items shall be ordered by an officer on his own responsibility if the revised estimate or deviation statement providing for the same requires the sanction of higher authority.

40 Payments:

40.1 Payment for the work done by the contractor will be made for the finished work based on the measurements recorded in measurement books by any officer of the department not lower in rank than a Assistant Engineer and check measured by any officer not lower in rank than a Deputy Executive Engineer. The measurement shall be recorded at various stages of the work done and also after work is completed. The contractor shall be present at the time of recording of each set of measurement and their check measurement and accept them then and there so as to avoid disputes at a later stage. If the contractor is not available at the work spot at the time of recording measurements or check measurements the particulars of measurements shall be signed by the authorized agent of contractor based on which the contractor shall accept the set of measurements without any further dispute. If for any reason the contractor's authorized agent is also not available at site the contractor is bound to accept the measurement. When the department decides to suspend the work, recording of measurements in the absence of the contractor or his authorized representative the department shall not entertain any claim from the contractor for any loss incurred by him on this account.

40.2 Payments and Certificates:

40.2.1 Payments shall be adjusted for recovery of advance payments if any, liquidated damages, security deposits in terms of tender conditions for the due fulfillment of the contract. Intermediate payment will be the sum equal to 92½% of the value of work done and balance of 7½% will be withheld and retained as security for the due fulfillment of the contract.

On completion of the entire works the contractor will receive the final payment of all the moneys due or payable to him under or by virtue of the contract except earnest money deposit of 2 ½% retained as security and a sum equal to 2½ percent of the total value of the work done. The amount withheld from the final bill will be retained under deposits and paid to the contractor together with the earnest money deposit retained as security after expiry of defect liability period as all defects shall have been made good according to the true intent and meaning thereof.

40.2.2 In case of over payments or wrong payment if any made to the contractor due to wrong interpretation of the provisions of the contract, APSS or Contract conditions etc., such unauthorized payment will be deducted in the subsequent bills or final bill for the work or from the bills under any other contracts with the Government or at any time thereafter from the deposits available with the Government.

40.2.3 Any recovery or recoveries advised by the Government Department either state or central, due to non-fulfillment of any contract entered into with them by the contractor shall be recovered from any bill or deposits of the contractor.

40.2.4 No claim shall be entertained, if the same is not represented in writing to the Engineer-in-Charge within 15 days of its occurrence.

40.2.5 The contractor is not eligible for any compensation for inevitable delay in handing over the site or for any other reason. In such case, suitable extension of time will be granted after considering the merits of the case.

40.3 Intermediate Payments:

40.3.1 For intermediate Stage of work, only part rates as fixed by the Engineer-in-Charge will be paid.

40.3.2 Part rates shall be worked out for the work done portion based on the actual operations involved keeping in view the value of the balance work to be done, to avoid unintended benefit to the Contractor in initial Stage.

40.3.3 Full rate shall be paid when the work is completed as per specifications & Drawings.

41 Interest on Money due to the Contractor:

41.1 Interest on money due to the contractor is not admissible.

42 Certificate of Completion of works:

42.1 When the whole of the work has been completed and has satisfactorily passed any final test that may be prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer-in-Charge accompanied by an undertaking to carry-out any rectification work during the period of maintenance, such notice and undertaking shall be in writing, to issue a Certificate of completion in respect of the Works. The Engineer-in-Charge shall, within twenty one days of the date of delivery of such notice either issue to the Contractor, a certificate of completion stating the date on which, in his opinion, the works were completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the Works which, in the Engineer-in-Charge'' opinion, required to be done by the Contractor before the issue of such Certificate. The Engineer-in-Charge shall also notify the Contractor of any defects in the Works affecting completion that may appear after such instructions and before completion of the Works specified there in. The Contractor shall be entitled to receive such Certificate of the Completion within twenty-one days of completion to the satisfaction of the Engineer-in-Charge of the Works so specified and making good of any defects so notified.

42.2 Similarly, the Contractor may request and the Engineer-in-Charge shall issue a Certificate of Completion in respect of:

a) Any section of the Permanent works in respect of which a separate time for completion is provided in the Contract, and

b) Any substantial part of the Permanent Works, which has been both, completed to the satisfaction of the Engineer-in-Charge and occupied or used by the Department.

43 Taxes included in the bid:

43.1 The percentage quoted by the contractor shall be deemed to be inclusive of all the taxes that the contractor will have to pay for performance of this contract, excepting the taxes specifically mentioned as reimbursable.

43.2 Any Central or State sales and other taxes on completed items of works of this contract as may be levied and paid by the contractor are to be borne by himself / herself.

44 Price Adjustment:

44.1 Price Adjustment Clause shall apply for Steel, Cement, Bitumen and POL for all the works irrespective of estimated cost & time period.

44.2 Price adjustment will apply only when the difference between the estimated rates of steel, Cement, POL, Bitumen and all other Material and their current price is more or less than 5%. Thus if the price increase is 10%, payment will be made only to the extent of 5% (10%-5%) and vice versa in case of decrease in rates.

44.3 Price Adjustment Clause shall apply for labour and other materials only for the works where the estimate contract value is Rs. 2.00 Crores and above and where the time schedule provided is 12 Months and above.

44.4 The price adjustment shall be applicable within original contract period or period extended on grounds of the departmental delays and valid reasons and shall not be applicable to the extensions granted on account of the contractors fault. Price adjustment shall be applicable for actual components of items of works actually carried out during the period of the bill.

44.5 In the formula of Price Adjustment, R, the value of work shall exclude Seigniorage charges, VAT and all other fixed charges specifically mentioned in the Agreement.

44.6 The weight age for different components taken together including those included in price adjustment should not exceed 100% and the weight age for the above shall be got verified during each quarter and also at the final bill stage.

44.7 Price adjustment shall be calculated separately for the components of the payment for work done in the manner explained below.

i) Adjustment clause for Steel & Cement component shall be as follows:

Price adjustment for increase or decrease in the cost of Steel & Cement shall be paid for absolute variation between the estimated rates and the rates approved by the sub-committee constituted as per G.O.Ms.No.2, I&CAD(Reforms) Dept., dated 10-07-2014 and affected as per clause 44.2

ii) Adjustment clause for Labour component shall be as follows:

Price adjustment for increase or decrease in the cost of labour component shall be paid only when the difference is more unless by 5% in accordance with the following formula.

VL= 0.85 x PL/100 x R x (Li - Lo)/ Lo
VL= Increase or decrease in the cost of work done during the period under consideration due to changes in the rates of Labour.
Lo= plus or minus 5% of All India consumer price index for industrial workers on the day 28 days prior to date of submission of bids.
L0, 1.05 x All India consumer price index for industrial workers on the day 28 days prior to date of submission of bids if Li > L0

0.95 x All India consumer price index for industrial workers on the day 28 days prior to date of submission of bids if Li < L0

Li= All India consumer price index for industrial workers on the day 28 days prior to the last date of measurement recorded to which a particular bill payment is related.

PL= Percentage of Labour component of the work.

iii) Adjustment clause for Bitumen component shall be as follows:

Price adjustment for increase or decrease in the cost of bitumen shall be paid for absolute variation between the estimated rates and the average Wholesale price of bitumen at the nearest refinery provided in the sanctioned estimate.

iv) Adjustment clause for POL component shall be as follows:

Price adjustment for increase or decrease in the cost of POL shall be paid in accordance with the following formula.

Vf= 0.85 x Pf/100 x R x (Fi - Fo)/ Fo

Vf= Increase or decrease in the cost of work done during the period under consideration due to changes in the rate for POL.

Fo= plus or minus 5% of the Average Wholesale Price of POL determined by the PSUs may be allowed on the day 28 days prior to date of submission of Bids.

Fo, 1.05 x the Average Wholesale Price of POL determined by the PSUs may be allowed on the day 28 days prior to date of submission of Bids if Li > L0

0.95 x the Average Wholesale Price of POL determined by the PSUs may be allowed on the day 28 days prior to date of submission of Bids if Li < L0

Fi= The Average Wholesale Price of POL determined by the PSUs may be allowed on the day 28 days prior to the last date of measurement recorded to which a particular bill payment is related.

Pf= Percentage of POL component of the work.

v) Adjustment clause for all other materials shall be as follows:

Price adjustment for increase or decrease in the cost of all other materials shall be paid in accordance with the following formula.

Vm= 0.85 x Pmc/100 x R x (Mi - Mo)/ Mo

Vm= Increase or decrease in the cost of work done during the period under consideration due to changes in the rate for all other materials.

Mo= plus or minus 5% of the Average Wholesale Price of all other materials on the day 28 days prior to date of submission of Bids.

Mo, 1.05 x the Average Wholesale Price of all other materials on the day 28 days prior to date of submission of Bids if Mi > M0

0.95 x the Average Wholesale Price of all other materials on the day 28 days prior to date of submission of Bids if Mi < M0

Mi= The Average Wholesale Price for all other materials on the day 28 days prior to the last date of measurement recorded to which a particular bill payment is related.

Pmc= Percentage of all other materials component of the work.

vi) Adjustment clause for EM & HM works shall be as follows:

1. The Price variation for EM & HM Equipment is allowed as per the procedure laid down by IEEMA / IPMA and allowed for the variation beyond (+/-) 5% over the rates of various components as per sanctioned estimate of the EM & HM Equipment.

2. For the imported EM & HM Equipment including spares, the variation in Foreign Exchange shall be considered. The base rate would be last date of filing of bids. The actual variation in foreign exchange would be arrived based on the supply date of EM and HM equipment including spares with respect to the last date of filing of bids and variations worked out for payments. The rates to be adopted shall be as per the standard rates fixed by the R.B.I. on the relevant dates.

45. Retention:

45.1 The department shall retain from each payment due to the contractor at the rate of 7.5% of bill amount until completion of the whole of the Works. The retention money so accumulated will be released against the Bank guarantee in spells of Rs. 25 lakhs subject to the conditions that the rate of progress is maintained. However the total of such released amount shall not exceed 5% of total value payment made for the works.

45.2 On completion of the whole of the Works 5% out of 7½% of the amount retained is re-paid to the Contractor and balance 2 ½ % along with EMD of 2 ½ % shall be paid after the Defects Liability Period has passed and the Engineer-in-Charge has certified that all the Defects notified by the Engineer-in-Charge to the Contractor before the end of this period have been corrected.

46 Liquidated Damages:

46.1 If for any reason, which does not entitle the contractor to an extension of time, the rate of progress of works, in the opinion of the is too slow to ensure completion by the prescribed time or extended time for completion, Superintending Engineer,----------, shall so notify the contractor in writing and the contractor shall there upon take such steps as are necessary and the Superintending Engineer/Executive Engineer,----------, may approve to expedite progress so as to complete the works or such section by the prescribed time or extended time. The contractor shall not be entitled to any additional payment for taking such steps. If as a result of any notice given by the Superintending Engineer,---------- under this clause the contractor shall seek the Superintending Engineer,----------, permission to do any work at night or on Sundays, if locally recognized as days or rest, or their locally recognized equivalent, such permission shall not be unreasonably refused.

46.2 If the contractor fails to complete whole of the works or any part thereof or section of the works within the stipulated periods of individual mile stones (including any bonafide extensions allowed by the competent authority without levying liquidated damages), the Superintending Engineer may without prejudice to any other method of recovery will deduct one tenth of one percent of contract value of the relevant milestone per calendar day or part of the day for the period of delays subject to a maximum of 10% of the contract value.

46.3 The payment or deductions of such damages shall not relieve the contractor from his obligation to complete the works, or from any other of his obligations and liabilities under the contract.

46.4 The liquidated damages for the whole of the work are levied as below.

	Rupees(Amount per day)	
For milestone 1	**Rs:3524**	**Per day**
For milestone 2	**Rs:2643**	**Per day**
For milestone 3	**Rs:2643**	**Per day**
For milestone 4	**Rs:5285**	**Per day**
For milestone 5	**Rs:5285**	**Per day**
For milestone 6	**Rs:3524**	**Per day**

For milestone 7	**Rs:3524**	**Per day**
For milestone 8	**Rs:2937**	**Per day**

The maximum amount of liquidated damages for the whole of the works is ten percent of final contract price.

47. Securities:

47.1 The Earnest Money Deposit and Additional Security (for discount tender percentage beyond 5% as per Clause 3.60) shall be provided to the Department not later than the date specified in the Letter of Acceptance and shall be issued for an amount by a bank acceptable to the Department. The Earnest Money shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security shall be valid until a date 28 days from the date of issue of the certificate of completion.

48. Cost of Repairs:

48.1 The Contractor at his own cost shall remedy loss or damage to the Works or materials to the Works between the Start Date and the end of the Defects Correction Periods if the loss or damage arises from the Contractor's acts or omissions.

E. FINISHING THE CONTRACT

49 Completion:

49.1 The Contractor shall request the Engineer-in-Charge to issue a Certificate of completion of the Works and the Engineer-in-Charge will do so upon deciding that the work is completed. Such decision of completion of work or otherwise shall be communicated within (15) days of receiving of request from the contractor. Any balance items of work required for completion shall also be specifically communicated by the Engineer-in-Charge.

50 Taking Over:

51.1 The Department shall take over the Site and the Works within seven days of the Engineer-in-Charge issuing a certificate of Completion. Such taking over shall be done in the presence of the agency or his authorized representative and Engineer-in-Charge or his representative not below the level of Deputy Executive Engineer, at the site of the completed work.

51 Termination:

51.1 The Department may terminate the Contract if the contractor causes a fundamental breach of the Contract.

51.2 Fundamental breaches of Contract include, but shall not be limited to the following.

a) The Contractor stops work for 28 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the Engineer-in-Charge.

b) If the Contractor is bankrupt or goes into liquidation other than for a reconstruction or amalgamation.

c) The Engineer-in-Charge gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer-in-Charge;

d) The Contractor does not maintain a performance security which is required as per agreement conditions.

e) The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined.

f) If the contractor, in the judgment of the Department has engaged in corrupt or fraudulent practices in competing for or in the executing the contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Government and includes collusive practice among Bidders (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Government of the benefits of free and open competition.

51.3 Notwithstanding the above the Department may terminate the contract for convenience.

51.4 **The entire process of Termination shall be completed within a period of 60 days from the date of issue of Notice by the Superintending Engineer (Agreement authority / Employer). The termination orders should be given by the Agreement authority.**

51.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secured in the presence of Engineer-in-Charge or his representative not below the level of Deputy Executive Engineer, leave the Site as soon as possible.

52 Action upon Termination:

If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer-in-Charge shall certify the value of the work done less advance payments received upon the date of the issue of the certificate, less other recoveries due in terms of the Contract, less taxes due to be deducted at source as per applicable laws and less 20% of the value of the work not completed. Additional Liquidated Damages shall not apply. If the total amount due to the Department exceeds any payment due to the Contractor the difference shall be a debt payable to the Department. In case of default for payment within 28 days from the date of issue of the notice to the above effect, the contractor shall be liable to pay interest at 12% P.A. for the period of delay.

Should the amount so certified be less than the amount which would have been due to the Contractor on the completion of the works by him, the difference shall not be paid to the Contractor by the department.

53 Property:

53.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Department if the Contract is terminated because of Contractor's default.

54 Release from Performance:

54.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Department or the Contractor, the Engineer-in-Charge shall certify that the contract has been frustrated. The Contractor shall make the site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all works carried out before receiving it and for any work carried out after-words to which commitment was made.

SPECIAL CONDITIONS OF CONTRACT

1. Water Supply:

The Contractor has to make his own arrangements for water required for the work and to the colonies and work sites.

2. **Electrical Power:**

The Contractors will have to make their own arrangements for drawing electric power from the nearest power line after obtaining permission from Electricity authority at their own cost. In case of failure of electricity, the Contractor has to make alternative arrangements for supply of electricity by Diesel Generator sets of suitable capacity at place of work. If the Department arranges the supply, necessary Tariff rates shall have to be paid based on the prevailing rates.

The contractor will pay the bills of Electricity towards the cost of power consumed by him.

The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under rule –45(I) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

The power shall be used for bonafide Departmental works only.

2.1 Electric Power for Domestic Supply:

a) The contractor has to make his own arrangements for the supply of electric power for domestic purposes and the charges for this purpose have to be paid by him at the rates as fixed by the **Electricity authority** from time to time.

b) The contractor will have to make his own arrangements to lay and maintain the necessary distribution lines and wiring for the camp at his own cost. The layout and the methods of laying the lines and wiring shall have the prior approval of the Engineer-in-Charge. All camp area shall be properly electrified. All lines, streets, approaches for the camp etc., shall be sufficiently lighted for the safety of staff and labour of the contractor, at the cost of the Contractor and it will be subject to the approval of the Engineer-in-Charge.

3 Land:

3.1 Land for Contractor's use:

The contractor will be permitted to use Government land for execution of work. The contractor shall have to make his own arrangements for acquiring and clearing the site, levelling, providing drainage and other facilities for labour / staff colonies, site office, workshop, **quality laboratory** or stores and for related activities. The Contractor shall apply to the Department within a reasonable time after the award of the contract and at least 30 days in advance of its use, the details of land required by him for the work at site and the land required for his camp and should any private land which has not been acquired, be required by the contractor for his use. The contractor at his own cost may acquire the same by private negotiations and no claim shall be admissible to him on this account.

The Engineer-in-Charge reserves the right to refuse permission for use of any government land for which no claim or compensation shall be admissible to the contractor. The contractor shall, however, not be required to pay cost or any rent for the Government land given to him.

3.2 Surrender of Occupied Land:

a) The Government land as here in before mentioned shall be surrendered to the Engineer-in-Charge within seven days, after issue of completion certificate or **termination of the contract.** Also no land shall be held by the contractor longer than the Engineer-in-Charge shall deem necessary and the contractor shall on the receipt of due notice from the Engineer-in-Charge, vacate and surrender the land which the Engineer-in-Charge may certify as no longer required by the Contractor for the purpose of the work.

b) The contractor shall make good to the satisfaction of the Engineer-in-Charge any damage to areas, which he has to return or to other property or land handed over to him for purpose of this work. Temporary structures may be erected by the contractor for storage sheds, offices, residences etc., for non-commercial use, with the permission of the Executive Engineer on the land handed over to him at his own cost. At the completion of the work these structures shall be dismantled site cleared and handed over to the Executive Engineer. The land required for

providing amenities will be given free of cost from Government lands if available otherwise the contractor shall have to make his own arrangements.

3.3 Contractor not to dispose off Spoil etc.:

The contractor shall not dispose off or remove except for the purpose of fulfillment of this contract, sand, stone, clay ballast, earth, trees and shrubs or other materials obtained in the excavation made or lying on the site of the work, and all such materials and produce shall remain property of the Government. The Department may upon request from the contractor, or if so stipulated in the conditions of the contract allow the contractor to use any of the above materials for the works either free of cost or after payment as may be specifically mentioned or considered necessary during the execution of the work.

4 Roads:

4.1 In addition to existing public roads and roads Constructed by Government, if any, in work area all additional approach roads inside work area and camp required by the Contractor shall be constructed and maintained by him at his own cost. The layout design, construction and maintenance etc. of the roads shall be subject to the approval of the Engineer-in-Charge. The contractor shall permit the use of these roads by the Government free of charge.

4.2 It is possible that work at, or in the vicinity of the work site will be performed by the Government or by other contractors engaged in work for the Government during the contract period, the contractor shall without charge permit the government and such other contractor and other workmen to use the access facilities including roads and other facilities, constructed and acquired by the contractor for use in the performance of the works.

4.3 The contractor's heavy construction traffic or tracked equipment shall not traverse any public roads or bridges unless the contractor has made arrangement with the authority concerned. In case contractor's heavy construction traffic or tracked equipment is not allowed to traverse any public roads or bridges and the contractor is required to make some alternative arrangements, no claim on this account shall be entertained.

4.4 The contractor is cautioned to take necessary precautions in transportation of construction materials to avoid accidents.

5 Payment for Camp Construction:

5.1 No payment will be made to the contractor for construction, operation and maintenance of camp and other camp facilities and the entire cost of such work shall be deemed to have been included in the tendered rate for the various items of work in the schedule of quantities and bids.

6 Explosive And Fuel Storage Tanks:

6.1 No explosive shall be stored within ½ (half) KM of the limit of the camp sites. The storage of gasoline and other fuel oils or of Butane, Propane and other liquefied petroleum gases, shall confirm to the regulations of Telangana State Government and Government of India. The tanks, above ground and having capacity in excess of 2000 liters, shall not be located within the camp area, nor within 200m, of any building.

7. Labour:

7.1 The contractor shall, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

Labour importation and amenities to labour and contractor's staff shall be to the contractor's account. His quoted percentage shall include the expenditure towards importation of labour amenities to labour and staff;

The contractor shall, deliver in writing to the Engineer-in-Charge in such form and at such intervals as the Engineer-in-Charge may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the contractor on the Site and such information regarding Contractor's Equipment as the Engineer-in-Charge may require.

8. Transportation of Labour:

8.1 The contractor shall make his own arrangement for the daily transportation of the labour and staff from labour camps colonies to the work spot and no labour or staff of the contractor shall stay at the work spot. No extra payment will be made to the contractor for the above

transportation of the labour and his quoted percentage to the work shall include the transportation charges of labour from colonies to work spot and back.

8.2 The contractor will at all times duly observe the provisions of employment of children Act XXVI of 1938 and any enactment or modification of the same and will not employ or permit any person to do any work for the purpose under the provisions of this agreement in contravention of said Act. The contractor here by agrees to indemnify the department from and against all claims, penalties which may be suffered by the department or any person employed by the department by any default on the part of the contractor in the observance and performance of the provisions of the employment of children Act. XXVI of 1938 or any enactment or modification of the same.

8.3 As per Govt. memo No.721/Gr. (1)/81-35, Dt: 17.11.87. The contractor shall obtain the insurance at his own cost to cover the risk on the works to labour engaged by him during period of execution against fire and other usual risks and produce the same to the Executive Engineer concerned before commencement of work.

9 Safety Measures:

(1) The contractor shall take necessary precautions for safety of the workers and preserving their health while working in such jobs, which require special protection and precautions. The following are some of the measures listed but they are not exhaustive and contractor shall add to and augment these precautions on his own initiative where ever necessary and shall comply with directions issued by the Executive Engineer or on his behalf from time to time and at all times.

(2) Providing protective foot wear to workers in situations like mixing and placing of mortar or concrete, sand in quarries and places where the work is done under such wet conditions.

(3) Providing protective head wear to workers in at places like underground excavations to protect them against rock falls.

(4) Providing masks to workers at granulates or at other locations where too much fine dust is floating about and sprinkling water at frequent intervals by water hoses on all stone crushing area and storage bins abate to dust.

(5) Getting the workers in such jobs periodically examined for chest trouble due to too much breathing in-to fine dust.

(6) Taking such normal precautions like fencing and lightening in excavation of trenches, not allowing rolls and metal parts of useless timber spread around, making danger areas for blasting, providing whistles etc.

(7) Supply to work men with proper belts, ropes etc., when working in precarious slopes etc.

(8) Avoiding naked electrical wire etc., as they would electrocute the works.\

(9) Taking necessary steps towards training the workers concerned on the machinery before they are allowed to handle them independently and taking all necessary precautions in and around the areas where machines hoists and similar units are working.

10. Fair Wage Clause:

1. The contractor shall pay not less than fair wages to labourers engaged by him on the work.

2. "Fair" wages means wages, for time of piecework notified by the Government from time to time in the area in which the work is situated.

3. The contractor shall, not with-standing the revisions of any contract to the contrary cause to be paid to the labour, in directly engaged on the work including any labour engaged by the sub-contractor in connection with the said work, as if the labourers had been directly employed by him.

4. In respect of labour directly or indirectly employed in the works for the purpose of the contract or part of the agreement, the contractor shall comply with the rules and regulations on the maintenance of suitable records prescribed for this purpose from time to time by the Government. He shall maintain his accounts and vouchers on the payment of wages to the labourers to the satisfaction of the Executive Engineer.

5. The Executive Engineer shall have the right to call for such record as required to satisfy himself on the payment of fair wages to the labourers and shall have the right to deduct from the contract amount a suitable amount for making good the loss suffered by the worker or workers by reason of the "fair wages" clause to the workers.

6. The contractor shall be primarily liable for all payments to be made and for the observance of the regulations framed by the Government from time to time without prejudice to his right to claim indemnity from his sub-contractors.

7. As per contract labour (Regulation and Abolition) Act. 1970 the contractor has to produce the license obtained from the licensing officers of the labour department along with the tender or at the time of agreement.

8. Any violation of the conditions above shall be deemed to be a breach of his contract.

9. Equal wages are to be paid for both men and women if the nature of work is same and similar.

10. The contractor shall arrange for the recruitment of skilled and unskilled labour local and imported to the extent necessary to complete the work within the agreed period as directed by the Executive Engineer in writing.

11 Indemnity Bond:

Name of work: Construction of Protection Wall along Manair River both sides on both Flanks between downstream of LMD and Check Dam No. II of Karimnagar Rural (M), Karimnagar District

I_____Contractor S/o._____ aged _____ Resident of _____ do hereby bind myself to pay all the claims may come (a) under Workmen Compensation Act. 1933 with any statutory modification thereof and rules there under or otherwise for or in respect of any damage or compensation payable in connection with any accident or injury sustained (b) under Minimum wages Act 1948 (c) under payment of wages Act.1936 (d) under the Contract labour (Regulation and Abolition) Act. 1970 by workmen engaged for the performance of the business relating to the above contract i.e., failing such payment of claims of workmen engaged in the above work, I abide in accepting for the recovery of such claims, affected from any of my assets with the departments.

12 Compliance With Labour Regulations:

During continuance of the contract, the contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notifications that may be issued under any labour law in future either by the State or the Central Government or the local authority and also applicable labour regulations, health and sanitary arrangements for workmen, insurance and other benefits. Salient features of some of the major labour laws that are applicable to construction industry are given below. The contractor shall keep the Department indemnified in case any action is taken against Department by the competent authority on account of contravention of any of the provisions of any Act or rules made hereunder, regulations or notifications including amendments. If the Department is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provision stipulated in the notifications/bye laws/Acts/Rules/regulations

including amendments, if any, on the part of the contractor, the Engineer-in-charge /Department shall have the right to deduct any money due to the contractor including his amount of performance security. The Department/Engineer-in-Charge shall also have right to recover from the contractor any sum required or estimated to be required for making good the loss or damage suffered by the Department.

The employees of the Contractor and the Sub-contractor in no case shall be treated as of the Department at any point of time.

13 Salient features of some major labour laws applicable to establishments engaged in buildings and other construction works:

(a)Workmen compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

(b)Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if any employee has completed 5 years service or more, or on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments, employing 10 or more employees.

TECHNICAL SPECIFICATIONS

1.1.**GENERAL SPECIFICATIONS**

1.1.1 A) These technical specifications, shall apply to all works as are required to be executed under the contract or otherwise directed by the engineer. In every case the work shall be carried out to the satisfaction of the engineer concerned and conform to the location, lines, grades and cross-sections shown on the drawings or as indicated by the engineer concerned. The quality of work and materials, shall comply with the requirements set-forth in this and succeeding sections. Where the drawings: and specifications describe a portion of the work in only general terms, and not in complete detail, it shall be understood that only the best general practice is to prevail, materials and workmanship off the best quality are to be employed and instructions of the engineer concerned are to be fully complied with.

B) The contractor shall carryout the works in accordance with the specifications laid down in this section together with the detailed specifications stipulated under succeeding sections, Andhra Pradesh standard specification, relevant codes with all amendments published up to the date of tendering and the departmental manual for quality control.

1.1.2 REFERENCE MARKS AND BENCH MARKS:

a) The basic centerlines, reference points and benchmarks will be fixed by the department.

b) The contractor shall establish at his own cost, at suitable points, additional reference lines and bench marks as may be necessary. The contractor shall remain responsible for the sufficiency and accuracy of all his bench marks and reference lines.. He shall take precautions to see that the lines, points and bench marks fixed by the department are not disturbed by his work and shall make good to any such damage.

1.1.3 SETTING OUT WORKS:

a) The Contractor shall be responsible for the correct setting out of all works at his cost. The Contractor shall execute the work true to alignment grade and levels as shown in the drawings and as directed by the Engineer in charge and shall check these at frequent intervals. The contractor shall provide all facilities like labour and instruments, and shall cooperate with the departmental officers to check all alignments, Grades, levels and dimensions. Such checking shall not absolve the Contractor of his own responsibility of maintaining the accuracy of the work.

2. CLEARING OF SITE

2.1.1 GENERAL

The data, pertaining to the work furnished in the relevant report and drawings, are for information of tenders. The Govt. of Andhra Pradesh does not guarantee the reliability or accuracy of any of the data and shall assume no responsibilities for any deductions, conclusions or interpretations that may be made from them. The contractor shall undertake at his expenses such studies as are necessary to assess the reliability and accuracy of the information presented in the data.

2.1.2 CLEARING AND GRUBBING:

a) The portion of the right-of-way, where required for earth work under these specifications, shall be cleared of all trees, bushes, rubbish and other objectionable matter. Trees designated by the Engineer-in-charge shall not be cut and shall be protected from injury; such cleared material shall be disposed off as provided in paragraph-2.1.4 below or removed from the site of work before the date of completion of the contract as approved by Engineer-in-charge. The useful materials should be stacked and handed over to the Department. The clearing operation shall be in accordance with Clause 4.1, 4.1.1, 4.2 and 4.3 of I.S.4701-1982 Indian Code of Practice for earth work. Surface boulders either loose or partly embedded in the ground will have to be removed and stacked as directed. –All holes and hollows whether originally existing or produced by digging up roots shall be filled with suitable earth, well rammed and leveled off. Thus trees more than 30 ems. girth, will be paid for separately at the rates specified in the Schedule-'A'. The logs/stumps cleared shall be neatly stacked and handed over to the representative of Engineer-in-charge as directed at the places indicated. The pits formed up roots which shall be filled with suitable earth and compacted and leveled at the cost of contractor.

2.1.3. GRUBBING

a) The ground surface under all the embankments and the surface of all excavation is to be used for embankments as shown in the drawings or as directed by the Engineer-in-charge shall be cleared of all stumps, roots and vegetable matter of every kind the sumps shall be pulled or otherwise and tools shall be grubbed.

2.1.4 DISPOSAL OF CLEARED AND GRUBBED MATERIAL:

A) The disposal of cleared and grubbed material shall be in accordance with clause 4.1.1 of I.S.4701 code of practice for earth work in canals. All waste material to be burnt shall be piled neatly and when in suitable condition shall be burnt completely as ashes. Piling of waste material for burning shall be done at such a location and in such a manner as would not cause any fire risk. Necessary precautions shall be taken to prevent spreading of fire to areas beyond the limits of cleared areas. Suitable materials and equipment for prevention and suppression of fire shall be kept available at all time.

2.1.5 PAYMENT:

Separate payment will not be made for clearing of trees below 30 cm. girth and grubbing including filling of holes and hollows and disposal of the cleared and grubbed material require under the above paras. The contractor shall include the cost thereof in the Schedule 'A' of the contract for the relevant finished item of work for which clearing and grubbing as mentioned in the above para are required. No payment towards removal of small stones and the boulders of size less than 0.03 cubic meters will be made, and the rate quoted for excavation should be inclusive of this item. However surface boulders of size greater than 0.03 cubic meters but less than 3 cubic meters, either loose or partly embedded in the ground, when removed payment will be made for actual quantity. Surface boulders shall be premeasured, after removal, the quantity based on stack measurement duly deducting 40% or more towards voids as considered by the Engineer-in-charge will be compared and minimum of the above measured quantity will be paid at the rates quoted in schedule 'A' for the relevant classification.

3. EXCAVATION FOR CANAL AND STRUCTURES AND OTHER WORKS

3.1.1 The list of I.S.codes and other publications applicable to this section is given below:
The abbreviations, A.P.S.S., I.S., I.R.C., B.S., ASTM shall be considered to have the following meanings.
A.P.S.S.: Andhra Pradesh Standard Specification

I.S. : Indian Standard or the Bureau of Indian Standards.

Sl.No.	I..S.Number	Short Title
01.	IS:4701-1982	Code of practice for Earth work on canal
02.	IS:7293-1974	Safety code for working with construction machinery
03.	IS:3764-1966	Safety code for excavation work
04.	IS:1498-1970	Classification and identification of soils for general Engineering purpose.
05.	IS:2720 (part..2)-1973	Method of test for soils part-2, Determination of water content.
06.	IS 2720 (part.7)-1980	Method of test for soils Determination of water content dry density relation using light Compaction
07	IS:2720 (part.28)-1974	Method of test for soils Determination of Dry Density of soils in place by sand replacement method.
08.	IS 2720 (part.29)-1976	Method of test for soils, determination of dry density of soils in place by core cutter method
09.	IS 1888-1982	Method of load test on soils
10.	IS 213 1-1981	Methods of standard penetration test for soils.
11.	IS 4332-1967	Method of test for stabilized soils Methods of

	(part 1)	sampling and preparation of stabilized soils for testing
12.	IS 2720-1983 (part.4)	Method of test for soils-Grain size Analysis.
13.	IS 2720-1985	Method of test for soils for determination of liquid and plastic limits
14.	IS 2720-1971 (Part.9)	Determination of dry Density moisture content relation by constant weight of soil Method.
15.	IS 2720-1991 (Part.10)	Determination of unconfined compressive Strength.
16.	IS 2720-1986 (Part.13)	Method of test for soils direct shear test..
17.	IS 2720-1986 Part-15)	Method of test for soils determination of consolidation properties.
18.	IS 2720-1983 (Part-14)	Method of test for soils. For determination of Density Index, (relative density) of cohesion less soils.
19.	IS 2720-1987 (Part. 16)	Method of test for soils Laboratory determination of C.B.R
20.	IS 2720-1964 (Part.18)	Method of test for soils Determination of field moisture equivalent.
21.	IS 2720-1977 (Part.40)	Method of test for soils Determination of flee swell index of soils.
22.	IS 2720-1977 (Part-41)	Method of test for soils of determination of swelling pressure of soils.
23.	IS 8237-1985	Code of practice for protection of slopes for reservoir embankment.
24.	IS 8414-1977	Guidelines for design of under seepage control measures for earth and Rock fill dams.

In addition to the above I.S.codes, revisions and , latest amendments of the codes ,the specifications of A.P.S.S and manual for Quality Control and Inspection. shall also be compiled with

3.1.2 GENERAL

a) The work to be done under these specifications shall consist of furnishing all tools, constructional plant, labor, materials and other things required for excavation in all stratas, conveyance and disposal of the excavated materials, leads and lifts, temporary work for performance of all the operations connected with the work embraced under the contract as will secure a satisfactory quality of work.

b) Construction and maintenance of diversions in case diversion of existing communication lines, channels, vague or drains where they were disturbed due to excavation of canal and for construction of structures..

3.1.3 SCOPE:

Excavation of canal/channel/approach channel/drain/cut off trench/key trench/toe wall/toe drain/foundation for structures/Cut off wall/Chute drains etc. in all soils/H.D.R.I and II/F.&F, rock/Nandyal Shales/H.R. in both wet and dry conditions and disposal of spoil not useful for construction on spoil bank and soils not required for construction on stock piles and stacking of useful stone, disposal of not useful stone, conveyance of excavated spoil/soils including swell, conveyance of excavated rock including voids, with all leads, lifts and delifts and formation and formation spoil bank/stock piles, including dewatering, diversion of streams formation and removal of ramps, diversion roads/approach roads, shoring/strutting, etc., as per drawings and as directed by the Engineer-in-charge to complete the finished item of work.

3.1.4 PLANNING:

a) Prior to the commencement of work, all relevant data shall be collected by the Contractor and drawing prepared by him showing the location of the excavation, spoil, deposition and filling. On these drawings, full cutting reaches, partial cutting and partial embankment reaches and full embankment reaches should be distinctly indicated. The quantity of material to be infill shall be noted clearly in these reaches. Where the material to be excavated consists of different types and if the various types have to be used separately in the fill or dumped to spoil bank, the quantities of each class of material in each area should be shown on drawings..

b) The contractor shall present his planning of the work along with required details to the Executive Engineer at least 15 days before starting the work.

3.1.5.

a) Setting out works:- Specification 1.1.3 shall apply.

b) Bench mark:- Specification 1.1.2 shall apply.

c) Prior to starting any work, the contractor shall erect additional permanent benchmarks, reference lines, reference points and check profiles at convenient locations approved by the Executive Engineer. The Bench Mark stones shall be of 600mm x 200mm, size with 450mm.. embeded under firm ground in concrete and 150 mm. projecting above ground. The Word 'B.M.' showing value of R.L. shall be conspicuously carved and painted.

d) The check profiles shall be located at 25m apart or closer as directed by the Engineer-in-charge so as to ensure execution of all slopes, steps and elevations, to the profile or profiles indicated on the approved drawings. All the important levels and all control points with respect to Bench Marks and reference lines shall be fixed and correlated by the Engineer-in-charge.

e) The contractor shall take all precautions to see that the lines, points and Bench Marks fixed by the Department are not disturbed by his work and shall make good of any such damage.

f) All materials and labour for setting out works including construction of Bench Marks, reference lines, check profiles and surveys, as may be required at various stages of construction shall be supplied by the Contractor at his cost. The cost of such work shall be deemed to have been included in the cost of the relevant item of excavation in the Schedule-'A'.

g) The alignment of the canal is only tentative. Even if the alignment is changed the rates quoted by the contractor will hold good.

3.1.6 CLEARING THE SITE:

The provisions of specifications 2.0 shall apply.

3.1.7.Preparation of surface under embankment:

a) General:

The preparation of surfaces to the full width of proposed canal cutting including the bed, berms and under canal banks and tank bund and borrow area shall be in accordance with clause 6.5 IS:4701-1982. Before commencing the work, the toe of the slope on each side of the banks plus 450 to 600mm on each side for trimming of loose soils from the edge after compaction shall be lock-spitted (Dog-bellied) and marked by pegs, firmly driven into the ground at intervals of 25m. or closer. Profiles made by bamboos, earth or Other convenient materials and strings shall be set up for the guidance of the workmen at about 50meters apart over straight reaches and about 25 meters apart at curves. In setting up the profile for an embankment a suitable allowance shall be made for settlement.

b) Before beginning the excavation and or construction of embankments, the surface area of ground to be occupied and also the area of canal cutting from which useful materials for construction of embankments are to be used shall be cleared as per the provisions of specification 2.0

3.1.8. STRIPPING:

If separate schedule-'A' item for stripping is not provided the minimum stripping depths are as follows:

TABLE.1 DEPTH OF STRIPPING

Sl.No.	Type of Vegetative Cover on the Soil	Depth of Stripping
1)	Soil Containing Light Grass Cover	5.0 to 7.5 centimetres
2)	Agricultural Land	To the bottom of Ploughed zone usually 15.0 to 22.5 Centimetres

a) The stripping shall be done in advance.

b) No separate payment will be made to the contractor for complying the requirements of this paragraph and all costs shall be deemed to have been included in the rates quoted in schedule – A for the items of formation of embankment, unless otherwise specified.

c) Where the ground surface under any embankments is not suitable as determined by the Engineer in charge for foundation of the embankment such as sand mixed BC soils, the contractor shall strip the area under the embankment of such unsuitable material to such depths as may be directed by the Engineer in charge. Measurement for payment for this extra depth of stripping of unsuitable material under embankments will be made only to the lines and to such depths as may be directed by the Engineer in charge and payment will be made at the unit rate of relevant item in Schedule-"A" for excavation.

d) Where the ground surface is below the bed level of the canal this area shall also be stripped.

e) All the stripped material shall be deposited beyond the catch drain at the rear toe of embankment.

3.1.9 SCARIFICATION:

a) The stripped surface under all canal embankments (excepting rock surfaces) shall be loosened or scarified by means of a plough or ripper or any other method. The furrows shall be not less than 20 centimeters deep below the stripped ground surface at intervals not more than 1 meter.

b) Where the ground surface is below the bed level of the canal, the entire surface of the foundations for bed filling shall also be scarified as above.

c) No payments shall be made for scarifying. The cost of scarifying the foundation surface under canal embankment and other embankments shall be deemed to have been included in the unit rate of relevant item in Schedule-"A" for item of formation of embankment.

3.1.10 RECORDING OF CROSS SECTIONS:

a) After clearing the are required for canal excavation and construction of embankments, in accordance with the provisions of specifications 2.1, cross sections shall be taken at every 25 M. interval or closer, depending on the nature of ground, normal to axis of canal upto sufficient distance outside the limits of the work. Levels on cross sections shall be at 3M intervals or closer intervals as directed by the Engineer-in-charge and entered in level field books by the Engineer-in-charge in the presence of the contractor or his authorized representative and these shall be binding on the contractor. The contractor shall write a certificate : Accepted the preleveels recorded on pages from _____to_____" and sign at the end of levels in the level field book in token of acceptance.

b) After stripping and prior to commencement of excavation cross sectional levels of the stripped surface shall be taken at the same locations and intervals as specified in para(a) above and certificated as mentioned shall be recorded by the contractor.

At the earliest, cross sectional profiles shall be prepared duly plotting the prelevels and contractor's signature shall be obtained on these cross-section sheets. The cross sections called initial cross section taken after striping shall form the basis of all future measurements and payments. These initial cross sections duly signed by the contractor and Exe. Engineer shall be preserved. All linear dimensions shall be measured in meters to the nearest 0.01 meter, volumes worked out in cubic meters corrected to 0.01 cubic meter. However, in case of rock excavation occurring in bed or sides, the actual quantity of rock

shall be arrived by taking block levels at 2.5M, intervals all along the entire area of bed and sides.

c) Initial stripping level will be taken by Asst.Engineer/Asst.Executive Engineer and check levels by the officer not lower than the rank of Dy.Exe.Engineer before starting the work and signature of the contractor will be taken in token of acceptance of the levels.

d) No separate payment will be made to the contractor for the materials and labor provided for taking the cross-sectional levels.

3.1.11 AUTHORITY FOR CLASSIFICATION:

a) The classification shall be done by the construction Executive Engineer and Executive Engineer/Quality Control & Inspection. If the variation in classification is 10% and above, the classification shall be done by the concerned Superintending Engineer, Quality Control & Inspection.

b) The final classification shall be decided by the Superintending Engineer and his decision shall be final and binding on the contractor. The Soil Classification shall be based on the open classification.

c) Merely the use of explosives in excavation will not be considered as a reason for a higher classification unless blasting is clearly necessary in the opinion of the Executive Engineer. Contractor shall assume all responsibility for deductions and conclusions. as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavations.

Note: The department will have the right to reclassify the soils and rock even after excavation and payment based on the inspection of excavated materials and the existing slopes of the canal

d) It is the responsibility of the contractor to perform and maintain the excavation to the pay lines described in these specifications or as shown on the drawings.

3.1.12 CLASSIFICATION OF EXCAVATED MATERIAL:

All materials involved in excavation shall be classified by the Executive Engineer into the following groups.

a) All Soils:

This shall comprise ordinary soils such as sand and loose soils, wet sand not under water, silt in canals, channels and drains. Loamy and clayey soils like back cotton soils, red earth and ordinary gravel. Slushy soils, clayey soils in wet and slushy condition. Hard gravely soils, mixture of gravel, and soft disintegrated rock like shells ordinary gravel., stony earth and earth mixed with fair size boulders. soft disintegrated rocks(removable by pick axes and crow bars) and stone matrix in any direction and mixture of these and similar materials in both dry wet conditions.

b) Hard Disintegrated Rock – I & II:

This shall comprise hard disintegrated rock and conglomerate rock etc. removable by pick axes, and crow bars and Hard disintegrated rock or soft rock or conglomerate rock, hard lime kankar requiring partial blasting.

c) Fissured and Fractured rock: Fissured and fractured rock and boulders upto 3 cubic meters in size requiring blasting.

d) Hard Rock: Hard rock and boulders of size greater than 3 cubic meters in size requiring blasting.

3.1.13 EXCAVATION:

a) Where sub-soil water is expected the excavation shall be started preferably from the nearest valley.

b) The contractor shall commence excavation immediately after the surface area of ground is prepared.

c) The cross sections are shown on the drawings. The Government reserves the right, during the progress of work to vary the slope of excavation or the slope of embankment and the

dimensions depended thereon. Any increase or decrease of quantities excavated as a result of such variations will be included for payment.

d) Suitable arrangements for drainage shall be provided to take surface water clear of excavation during the progress of work. Sump pits if found necessary shall be excavated at suitable places and the water thus collected shall be bailout or let into a nearby valley at his cost. When cutting on cross slopping ground, the contractor shall cut a catch water drain on the higher side to prevent water from flowing down the cutting slope. No separate payment shall be made for this work unless otherwise specified.

e) No distinction shall be made as to whether the material being excavated is wet or dry or in water.

f) All washable materials and any soil which generally becomes unstable on saturation such as organic soil, loose soils and expansive soils shall be removed as directed by the Engineer-in-charge. Payment will be made for this work as per the relevant rate in Schedule-A..

g) All suitable excavated material within economic lead shall be used for construction of embankments.

h) Stones of more than 75mm in size and indurated material shall be removed from material to be used for compacted embankments.

i) In soils the Contractor shall not excavate out side the slopes or below the established grades or loosen any material outside the limits of excavation. Any excess depth excavated below the specified levels shall be made good at the cost of the contractor to standards as prescribed by the Engineer-in-charge.

j) The method of drilling and blasting to be resorted to the excavation in rock shall be in accordance with specification 3.3 "Drilling and Blasting" and got approved by the Executive Engineer.

k) Above the lining, in case of lined canals and above the proposed water level in case of unlined canals. the rock may be allowed to stand at its safe angle and no finishing is required other than removal of rock masses which are loose and are liable to fall.

l) Except in areas of rock, all areas to be excavated shall be pre-wetted so that at the time of excavation moisture content, will be at about optimum. However, in case of the spoils to be deposited on spoil banks such pre-wetting need not be done.

m) During rock excavation, the contractor will not be allowed to dispose of the rubble. Surplus usable rubble shall be allowed to be used in construction of rocktoe. Masonry works and for crushing to use as metal in concrete works etc. subject to approval of the Executive Engineer. The cost thereof will be recovered from the contractor's bills.

n) The regradation for tail channel and approach channel for structures and diversion of drains or vagus shall conform to the lines, dimensions, grades, side slopes, and levels and shown on drawings or directed by the Engineer-in-charge. Payment shall be made for this work at the relevant rate of Schedule- "A" for excavation.

o) Where suitable material in excess of that required to construct adjacent embankments or in deficit sections by conveyance or back filling of structures or to construct O. & M. Road, Ramps and Bridge approach embankments as determined by the Engineer-in-charge in one continuous operation, then such material shall be stockpiled at places designated by the Executive Engineer for later use.

p) All gangways, roads and stopping shall be such that they fall within the cross sections so that the final dressing of slope will consist of digging and no rolling will be required.

q) During rock excavations, over-hangs or unsafe slopes shall not be permitted.

r) Unless otherwise specified, over excavation in rocks/soils shall not be permitted.

s) Blasting in a manner as to produce over-breakage which in the opinion of Executive Engineer is excessive shall not be permitted. Special care shall be taken to prevent over breakages or loosening of material on bottom and side slopes against which lining is to be placed.

t) Final cutting for 300mm.. in rock shall be carried out by controlled blasting or trimming or by chiseling wedging, barring with the help of pneumatic paving breakers and no extra payment will be made. The cost of such work shall be deemed to have been included in rates of relevant item Schedule – "A"

u) In the case of fissured rock and hard rock premeasurements shall be taken by the Dept. The contractor shall before commencing the excavation in rock etc., expose the surface for inspection by the Executive Engineer or his authorized subordinates. The premeasurements will be taken by taking levels' at 2.5M, intervals both way which forms the basis for payment of excavation for rocks. Where the rock is intermingled with ordinary soils contained premeasurements of soils shall be taken and measurement of soils shall be obtained after deducting from the contained measurements, the quantity of boulders etc, which will have to be stacked as per A.P.S.S.

v) In the case of boulders they should be marked by tar-premeasurements recorded. After removal and stacked as directed by the Executive Engineer or his subordinates, the contractor will be paid for the quantity of boulders as per the pre measurements or as per their stack measurements whichever is less. Wherever stack measurement are taken a minimum of 40% shall be deducted for voids. After the work is completed a certificate shall be given in the measurements book regarding the clearance of those soils. Stack measurements will be resorted to by making due allowance of voids if it is necessary to deduce any other information. For example, fissured and fractured rock and hard rock and H.D.R. occur very badly intermingled in certain places and cannot be premeasured or finally measured or separately. In such cases any combined measurements shall be taken as mentioned above and measurements of Hard Disintegrated rock shall be deduced from stacks of hard rock that have been formed. The spoil of the boulders so removed shall be stacked or deposited separately as directed and in place as shown by the Executive Engineer or his Subordinates and shall not be mixed with other soils. No separate charges for stacking done for the purpose explained above shall be paid to contractor.

w) In case of reservoir/tank works, the useful materials excavated in the cut of trenches, key trenches approach channels from the sluices, over burden removal on the U/S and D/S sides of surplus weir, and foundations excavation for sluices and surplus weir, excavated under the provisions of schedule 'A' shall be used for construction purposes. Any materials unsuitable for construction purposes shall be disposed of as directed by the Engineer-in-charges.

3.1.14 .EXCAVATION FOR KEY TRENCHES AND CUT OFF-TRENCHES:

a) Immediately after preparation of the ground surface for embankment and prior to commencement of canal excavation the contractor shall excavate key and cutoff trenches to dimensions, slopes, grades and levels as shown on the drawings or as directed by the Engineer-in-charge.

b) All materials suitable for embankment construction as determined by the Engineer-in-charge based on laboratory test result shall be used in construction of the embankments. Any material unsuitable for embankments shall be disposed off as directed by the Engineer-in-charge on the spoil bank on the rear side of catch drain/toe drain.

3.1.15.SLIDES/SLIPS:

a) If slides occur in cutting during the process of excavation they shall be removed by the contractor at his cost as directed by the Engineer-in-charge.

b) If finished slope slide into the canal subsequently such slips in rock shall be removed measured and paid, provided such slips are not due to the negligence on the part of contractor. The nature and quantity of such slips shall be determined by a joint inspection by the Executive Engineer, Inspection & Quality Control and Executive Engineer (Construction). The decision taken by them is binding on the contractor.

c) The classification of debris material shall confirm to its conditions at the time of removal and payment made accordingly regardless of its conditions earlier, if slide/slip is due to the causes beyond the control of the contractor.

3.1.16 OVER EXCAVATION:

In soils any excess depth below the specified levels and any excess excavation in slopes and widths shall be made good at the cost of the contractor with suitable soils of similar characteristics and compacted and to a density not less than 95% of proctor's density.

3.1.17 For excavation in rock, tolerance of 45mm beyond the designed canal profile will however be permitted. No extra payment will be made for the excavation beyond the designed canalprofile. The over breakage within the tolerance limit of 75mm shall be refilled with

i) Sand and metal in 1:2 ratio using 40mm. and 20mm size metal obtained from canal spoil in 4.1 ratio in bed.
ii) M7.5 mix using 40mm. MSA. H.B.Metal graded or approved quality obtainable from canal spoil for side lining.

Payment for filling such over breakages shall be at the unit rate quoted in Schedule "A"

a) Should any excavation occur beyond the tolerance limit, the excess quantity so removed beyond tolerance limit, will not be paid on the other hand the contractor is liable for penal recovery twice the agreement rate for similar item for the excess quantity excavated. The same shall also be refilled at contractor's own expenses, with

i) Sand and metal in (1:2) ratio using 40mm. and 20mm. size metal in (4:1) ratio in bed.
ii) R.R. Masonry in C.M. (1:6) in sides.

b) However, over-breakages occurring due to natural causes and slips in rock which are not due to the negligence of the contractor will be measured for payment.. The nature and quantity of such over breakages will be determined by joint inspection by a Geologist and the Superintending Engineer. The decision taken by them is binding on the contractor. Refilling of the same shall be done as indicated at (i) and (ii) under (a) above and such will be paid at the applicable unit rate in the item of Schedule-A for refilling of over breakages. The tenderer while quoting for excavation shall keep the above conditions in view..

c) In the canal section where expansive type of soil such as C.H.type of soil is encountered and over which cement concrete lining directly be laid, the canal prism shall be over excavated to the extents as directed by the Engineer-in-charge and such over excavated section shall be filled with suitable cohesive non-swelling (CNS) type soil and shall be placed in uniform horizontal layers and compacted as directed by the Engineer-in-charge.

The over excavation made in such strata filling by suitable soil locating and compacting of such soil will be paid separately.

3.1.18 DEWATERING:

If Water is met in the excavation due to sub-soil ground water, springs, seepage, rain or other causes, it shall be removed by suitable diversions, pumping or bailing out and the sub-soil water table shall be kept below the excavation so that the excavation kept dry whenever so required as directed by the Engineer-in-Charge care shall be taken to discharge the drained water as not to cause damage to the works, crops or any other properly. In case of lined canals, the sub soils water shall not be allowed to accumulate in the bottom of the canal. The bed/sides shall be moistured to receive lining as directed by the Engineer-in-charge. No separate payment will be made for dewatering. The cost of such work, shall be deemed to have been included in rate of respective item of Schedule –"A".

3.1.19 DISPOSAL OF EXCAVATED MATERIAL:

a) No rehandling of excavated material due to injudicious selection of place for dumping will be paid for.

b) Material removed in excavation including stripped top soil and expansive soils not required for embankments, back fill or other required earth work shall be deposited in waste banks on right of way owned by or controlled by the department as directed, by the Engineer-in-charge. A gap of 3M vide shall be left in spoil banks at 150M, intervals or as directed by the Engineer-in-charge for disposal of drainage in accordance with Clause 8.20 of IS:4701-1982.

c) Minimum gap of 1 meter or ½ the depth of excavation as per drawing (whichever is more) from the edge of the excavation at G.L. in cutting reaches and 1 m gap from the outer toe of the embankment to the inner toe of the spoil bank or a greater distance as prescribed by the Engineer-in-charge shall be maintained.

d) In case of Reservoir/Tank works, if the excavated material in stripping under embankment, foundations for sluices, surplus weir, toe wall, toe drain, cutoff trench, over burden

removal on the U/S and D/S sides of surplus weir. surplus course excavation, approach channels to the sluices, excavated under the provisions of schedule 'A' and not suitable for construction of embankment, shall be deposited beyond the toe drain of embankment of reservoir/tanks, leaving a gap of 1.0 meter or ½ the depth of toe drain or more and on either sides of the surplus coarse on the rear side of the guide banks formed, leaving a gap of 1.0m or ½ the depth of surplus coarse, or more, as per the drawings and as directed by the Engineer-in-charge. No excavated or foreign materials shall be left in the foreshore area of the Reservoir/Tank.

e) Where the canal is aligned on sloping ground, excavated material not required for construction of adjacent embankments at any other place, shall be deposited on the lower side. Where canal is on level or nearly level ground, the material from excavation shall be deposited on embankments on both sides of the canal.

f) In case of deep cutting the spoil shall be so disposed off as not to result in un sighty heaps and shall be leveled and properly dressed. The top of both the finished banks shall slope away from the inner edge with a suitable gradient.

g) If their is excess of useful material from the excavation than needed for construction of embankments of canal/reservoir/tank, it shall be used to strengthen the embankments on either side of the canal/reservoir/tank, deposited in low areas uphill of the canal to eliminate trapped drainage, or it should be deposited in stock piles as directed by the Engineer-in-charge. The disposal of excavated material shall be in accordance with clauses 8.1 of I.S.4701-1982.

h) The useful rock obtained from the cutting shall not be mixed with other soils and shall be closely stacked to the gauge separately beyond spoil bank and all other stone not useful for construction purpose shall be deposited on the slopes of the canal spoil bank, if the rock and soil are mixed up while depositing at the spoil banks, suitable deduction from the agreement rate as decided by the Engineer-in-charge will be made which is binding on the contractor.

i) Except as specially provided in these specifications for payment for conveying or placing of individual items of excavated materials, the cost of all work described in this paragraph shall be included in the unit rate per on cubic meter in respect of both soils and rock in the Schedule-"A"

j) The contractor has no claim over any of materials got out of excavation of the canal cutting and foundation excavation.

k) The responsibility for arranging the land required for disposal of excavated material rest with contractor. If the contractor desires to dispose the materials at near by places other than the places shown by the Engineer-in-charge, to reduce the lead and thereby the cost of conveyance.

3.1.20.LEADS:

a) The leads and lifts for the soils excavated either in canal or in foundations of embankments and structures and deposited on spoil bank or on stock piles will be measured as under.

i)Upto 100 meters lead and 9meters depth.

ii)Upto 100meters lead and 9 meters depth of canal excavation the payment for over all shall be on head load and head lifts for all soils, upto soft disintegrated rock, hard disintegrated rock and hard rock including F & F rock..

3.1.21 HEAD LEADS AND LIFTS:

a) i)The head leads and lifts will be measured in accordance with the clause 301.5.1.1 of A.P.S.S.

ii)Above 100M. lead and depth of excavation exceeding 9M, the lead will be measured along the shortest route from the center of excavation to the center of deposition.

b) The leads and lifts will not be measured for the soils utilized for formation of embankment obtained from canal excavation or from foundation excavation or from cutoff excavation or from surplus course excavation or from any soils excavated under the provisions of schedule 'A' items or from borrowed soils.

Note:- If no separate item is provided in schedule .A for lead's lifts delifts and for conveyance the respective schedule 'A' item for excavation should include the cost of leads, lifts, delifts and for conveyance for disposal of spoil/soil/rock or any other excavated material for disposal as per clause 3.1.19 above.

3.1.22 PAY LINE:

a) The canal shall be excavated to the lines, dimensions side slopes and levels shown on the drawings. Pay line for excavation in all soils and rocks including subsequent removal of the extra depth for seating to lining shall be to the dimensions, slopes and grades and levels as shown on the drawings unless otherwise specified.

b) Payment for excavation done shall be strictly as per design section or for the section as directed by Engineer-in-charge. No payment will be made for excavation done beyond the pay lines shown on drawings and defined as above unless otherwise specifically indicated.

3.1.23 MEASUREMENT AND PAYMENT:

Measurement: a)All original works shall be measured by levels.

b) Where payments are to be-made with reference to the levels the level Field Books, the cross-section sheets and the calculations sheets shall be treated as adjuncts to the measurement books.

c) All linear measurements shall be in meters: correct to 0.01 meter: and volume worked out in cubic meters correct to 0.01 cubic meter.

d) Unless otherwise specified in these specifications excavation for cut off trenches, canal, drains etc. shall be measured in excavation to the lines, slopes, grades and as shown on the drawings or as provided in these specifications or as prescribed by the Engineer-in-charge.

e) It shall be clearly understood that no excavation beyond pay line shall be measured for payment.

f) On the initial cross-sectional plans which forms the basis for all payments, lines, grades, side slopes, and levels of excavation according to classification and construction embankments shall be marked duly taking levels. On completion of excavation, final cross-sections and the quantities between the initial cross-sections and final cross-sections within the pay lines shall be worked out for payment.

g) The unit for payment of earth work excavation in soils and rock shall be one cubic meter.

3.1.24. INTERMEDIATE PAYMENTS

a) For intermediate payments lowest level may be taken for bund/embankment and highest level in canal cutting in a bay of 25 m.

b) Payment for earth work embankment compacted to proctor's desity will be for the net quantity of earth work after deducting the quantity towards shrinkage from the rolled quantity computed based on the compacted bund which should include allowance for shrinkage.

c) Intermediate payments also will be made based on levels.

3.1.25 RATE FOR PAYMENT:

The contract unit quoted rate for the items of excavation in Schedule – A for one cubic meter shall be the payment in full for carrying out the following operations required for the individual items including full compensation:

i) Setting out

ii) Site Clearance

iii) Top soil removal or stripping and jungle clearance.

iv) Marking out providing and forming model sections, lock spitting, strings and stakes as may be considered necessary by the Engineer-in-charge to guide the contractor in excavating and depositing.

v) Providing materials and labour for fixing reference lines, reference points, additional bench marks, for taking levels and connecting bench marks.

vi) Initial rate for excavation by suitable machinery.

vii) Dressing bed and trimming side slopes to exact sections as shown on working plans.

viii) Drilling wherever necessary or ripping.

ix) Blasting wherever necessary including cost, conveyance and storage of blasting materials and control blasting.

x) Final cutting of 300mm in all rocks by control blasting or wedging & baring or trimming with the help of pneumatic paving breakers for finishing.

xi) Safety measures.

xii) All dewatering.

xiii) Providing temporary ramps and steps at the sides of deep trenches and subsequent removal.

xiv) Transporting the excavated materials and depositing the same on sides of embankment or on spoil banks or stacking in stock piles to the specifications inclusive of all leads and lifts, delfts including preparation and maintenance of approach roads.

xv) All work necessary to maintain the excavation in good order during excavation.

xvi) All labour, materials, tools, equipments, safe guards and incidentals necessary to complete the work as per drawings to specifications.

3.1.26 EXCAVATION FOR STRUCTURES:

Description of Work:

a) Excavation and depositing the soil on spoil bank or at any place specified by the Engineer-in-charge with all leads and lifts for structures shall consist of the removal of material for the construction of foundations for the Structures like Bridges, U.Ts. Acqueducts, Super-passages, retaining walls, canal side walls, in lets, out lets, head walls, cut off walls, pipe under-tunnels, cross regulators, off-take sluices and other similar structures, in accordance with the requirements of these specifications and the lines elevations and dimensions shown on the drawings or as indicated by the Engineer-in-charge.

The work shall include providing all the materials, tools and plants and labour required for presplitting and utilizing controlled blasting technique over and above the normal blasting technique in hard rock and quartzite excavation, construction of the necessary coffer dams and cribs and their subsequent removal and necessary sheeting, shoring, strutting, benching, draining and pumping the removal of all logs, stumps, grubs and other deleterious matter and obstructions necessary for placing the foundations; trimming bottom of excavations; all leads and all lifts of excavated material back filling with selected approved material and clearing up the site and the disposal of all surplus materials, spoil and the stone not useful for construction purpose shall be deposited beyond the profile of the structure, canal, stream etc. leaving a minimum gap of 5 meters, and in accordance with clause 8.1 of IS 4701-1982 or at greater distance as directed by the Engineer-in-charge. The useful stone stacking and soils required for back filling shall be placed at the contractors convenience without foregoing the working space. No rehandling of material will be paid and at the same time recovery will be made if the obstructions are not removed after completion of the work from the final bill at the rate calculated by the Engineer-in-charge to do the same work with other agency. In so far as practicable, the material removed in excavation for structures shall be used for backfilling and embankments.

3.1.27 CLASSIFICATION OF EXCAVATION:

All materials involved in excavation shall be classified in accordance with para 3.1.12.

3.1.28 CONSTRUCTION OPERATIONS:

i) Setting-out

After the site has been cleared to the limits of excavation the work shall be set out true to lines, curves, and slopes as shown on plans.

ii)Excavation:

a) Excavation shall be taken to the width of the lowest step of the footing and the sides shall be left to plumb where the nature of soil allows it. Where the nature of soil or the depth of the trench does not permit vertical sides, the contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer-in-charge.

b) The depth to which the excavation is to be carried out shall be as shown on the drawings, unless the type of material encountered is such as to require changes in which case the depth shall be as ordered by the Engineer-in-charge and will be paid for.

c) Excavation in rock shall be carried out by crow bars, pickaxes, chisels or pneumatic drills etc. unless permitted by Engineer-in-charge blasting shall not be resorted to.

d) Where blasting is to be resorted to the same shall be carried out to the requirements of specification 3.3 and all precautions therein observed.

e) No distinction shall be made as to whether the material being excavated is dry or moist or in water. The method of drilling and blasting to be adopted for hard rock including F&F, rock excavation shall be approved by the Engineer-in-charge.

Blasting in a manner as to produce over breakage which in the opinion of Engineer-in-charge is excessive shall not be done. In order to minimize over breakage and loosening of material at the finished surface on bottom and side slopes over which foundation concrete is to be laid, final cutting for the last 300mm in hard rock shall be carried out by controlled blasting or chiseling or trimming with the help of pneumatic paying breakers. If excavation is required to be done within 30m. from the existing structures the same should be carried out by chiseling without resorting to blasting for which no extra rate is payable.

3.1.29.DEWATERING AND PROTECTION:

a) Where water is met with in excavation due to streamflow, seepage, rain or other reasons, the contractor shall take adequate measures such as bailing, pumping, construction of diversion channels, drainage channels, bunds, cofferdams and other necessary works to keep the foundation trenches dry when so required and to protect the green concrete/masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regard and other derails their of shall be left to the choice of the contractor but subject to approval of the Engineer-in-charge.

b) Approval of the Engineer-in-charge shall however shall not relieve the contractor of the responsibility for the adequacy of dewatering and protection arrangements and for the quality and safety of works.

c) The Contractor shall take all precautions in diverting the channels and discharging the drained water as not to cause damage to the works, crops or any other property.

d) Pumping from the interior of a foundation shall be done in such a manner as to preclude the possibility of the movement of water through any fresh concrete. No pumping shall be permitted during the placing of concrete or for any period of atleast 24 hours thereafter, unless it is done from a suitable sump separated from the concrete works by water tight wall or other similar means.

3.1.30 PREPARATION OF FOUNDATION:

a) The contractor shall prepare firm foundation for the structure as shown in the drawings. The bottom and side slopes of foundation upon or against which the structure is to be placed shall be finished to the prescribed levels and dimensions shown on plans.

b) The bottom of the foundation shall be leveled both longitudinally and transversely or stepped as directed by Engineer-in-charge. Before foundation concrete is laid. the surface shall be slightly watered and rammed. In the event of excavation having been made deeper than that shown on the drawings the extra depth shall be made up with concrete or masonry of the foundation grade at the cost of the contractor as directed by the Engineer-in-charge. Ordinarily earth filling shall not be used for the purpose to bring the foundation level. If hard strata is not met at foundation level shown in the drawings extra depth as directed by Engineer-in-charge shall be excavated to remove unsuitable material. The extra excavation or extra depth made up with masonry or concrete will be paid for as approved by the Engineer-in-charge.

c) When rock or other hard strata is encountered, it shall be free from all soft and loose material, cleaned and cut to a firm surface either level, steeped or serrated as directed by the Engineer-in-charge. All seams shall be cleaned out and filled with cement mortar or grout to the satisfaction of the Engineer-in-charge.

d) If it is considered necessary by the Engineer-in-charge, to consolidate the foundation stratta by grouting cement slurry, the drilling and grouting or any other foundation treatment as directed by the Engineer-in-charge shall be done by the contractor and payment will be made at the rates quoted in Schedule 'A'.

e) Separate payment will not be made to the contractor for moistening and compacting the foundation for structures. The contractor shall include the cost thereof in the rate per cubic meter of the item of Schedule "A" for preparation of foundations.

f) The quantities for payment will be to the dimension shown on the drawings.

3.1.31 OVER EXCAVATION

a) If at any point in common excavation, the foundation material is excavated beyond the lines required to receive the structure or the natural foundation material is disturbed or loosen during the excavation process, it shall be done as follows:

i) In excavation of soils, over excavation shall be filled back with suitable selected bedding material and compacted.

ii) The Soils loosened or disturbed shall be compacted by filling extra selected bedding material if found necessary and compacted.

iii) In respect of rock all excess excavation or over excavation performed by the contractor for any purpose or reason except for additional excavation as may be prescribed by the Engineer-in-charge whether or not due to the negligence or fault of the contractor, the excess or over excavation shall be filled in by C.C. of grade directly coming over it or M. 15.

iv) No extra claim for such excavation, filling and compaction of soil/filling concrete as specified above shall be entertained.

3.1.32 SLIPS AND BLOWS:

If their are any slips or blows in the excavation, these shall be removed by the contractor at his cost.

3.1.33 PAY LINE:

Regardless of excavation, pay line shall be to the lines dimensions and actual foundation levels shown on the drawings or the subsequent levels and dimensions as directed by the Engineer-in-charge in writing.

3.1.34 BACK FILLING:

Back filling shall be done with approved material after concrete or masonry is fully set and carried out in such a way as not to cause undue thrust on any part of the structure as specified in para 3.2.26. All space between foundation masonry/concrete and sides of excavation shall be refilled to the original surface, making due allowance for settlement in 250mm. loose layers which shall be watered and compacted.

3.1.35 Measurement for Payment:

a) Excavation for structures shall be measured in cubic meters for each class of material encountered, limited to the dimensions shown on the drawings or as directed by the Engineer-in-charge. Excavation for structures will be measured for box cutting with vertical sides of foundation dimensions. Excavation of increased width, cutting of slopes, shoring, shuttering and planking shall be deemed as convenience for the contractor in executing the work and shall not be measured and paid for separately.

b) Foundation sealing, dewatering including pumping shall be deemed to be incidental to the work and no separate payment will be made.

c) The quantity for excavation in soils and rock will be arrived at from the prelevels and finished levels of respective strata taken at 3 Meter or less interval both ways as decided by the Engineer-in-charge. The levels will be plotted on graph sheet and average levels arrived at for purpose of determining the quantity of excavation.

d) The contractor or his authorized agent's signature in token of hiss acceptance shall be recorded in level field books and graph sheets on which levels have been plotted. Final payment will be made on levels only. The contractor shall expose the surface of the strata for inspection of Engineer-in-charge and for taking levels wherever the classification and strata gets changed.

3.1.36 RATES FOR PAYMENT:

a) The unit rate per cum with tender premium quoted by the contractor in Schedule 'A' for the items of excavation for structures shall be the payment in full for carrying out the required operations including full compensation for.

i) Site clearance, such as clearing of shrubs, brushwood and disposal.

ii) Setting out.

iii) Forming temporary steps at sites of deep trenches and subsequent removal.

iv) Construction of necessary cofferdams, cribs, shuttering, shoring, strutting and bracing and their subsequent removal.

v) Removal of all logs, stumps, grubs and other deleterious-matter and obstructions for placing the foundations including trimming of bottoms of excavation.

vi) Foundation sealing dewatering including pumping.

vii) All labor, materials, tools, plant, machinery equipment, safe guards and incidentals necessary to complete the work to the specifications and depositing of excavated useful materials on temporary stock piles or on embankments under construction and disposing the waste materials.

viii) Trimming of rock foundation by controlled blasting technique over and above the normal blasting technique and cleaning the foundation surface and filling/sealing of all seams with cement grout or mortar Including all materials, labor and incidentals required for completing the work and cleaning site after completion of work..

ix) Removing slips and blows during excavation.

x) Public safety measures.

xi) Disposal of surplus materials, with all leads, lifts and delfts the excavated material.

xii) Completing the finished item of work.

3.1.37 PUBLIC SAFETY:

Nearest, towns, villages and all frequented places, trenches and foundation pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accidents. The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures or property..

3.1.38 DISPOSAL OF EXCAVATED MATERIAL:

a) No rehandling of excavated material due to injudicious selection of the place for dumping will be paid for.

b) All surplus excavated material which is not useful for any embankment, or filling shall be disposed in accordance with clause 3; 1 19 and as directed by the Engineer-in-charge.

3.1.39 Side drains:

The location, grades and sections of the drains shall be as shown on the drawings and or as directed. Measurement of excavation for the above drains will be made to the lines shown on the drawings or as directed. Payment for excavation for the above drains and channels will be made at the unit rate for excavation which unit rate shall include the cost of excavation and placing the Materials in embankment or otherwise disposing of the excavated material and all work necessary to maintain the work in good order.

3.2 EMBANKMENT CONSTRUCTION

3.2.1 SCOPE:

Site clearance, stripping and formation of embankment of homogeneous section/zonal section viz., casing zone/hearting zone with useful excavated soils and balance soils of approved quality from the borrow are including the cost of sol, if any, sampling, testing and prewetting of soils at source of excavation and conveyance of Soil and extra soils required for shrinkage including swell factor with all leads, lifts, delfts, laying on bank, spreading, breaking clods, sectioning, extra watering and consolidation including benching of Old embankment Slopes, joining with the new embankment formation, trimming of side slopes, formation and removal of ramps, formation of Dowel banks etc., as per drawing and as directed by the Engineer-in-charge to complete the finished item of work..

3.2.2 Embankment Construction.

Setting out:- specifications No. 1.1.2 shall apply

3.2.3 General Requirements..

a) The Cross sections for embankment are designed to suit the characteristics of the best quality soils available in the vicinity of proposed work. If the contractor proposes to use any other type soils than those mentioned in the design to save the lead and thereby the cost pursuant to the clause of I.S.Code and A.P.S.S, the contractor has to form the embankment to the revised profiles worked out by the competent authority sanctioning the estimate. The extra quantity involved will not be measured and paid. The theoretical quantity required based on the original cross sections will only be measured and paid.. But the Contractor has to form the bund to revised cross section designed with characteristics of the proposed soils. The designs given by the estimate sanctioning authority are final.

b) Embankment shall be built to the height, top width and side slopes as shown on the drawings. All the edges of the embankment shall be neatly aligned symmetrical to the central line. They shall be absolutely straight in all reaches except at bends. At bends the shall be smoothly curved.

c) The top of each embankment shall be leveled and finished so as to be suitable for road way and given a cross slope to drain away rain water. The bank carrying road shall be given a suitable cross slope.

3.2.4. Material :- The provisions of schedule 'D' shall apply.

a) The suitability of foundation of placing embankment materials thereon and all materials proposed for use in construction of embankment shall be determined by the Executive Engineer well in advance on the basis of laboratory Test results. Chemical and Physical tests of the material proposed for construction of embankment shall be carried out to ensure that the soil does not contain soluble lime content, soluble lime salt content or cohesion's less fines, in quantities harmful tothe embankments.

b) Material for construction of embankment should be free from the organic material. Unless otherwise directed by the Superintending Engineer/Executive Engineer all materials shall be deposited in embankments so that cobbles, gravel and boulders are well distributed through other material and not nested in any position within or under are embankment as per clause 6.4 of IS.4701-1982.

c) Suitable excavated material available from the cut off trenches, canal cutting, extra cutting for seating to lining, foundation excavation for structures, approach and tail channels for structures, vagu diversions, removal of ramps obstruction removal on the upstream and downstream of surplus weirs and excavation in surplus course and any such excavations, shall be used for construction of adjacent embankments and also embankments of deficit reaches.

d) After completing the construction of embankments with the materials as indicated in above, material required for the construction of balance embankment shall be obtained from the borrow areas..

e) The soils and morum excavated and useful for construction of embankment shall be classified by the Superintending Engineer/Executive Engineer as impervious and Semi-Pervious based on Laboratory Test results. They shall be utilized on the embankment work.

3.2.5. Preparation of ground surface for embankment.

(a) Clearing site : Specification 2.0 shall apply.

(b) Stripping : specification 3.1.8 shall apply.

(c) All portions of excavation made for test pits or other subsurface investigations, all holes, hollows and all other existing cavities found within the area to be covered and to the extent below the established lines of excavation for embankment seat shall be filled in earth of corresponding zone of the embankment and suitably compacted. The pits of surface boulders shall be filled with suitable material and compacted at no extra cost..

(d) Pools of water shall not be permitted in the foundation for embankment and such water shall be drained and cleared prior to placing the first layer of embankment materials.

(e) On sloping ground or in case of existing banks, where embankment portions are to be modified, benching of slopes shall be done with a little slope towards the inside of benching so as to give a good grip to the embankment soil with the subgrade. Unless otherwise specified the benches shall be 0.3 x 0.6 m. on the front and rear slope of the embankment. Before benching, the bank slopes shall be cleared of all roots and vegetables matter as per specification 2.0. No separate payment will be made for either benching or refilling. The rate quoted for raising embankment is inclusive of above operations. The bank section shall be brought to design standards by filling the scours with suitable material and compacting to 98% proctor density by suitable measure of compaction.

(f) Soil foundation.

The ground surface under embankment and area of bed filling wherever necessary (except rock surfaces) shall be loosened or scarified making open furrows by means of a plough, or ripper or any other methods to a depth of not less than 200mm deep below the stripped surface at intervals of not more than 1m to the satisfaction of the Engineer-in-charge. Roots or other debris turned up during scarifying, shall be removed from the entire foundation area for the fill. The areas under the embankments shall be prewet by sprinkler before the construction of embankment begins. The moisture content shall be optimum. Water applied for prewetting of areas under the embankment will not be measured for payment and shall be included in the unit rate per cum quoted in Schedule "A" for compacting embankment.

(g) **Rock foundation**

The treatment of the rock surface under the embankment shall be done so as to ensure tight bond between embankment and the foundation. This shall be done by the following procedure.

i) The area of the rock surface which is to be in contact with the embankment shall be fully exposed by removing all the loose and disintegrated rock having the surface of rock rugged. Hard rock projects and overhangs shall be removed. If blasting is to be resorted to care shall be taken to avoid objectionable shock to foundation rock. As far as possible the whole contact area shall be exposed at one time to enable examination of rock surface characteristics and planning the method of treatment.

ii) Exposed rock shall be benched.

3.2.6 Compaction

a) General

The earth compacting equipment specified in Appendix-C of I.Ss.4701-1982 shall be used for compacting the soils shown against them. The compacting equipment shall confirm to the relevant I.S.Specification. While the I..S.Specificattion specify the compacting. It is contended that the use of improved compaction equipment for embankment construction shall be encouraged as may be most suited to the site conditions and the program of construction. The methods of compaction shall confirm to clause 7.2, 7.2.2 and 7.2.3 of I.S.4701 – 1982.

3.2.7. Cohesive Materials:

a. When each layer of material has been prepared so as to have the proper moisture content uniformly distributed throughout the material, it shall be compacted by passing the roller. The layer shall be compacted in strips over lapping not less than 0.30 Meter. Rolling shall commence at edges and progress towards centre longitudinally. The rollers shall travel in a direction parallel to the axis of the bank. Turns shall be made carefully to ensure uniform

compaction. Density tests shall be made after rolling and dry density attained shall be not less than 98% of the maximum dry density (standard proctor) as obtained in the laboratory for the type of material used.. The density achieved shall not normally be less than the designed density. The dry density of soil in field shall be determined in accordance with I.S. 2720 (Part-XXVIII)-1974 or I.S.2720 (Part.XXIX)-1975.

b. Standard proctor density test shall be carried out at regular intervals to account for variations in the borrow are materials as well as that in-sity excavated material. Not less than three tests shall be carried out to indicate variations in the Standard Proctor Density attained in Laboratory.

c. Engineer-might review the design if necessary on examination of density test results and the contractor shall have no claim arising out of such a review and consequent change, If any, in the design..

d. i) In case embankment covers the barrels of cross drainage or any other structures, first 45 cm. of the embankment shall not be compacted with roller but it shall be compacted with pneumatic/hand tampers in thin layers. The compaction above this layer of total 45 cm shall be done by using suitable light rollers to avoid damage to the structure, by adjusting the thickness of layers until sufficient height is achieved to permit compaction by heavy rollers.. Density test shall be conducted from time to time on site to ascertain whether the compaction is attained as specified above.

i) Separate tests shall be conducted for each zone of the embankment for every 1500 cubic meters of compacted earthwork; atleast one field density test shall be taken in each layer. Minimum two density tests shall be taken in each layer. Minimum two density tests shall be taken in each layer per day irrespective of the quantity of earthwork specified above. In case the test shows that the specified densities are not attained, suitable measure shall be taken by the contractor either by moisture correction or by entire removal and relaying of layer or by additional rolling so as to obtain the specified density which shall be checked again by taking fresh tests at the same locations. Necessary unskilled labor required for carrying out such density tests shall be provided by the Contractor..

e. Compaction shall be achieved by the use of smooth rollers, pneumatic type rollers, sheep foot rollers, mechanical compactors like vibratory rollers, vibrating plates, programmers, power rammers, slope compacting equipment, pneumatic tamping equipment and such other equipment as shall be specified by the Engineer based on type of material and actual field tests..

f. The dimensions and weight of the rollers should be such as to exert a ground pressure of not less than 12kg/cm^2 of tamping when it is empty and 25 Kg/Sqcm when ballasted, The number of passes required for each layer to obtain the specified density shall be determined by actual field tests..

3.2.8 Cohesionless Materials

a. Where compaction of Cohesionless free-draining material such as sand and gravel is required. The materials shall be deposited in horizontal layers and compacted to the relative density specified. The excavating and placing operations shall be such that the material, when compacted, shall be blended sufficiently to secure the highest practicable degree of compaction and suitability. Water shall be added to the materials if required to obtain the specified density depending on the method of compaction being used.

b. As per Clause 6.6.2.1 of I.S.4701-1982. the thickness of embankment layer shall not exceed 25 cms. (Loose) before compaction and it should be spread over the full width of embankment and compaction shall be done by rollers or tampers to obtain specified density. The thickness of the horizontal layers after compaction shall not be more than 10 cm.. If compaction is performed by tampers, not more than 15 cm. if by 8 to 10 tones rollers and not more than 30 cm. If compaction is performed by vibratory or pneumatic rollers or similar equipment.. The relative density of the compacted materials shall not be less than 70 percent as determined by laboratory tests as per I.S.2720 Part-XIV. If compaction is performed by internal vibrators, the thickness of layers shall not be more than the penetrating depth of the vibrator.

3.2.9 Embankment without controlled compaction.

a. No materials shall be placed in any section of the earth fill portion of the embankment until the embankment seat for that section has been approved by Executive Engineer..

b. Where the natural ground surface is above the maximum water but below the top of the embankment, the embankment shall be built in layers not exceeding 15 Cm, in thickness and to the full width of embankment.. Each layer shall be commenced from the edge farthest from excavation. It shall be compacted with Two ton roller.

c..The excavating and hauling equipment shall travel over the embankment to evenly distribute the material and compacting effect over the whole surface.

3.2.10.Embankments with controlled compaction.

a. Bushes, roots, sods or other perishable or unsuitable materials shall not be placed in the embankment..

b. (i)Unless otherwise specified, embankment materials shall be spread in successive horizontal layers generally not exceeding 25 cm, in thickness(loose layer) in the zones where these are required to be laid, extending to the full width of the embankment including slopes at the level of the particular layer. Each layer shall be commenced from the edge farthest from excavation. In no case shall embankments be widened by material dumped from the top.

(ii)Top of each layer shall be kept slightly depressed in the centre.

c) (i)Extra width of 600mm. in thickness as measured perpendicular to the slope shall be provided on either side so that when compacted, lines of the finished embankment slopes shall have not less than specified density.

(ii) Later the extra width shall be neatly trimmed and the trimmed material shall be permitted for re-use in embankment at higher elevations.

(iii)No payment shall be made for providing or removal of the extra section. Removal of extra section in the embankment shall be deemed to have been included in the item of compaction.

(d)Thickness of layers shall be adjusted with particular type of compactors used to give the required density by carrying out trial compaction and requisite tests and required number of passes should also be determined as directed by the Engineer.

(e)No fresh layer shall be laid until the previous layer is properly watered and compacted as per requirement.. The work of spreading and compaction shall be so adjusted as not to interfere with each other and in such a way that neither of the operations is held up because of non-completion of the rolling and watering. The surface of the banking shall at all times of construction be maintained true to required cross section. If the surface of any compacted layer of earth fill is too dry or too smooth it shall be moistened and scarified to provide a satisfactory bonding surface before the succeeding layer is placed.. All the rollers used to any one layer of fill shall be of the same type and same weight.

(f) The contractor shall ensure that only approved soils are used for construction of embankment.

(g)For proper bond of the embankment done in the previous season with the new embankment. the work shall be carried out as detailed below:-

(i) In case of the old bank to be extended horizontally. It shall be cut to a slope not steeper than 1 in 4 and the surface so prepared shall be scarified and made loose at least for a depth of 15 Cm. Necessary watering shall be done and the earth surface shall be thus prepared to receive the new embankments.. The soils shall be laid in layers and compacted to the required degree of compaction to have a proper bond with the old one.

(ii)If the old bank is to be raised vertically, vegetation shall be cleared followed by scarifying, watering and placing of the new earth layer as specified above.

iii) The surface which are damaged due to rain shall be made good by filling with proper soil duly compacted by tampers. A cross slope away from the centre of canal of about 1 in 80 shall be maintained throughout the rainy season to ensure proper drainage in the event of occasional rainfall. No extra or separate payment shall be made for these items of work.

(h) Settlement of allowance:

i) The canal embankments shall be constructed to a higher elevation than that shown on drawings at the rate of 2.5cm. per every one meter height of bank if power driven

equipment is used and 25cm/ 1mt height if other than power driven equipment is used for compaction towards Shrinkage/Settlement.

ii) No extra or separate payment shall be made for this work as this shall be deemed to have been included in the respective item of construction and consolidation of embankment.

(I) i) Care shall be exercised that all large clods are broken and no clod bigger than say 8 Cm. rock, are buried in the banks.

ii) **Homogenous Sections**.
The homogeneous section for canal embankments shall be provided as specified in the drawings. The available coarser and more pervious materials shall be placed nearby outer slopes in order to have increasing permeability from inner to outer side.. The compaction shall be carried out as per Clause.6.6.2 of I.S. 4701-1982.

iii) **Zonal Embankments.**
In zonal sections the selected and approved soils shall spread to the required widths of respective zones. All the zones shall be tackled simultaneously and the difference in level between zone to zone shall not be more than 150mm.

3.2.11. Moisture content:

a) The initial moisture content of the material shall be determined at the source of supply (all excavations including from the borrow areas) in field laboratory test. Prior to and during compaction operations, the embankment shall have optimum moisture content required for the purpose of compaction and this moisture content shall be fairly uniform throughout the layer, as per clause 6.6 of I.S.4701-1982. In so far as practicable the moistening of the material shall be performed at the site of excavation but such moistening shall be supplemented as required by sprinkling water at the site of compaction, if necessarily. Flooding shall not be permitted under any circumstances. Sprinkling of water shall be done either through a proper sprinkler tanker or using proper spray noules. Sprinkling straight from the water hoose shall not be allowed.

b) If the earth delivered to the embankment is too wet, it shall be dried by aeration, exposure to the sun, ploughing, disc harrowing or other methods, till the moisture content is reduced to acceptable optimum for compaction. If due to wet weather, the moisture content cannot be reduced to the required optimum by the above procedure, work on compaction shall be suspended until such time the earth has dried to the optimum moisture content. For such suspension of work no extra claim by the contraction shall be allowed.

c) If the moisture content is not uniformly distributed throughout the layer or less than the optimum rolling shall be stopped and shall be started again only when the above conditions are satisfied. After adding the required amount of water, if found necessary, the soil shall be processed by means of harrows, rotary mixers or as otherwise approved until the layer is uniformly wet at optimum moisture content.

d) Moisture content of each layer of soil shall be checked in accordance with I.S.2720 (Part.II) 1973 and unless otherwise mentioned shall be adjusted, making due allowance for evaporation losses that at any time of compaction; upto –1% to + 2% than the optimum moisture content in casing zones and upto +1% to –I% than the optimum moisture content in the heating zones may be permissible. The optimum moisture content shall be determined in accordance with I.S. 2720 (Part.VII) 1973. The above compaction tests will be conducted by the Engineer or his authorized representative and the contractor shall ensure compaction till it is satisfied that 98% of the maximum dry density at OMC is obtained.

3.2.12.Special Precautions:

a) During the actual construction of any earth work, maximum use should be made of construction plant and routing of the plant should be carefully controlled to obtain uniform compaction over as wide an area as possible. Care should also be taken during the compaction operation to shape of surface of the works to facilitate the shedding and to minimize the absorption of rain water, particular attention being given to the prevention of ponding of water. The contractor shall do this at the end of each day's work.

b) The earth moving machinery shall not be allowed to pass over a compacted portion of the embankment beyond certain limits by varying the hauling routes and ramps, thus ensuring that over compaction does not take place in any particular reach.

c) During the construction, a small a transverse slope from centre towards the edges shall be given and further in the reach when-bank is being raised, the works shall be tackled in continuous horizontal layers to avoid pools of water and concentration of flow of water during rains, which will cause damages, scours and rain gullies.

d) Special precautions shall also be taken while rolling the spread soil near structures, conduits, sluice barrels, filters, rock toes at the junctions of bank connections with the structures, using hand or power tampers. It is essential that the compaction of filling should be carried out in such a manner as to avoid an unbalanced thrust on walls etc., which might displace or damage it. The equipment shall be provided with suitably shaped heads to obtain the required density.

3.2.13.Embankment test section :

Test Embankment section shall be built as directed by the Engineer-in-charge prior to starting fill operations or at an early stage of embankment constructions. The test section shall be used to establish.

i) Layer thickness of fill materials.

ii) Optimum practicable moisture content.

iii) No of passes of sheep foot roller / vibratory roller for effective compaction.

3.2.14 Measurement and Payment

i) Embankment with Excavated Soils, and borrowed Soils:

The quantities between the levels taken after stripping and cross sectional levels taken after construction of consolidated embankments with the available useful excavation soils and with the soils obtained from Borrow areas within the pay lines shall be worked out excluding rock toes and filters. It shall be clearly understood that construction of embankments to extra widths and extra height formed for shrinking allowance as specified in preceding paras will not include for payment.

3.2.15 Intermediate Payment:

1) For Intermediate payments lowest level may be taken for bund/embankment in a bay of 25M.

2) Paymet for earth work embankment compacted to Proctor's density will be for the net quantity of earthwork after deducting the quantity towards shrinkage from the rolled quantity computed based on the completed bund which should include allowance for shrinkage.

3) Intermediate payment also will be made based on levels.

3.2.16 Rate for payment:

i) The payment shall be made for one cubic meter of finished item of work at the rate quoted in the Schedule "A" for the item of forming embankment with excavated soils and the balance with Barrow Soils & the rate shall include.

a) Setting out site clearance, sampling, testing.

b) Compacting Original Ground under embankment, prewetting of soils at source of excavation, if the soils proposed for embankment are from canal excavation, cut off excavation, foundation excavation, overburden removal on U/S and D/S of surplus weir, surplus course on by any other excavation soils covered under the provisions of the schedule 'A'.

c) Breaking colds, spreading and sectioning.

d) Extra watering and compacting to 98% proctor density / 90% proctor's density.

e) Conducting preconstruction tests of materials, and tests during execution of work.

f) Hire and operational charges of all machinery.

g) Trimming of outer slopes of embankment.

h) Extra width to ensure edges consolidation and trimming to the required profile.

i) Shrinkage allowance and all other operations necessary to complete the finished item of work.

j) Cost and conveyance of Soils including shrinkage allowance, swell factor and water with all leads and lifts, delfts.

k) Cost of soils includes cost of borrow area, (if necessary) excavation of soils at borrow area, prewettting of soils at borrow area, removal of top soil at borrow area, removal of boulders and stones, wastage etc.

l) All other operational and incidental charges necessary to complete the finished item of work.. Payment shall only be made after the completed section of embankment.

Payment shall only be made after the completed section of embankment.

3.2.17.Refilling of key trench and consolidation:

a) Key trench shall be back filled with impervious material of the same specifications and in the same manner, as for the impervious hearting zone of the embankment of the canal. The impervious soils shall be place in continuous and approximately horizontal layers not more than 25 cm. (loose) thick and compacted by 8 to 10 Tone Power roller under optimum moisture content.

b) Rolling shall be done along the key trench and the roller shall be taken close to the sides of the trench..

c) In cases where the compaction by rollers is not possible, compaction to the required density shall be achieved by such other means as specified by the superintending Engineer/Executive Engineer..

d) Each layer shall be compacted to achieve the required dry density of not less than 98% of the maximum dry density (Proctor's density) for the type of material at optimum moisture content.

e) Watering material for its compaction shall have to be arranged by the Contractor at his cost as the quoted rate for consolidation of Schedule 'A' is inclusive of watering.

f) During placing and compaction of impervious soils in the key trench where dewatering is involved, the sub soil water level at every point in the key trench shall be maintained below the bottom of the earth fill until the compacted fill in the key trench at that point has reached a height of 3 m after which water level shall be maintained at least 1.5m below the top of compacted fill.

g) The quantity for payment shall be the volume of key trench measured in cubic meters. The unit for payment shall be one cubic meter, payment shall be at the quoted rate in Schedule "A" formation of embankment for one cubic meter.

3.2.18.Compacting by other than Power Driven Equipment :

a) This shall conform to that of embankments compacted by power driven equipment except that instead of using powerdriven rollers ordinary rollers driven by tillers shall be adopted for compaction if the work is at small magnitude. No manual compaction shall be allowed except through the use of pneumatic tampers and only very occasionally hand tampers shall be used.

b) Thickness of layer shall not exceed 150 mm before compaction(loose)

c) Each layer shall be compacted to not less than 90% dry density (Proctor's density) at optimum moisture unless otherwise specified.

d) Any loose soil shall be removed by trimming bringing embankment and side slopes of canal to the sections shown on the drawings.. Slope compacting equipment and Pneumatic equipment should be used.

e) Measurement and rate for payment shall conform to Para 3.2.14 slope compacting equipment and Pneumatic tamping equipment should be used.

3.2.19 DOWEL BANKS:

a) Dowel Banks shall be constructed to the dimensions, grades, slopes as shown on the drawings..

b) Payment will not be made for construction of Dowel Banks. The rates quoted in Schedule "A" for formation of embankment is inclusive of cost and conveyance of soils, forming dowel Banks neat sectioning and all other operations necessary for the finished item of work.

3.2.20 Weather Conditions:

a) Embankment soils shall be placed only when the weather conditions are satisfactory to permit accurate control of the moisture content in the embankment material. Before closing work in embankment, in any continuous reach prior to setting of monsoon, the top surface shall be graded and rolled with a smooth wheeled roller to facilitate run-off away from the canal. Prior to resuming work, the top surface shall be scarified and moistened or allowed to dry as necessary.

b) The Contractor shall provide suitable protection works protect the slope from erosion due to rain water. No payment whatsoever shall be made for providing such protection work and rectifying any monsoon damages.

3.2.21 BORROW AREA CONSIDERATION:

a) The contractor shall use only the suitable soils for formation of embankments, out of the soils excavated under the provisions of Schedule 'A', if they are proved to be suitable, based on Laboratory test results, and if they are with in the Economic lead. Otherwise the contractor shall borrow the soils from the borrow are after test checking the suitability of the soils for the embankments for particular embankment work.

b) The contractor shall be allowed to borrow the soils from the fore shore areas of Reservoirs/tanks, upto the MWL contour and on the sides of the Canal, Where the department is having provision to borrow or exploit the soils. The Contractors can avail this provision. If, for any reason, the contractor is not interested to borrow the soils, from the above said areas the Contractor is free to borrow the soils from any other places of his choice.

c) The responsibility for arranging and obtaining the land for disposal of spoil and the land for borrowing or exploitation in any other way shall rest with the Contractor, who shall ensure smooth and uninterrupted supply of materials/earth for the quantity required in construction during the construction period.

d) The rates quoted by the contractor in schedule 'A' shall include all the above consideration. No extra payment will be made for any of the above considerations. The payment for respective schedule 'A' item shall be at the quoted rate.

3.2.21.2.Borrow Pits

1) The borrow pits shall not normally be more than 25M in length, and 10 Min width and 1 ½ M depth. A clear spacing of one meter between each pit shall left out. Each pit shall be clearly peg marked and number tags of the pits shall be maintained.

2) In the case of earth dams unless otherwise specified the borrow pits shall not be located within a distance of 10 times the height of the embankment on the upstream side and two times the height of the embankment on the down-stream side..

3) The depth of the pits shall be so regulated that their bottom does not cut the hydraulic gradient line having a slope 4:1 from the top edge of the embankment.

4) In no case the pits shall be located within 5m from the toe of the embankment. If their are old pits in the borrow area the new pits shall be located one meter away from them.

5) If the contractor excavated the pits near to the toe against to the above clauses and the same is observed at any time during or after the execution of work, the contractor has to fill the same pits with the soils suitable for hearting zone of embankment and compact to 98% proctors density at the cost of contractor.

3.2.22 Stripping of borrow areas:

a) Borrow areas shall be stripped of top soil and any other objectionable materials to the required depths as ordered by the Superintending Engineer/Executive Engineer(Stripping operations shall be limited only to designed borrow areas) Materials from Stripping shall be deposited off in exhausted borrow areas or in the approved adjacent areas. Particular care shall be taken to exclude all organic matter from the barrow area.. The cleared areas shall be maintained free of vegetable growth during the progress of work.

b) No payment shall be made for removal of top soil on borrow area. The cost of the same shall be deemed to have been included in the quoted rate in Schedule "A" for formation of embankment.

3.2.23 Moisture Control at Borrow Areas:

a) Borrow area watering shall be done by the Contractor in the manner specified by the Engineer-in-charge.

b) No payment shall be made for watering the borrow area or drying the material in borrow are or on bank to reduce extra moisture content or for delay due to this.

c) The cost for such works shall be deemed to have been included in the rate in Schedule "A" for the item of compacting borrow quantity.

3.2.24 Measurement and Payment:

The leads and lifts for borrow earth will not be measured. The quantity on the embankment will be measured in terms of clause 3.2. and paid as per the rate in Schedule "A". The tendered has to quote his rates duly considering this aspect.

3.2.25 CLAY BLANKETS:

a) Scope : Clay blankets are made from impervious soils and are used on the beds of reservoirs or in channels or canals to reduce seepage.

b) Requirements: The materials used for these purposes, shall be impermeable, free from excessive shrinkage and swelling, shall resist erosion and have adequate stability. As for the possible, G.C. or S.C. materials shall be used. When satisfactory soils are not available, the surface shall be protected with a blanket of stable gravelly soils if so instructed by the Engineer-in-charge.

c) Laying : The clay blankets shall be laid and compacted to 98% proctors density to a length and depth.

d) Measurement : Dimensions shall be measured to the nearest 0.01 meter and volume worked out to the nearest 0.01 cum.

e) Rate : The rate for clay blanket shall be for a unit of 1 cum and shall include sampling, testing all operations of quarrying, transporting, laying, watering, compaction to 90% protectors density etc., complete. The rate shall include cost conveyance of water and earth with all leads, lifts, and delfts and all other operations necessary to complete the finished items of work as per drawings and as directed by the Engineer-in-charge.

3.2.26 Back filling :

1. Back filling with selected material in foundation trenches around structures and above lining key.

General :

a) The type of material used for backfill, and the manner of depositing the material, shall be subject to approval of the Engineer-in-charge. As far as practicable, backfill material shall be obtained from the excavation for structures or form adjacent canal excavation or from the excavation of the other ancillary works. Back filling shall be done with approved material after the concrete or masonry is fully set.

b) Backfill material shall not contain stone large than 7.5 cm size.

c) The previous materials (sand) with profused watering used for backfilling around the cut off wall shall be placed as shown on drawings or as directed by the Engineer-in-charge.

d) Backfill shall not be placed against retaining walls until the retaining wall is cured adequately and is strong enough to take lateral pressure of the backfill. Trimming of the sides of excavation against which the backfill is to be laid shall be delayed until immediately prior to backfilling and any excessive drying of the surface shall be conditioned properly and made adequately moist to avoid potential desiccation of the rock or partly compacted/consolidated materials.

e) The backfill material shall be placed carefully and spread in uniform layers. The backfill shall be brought up as uniformly as practicable on both sides of walls and all sides of structures to prevent unusual loading. The backfill material shall be placed at about the same elevation on both sides of the pipe portions of the structures and culverts and difference is elevation shall not exceed 15 cm at any time. The Contractor shall be responsible for providing adequate earth cover over pipe to prevent damage due to loads of construction equipment.

f) If a haul road is built over a pipe, all back fill around and over the pipe shall be placed to a uniform surface and no humps or depressions shall be permitted at the pipe crossing.

2.Compaction of Backfill :

a) When compacting the soil against the steep rock, abutment wall of masonry or concrete structures, the construction surface of embankment shall be sloped away from the rock or masonry or concrete structure leaving a minimum distance of 0.6 metre and at an inclination of 3.1 . Roller shall not be used close to structures as structural damage is very likely more particularly when structures have not been fully cured. The size and weight of equipment will depend on nature of material, the height and load assumed in design of structure. The backfill close to the structure up to the rolled layer shall be compacted in suitable uniform layers, using pneumatic tampers as appropriate to obtain dry density of at least 98% of Proctor density. The moisture content of the earth fill placed against rock or the structure shall be on higher side of OMC by about 2% or so, to allow it to be compacted into all irregularities of the rock. Profuse watering shall be done to previous materials (sand) before compaction as per instruction shall be carried out with special care without claiming any extra cost.

b) No payment shall be made of backfilling around the structures and consolidation as the cost of the same shall be deemed to have been included in the relevant item of concrete/masonry, payment shall not be made in full till the contractor carries out the compaction of backfill as per the above specifications. Deployment of hand tampers be restricted to rare usage that too for very small jobs.

3.Structures on backfill :

Where the original ground surface is below the base of the structure of below the bottom of pipe, all fill required for the structure foundation and all fill up to the bottom in the pipe shall be placed as compacted embankment. The embankment over natural ground up to pipe bottom and over the pipe shall be laid in accordance with Clause 9.2.4, 9.2.5 and 9.2.6 IS. 783 of 1985. The compacted back fill shall be placed in horizontal layers not exceeding 15cm after compaction. Heavy stones shall neither be dropped on top of pipes nor shall be allowed to roll down the side of the embankment against the pipes.

3.2.27 Inspection and Tests :

1.General :

a) The Engineer-in-charge shall maintain and exercise through check on the quality of fill material delivered to the embankment and shall arrange to obtain the data and in-situ properties of the material after compaction for compression with design assumptions. To achieve these objectives, a programme of field testing and inspection shall be planned to effect quality control.

b) Scope of testing and inspection : Field control of fill material shall be required by visual and laboratory checks. The checks on the effectiveness of placement and compaction procedures shall be made by field density tests at prescribed intervals.

2.Tests :

The following tests shall be carried out for determining compaction.

a) Density moisture relation of the soil. In accordance with I.S. 2720 (Part.VII)-1980.

b) Density of the Soil in Field :- In accordance with I.S.2720 (Part.XXVIII) 1974 or I.S.2720 (Part.XXIX) 1975.

c) Moisture Content : In accordance with IS 2720 (Part II) 1973.

Before compaction, materials delivered to the fill shall be visually examined and their properties estimated by way of inspection.

3.Embankment :

i. Moisture content tests shall be carried out in the field laboratory while placing the fill materials.

ii. Moisture content shall be controlled by adding water or allowing the soil to dry.

iii. It shall be ensured that the methods of dumping, spreading and moisture conditions are such as will result in reducing segregation and/or variation of moisture content to a minimum.

4.Borrow area :

i. Excavation of borrow areas shall be limited in extent and depth as indicated in specification 3.2.

ii. Estimation of moisture content of materials by visual examination and feel.

iii. Different samples shall be taken for laboratory analysis in case the soil is of different characteristics.

The inspection checks shall be supplemented by sampling the materials at prescribed minimum intervals and by testing the samples in the laboratory for gradation and moisture content.

During compaction :

It is intended that the checks in operations during compaction shall verify.

i. That the layer thickness of the material is as specified.

ii. That the fill is compacted at least to 98% of standard proctor's Density or (Dry density at OMC) or 70% relative density as the case may be.

iii. That no excessive rutting, waving or scaling of the fill occurs during compaction.

5. After compaction :

The condition of the fill after compaction shall be observed and recorded particularly with respect to rutting or waving. However, the properties of materials after compaction shall be determined primarily by field density tests. Routine tests on samples taken from constructed embankments shall include besides density tests, grain size distribution, Attenberg limits, permeability, shear and consolidation characteristics.

3.2.27. 1. Frequency of Testing :

a) It will be necessary to carryout sampling and testing of materials before and after compaction at sufficient frequencies so that effective checks on the full operations are maintained. Testing frequencies proposed should correspond to the frequencies as mentioned in the relevant paragraphs. However, the actual frequencies shall be adjusted to suit the nature and variability of materials placed and the rate of fill placement.

b) Testing shall be performed at frequent intervals than those specified in table during initial stages of placing in each zone in order to establish control on testing techniques and also testing should be conducted at higher rates in case of special problem of control caused by such factors such as material variations, equipment performance and weather.

c) Compaction :

Test location shall be chosen only through random sampling technique. Control shall not be based on the result of any other test but on the mean value of 5 to 10 density determinations. Generally these shall be at the locations indicated below or any other areas so determined by the Engineer-in-charge in addition to these shall be made at the following locations:

1) In areas where the degree of compaction is doubtful.

2) In areas where embankment operations are concentrated.

3) For record tests at the locations of all embedded instruments. Areas of doubtful density may be detected by the inspection by Engineer-in-charge and possible location of insufficient compaction include:
   i) The junction between areas of mechanical tamping and rolled embankment along abutment or cut-off-walls.
   ii) Areas where rollers turn during rolling operations.
   iii) Areas where too thick layer is being compacted.
   iv) Areas where improper water content exists in material.
   v) Areas where less than specified number of roller passes were made.
   vi) Areas where dirt clogged rollers were used to compact the materials.
   vii) Areas where compacted by rollers that have possibly lost part of their ballast.
   viii) Areas where oversized rock, which has been over looked,is contained in the fill.
   ix) Areas containing materials differing substantially from the average.

3.2.27.2 Record and Report:

Record of borrow area material and embankment-placing operations shall be maintained in order to have a continuous check on the suitability and availability of fill materials and quality of the fill. Thus it shall be possible to have complete description of materials, in any portion of the embankments. The record shall be maintained on the form specified in ANNEXURE-I.

3.2.27.3 Field Test Data:

Records of Field Test Data results should be presented in the form of statistical analysis sheets and summary sheets in order to provide control required for enforcement of statistical requirements of the specifications. The test data summary sheets and inspection reports be used to form the basis of construction control report, which should be issued from the site at fort-nightly intervals, during construction season. The report would contain narrative accounts of the progress and problems of field constructions, statistical analysis of test data and photographs of the fill operations.

ANNEXURE – I
Earth Work Engineers Daily Report

Construction _____
_____
Date_____shift_____Weather_____
Inspector_____Following Inspector _____
Type roller equipment used _____
Weight of roller _____

(A) EXCAVATION

1. Type of Excavator:
2. Depth of cut:
3. Type of Soil:
4. Borrow pit Location:
5. Whether water added at borrow pit:
6. Percentage of moisture content:

(B) FILL CONDITIONS

1. Location of fill:
2. Elevation:
3. Whether water added at the fill:
4. Moisture content before rolling:
5. Roller passes:

(C) TEST DATA

1. Location of sampling point:
   (a) Chainage:
   (b) Off-set:
2. Serial Number:
3. Moisture content:
4. Dry density(G/C):
5. Plasticity needle reading(kg/Sq.cm):
6. Quality of Earth Work rolled:

II. LABORATORY CHECK

1. Serial Number:
2. Optimum moisture content percent:
3. Maximum dry density(Gr/CC):
4. Plasticity needle reading (Kg/Sq.cm):

(D) COMPACTION EFFICIENCY

1. Field moisture deviation from optimum:
2. Percentage Compaction:

3.2.28 Surface Drains

a) This work shall consist of constructing surface drains, Schedule of work shall be so arranged that the drains are completed in proper sequence with canal excavation works is necessary subsequently or any damage is caused to these works due to lack of drainage.

b) Surface drains shall be excavated to the specified lines, grades, levels and dimensions. The excavated soils shall be removed from the area adjoining the drains and if found suitable utilized in embankment construction. All unsuitable soils shall be disposed off as directed.

c) The excavated bed and sides of drains shall be dressed to bring these in close conformation with the specified dimensions levels and slopes.

d) All works on drain construction shall be planned and executed improper sequence with other works as approved by Executive Engineer with a view to ensure adequate drainage for the area.

3.2.29 Rock fill in Toe of Embankments and filters:

Scope: This specification covers filters to be laid for internal drains, sandy filter blankets, horizontal and inclined filter drains, longitudinal and transverse filters around rock toe etc..

3.2.29.1 FILTERS:

i) **Sand as filter materials**: The provisions of schedule 'D' shall apply.

ii) Scope: Formation of said filters of specified thickness using the sand of approved quality including cost and conveyance of sand sampling, testing and laying with all leads, lifts, delifts and compaction to 70% relative density including hire and operational charges necessary to complete the finished item of work for filter blanket, horizontal and inclined filter drains, longitudinal and transverse filters around rock toe etc.. as per drawings and as directed by the Engineer-in-charge.

3.2.29.2 BASE FILTER BLANKETS:

a) As and where indicated in the approved drawings, Filter Blanket should be laid on the base, under the down stream portion of canal embankment. The number of layers in the filter blankets and the thickness of each layer shall be as specified in the drawings. Sand shall be placed and compacted to an average relative density of 85% with a minimum relative density of 70%. The sand shall be placed and tamped in place in such a manner that mixing of sand with foundation or backfill materials will not occur. The filter materials should satisfy the following criteria.

i) D. 15 of Filter material > 4. < 20 D. 15 Base Material.

ii) D. 15 of Filter Material < 5 D. 85 Base Material

iii) D. 50 of Filter material < 25 D. 50 Base Material.

[

iv) Co-efficient of Curvature $Cc = \frac{D30}{D10 \times D60}$ >/< 3

v) Coefficient of Uniformity $Cu = \frac{D60}{D10}$ >6 for SW

and $Cu = \frac{D60}{D10}$ >4 for GW

where SW=Sand well graded
GW= Aggregate well graded.

b) The base filter materials should be well graded so as to satisfy the above mentioned criteria. The grain size Curve should be approximately parallel to that of base materials especially in the fine range. Filter materials should not contain more than 5% of fines i.e. materials finer than 0.075mm (passing through sieve No. 200 I.S Sieve 75 micron) and fines should be cohesion less to ensure that filter does not sustain a crack. The filter should not have particles larger than 75mm so as to minimise the segregation.

c) D.15 is the size at which 15% of the total soil particles are smaller, the percentage being by weight, is being proposed to be determined by mechanical analysis. D.85 size is that at which 85% of the total soil particles are smaller. As more than one filter layer is required similar criteria is followed in each case, viz., the finer filter is considered as base materials for the selection of the gradation at the coarser filter.

d) The requirement for grading of the filter shall be established by the tests conducted in the field laboratory on the basis of mechanical analysis of adjacent materials. Mechanical analysis shall be performed of all samples, which have been compacted by the methods equivalent to compaction by roller, so that the individual particles are broken to their field condition in the embankment.

e) The filter materials shall be compacted to an average relative density of 85% with minimum relative density of 70% as determined by the standard U.S. Bureau of Reclamation (relative density test for cohesion less free draining soils)

$$Dd = \frac{emax - e}{e\ max - e\ min}$$

where e = in place void ratio

Dd = Relative density

e max = void ratio in looses state

e min = void ratio in most compacted state, and

$$\text{void ratio} = \frac{\text{Volume of Voids}}{\text{Volume of solids}}$$

The relative density may also be computed using the maximum and min density as follows:

$$Dd = Yd\ max\ (Yd - Y\ min) / (Yd\ max - Yd\ min)$$

Where Yd Max = Maximum dry density of soil as obtained by the laboratory procedure.

Yd min = Minimum dry density of soil as obtained by the laboratory procedure.

Yd = The dry density at which the soil is placed or the in place dry density.

f) The thickness of each filter layer shall be less than 150 mm.

3.2.29.3.Placing of Filter :

a) Filters shall be laid to the lines and grades and dimensions shown on the drawings.

b) The foundation shall be cleared and stripped in accordance with specification 2.0 before laying the bottom layer of filter material.

c) Filter material shall be laid in layers of 150 mm adequately watered and compacted by required number of passes of crawler type tractor or any method approved by the Superintending Engineer to get dense and stable filter.

d) Care shall be taken to ensure that material of different layers do not get mixed both at the time of placing and during compaction. Extreme care shall be taken when placing materials to obtain a fill free lenses, layers and streaks of segregated materials.

e) In case of horizontal filters after being compacted earth fill material shall be laid over it in layers of 150 mm and compacted as directed by the Engineer-in-charge Sheep foot roller or DDR shall not be used till earth has been laid and compacted to a thickness of 600 mm over the filter blanket. However the construction of earth fill in the initial 600 mm

thickness shall be subject to the same quality control regarding moisture content and dry density as for the rest of the embankment.

f) In case of inclined filter, the filter shall be raised along the adjoining embankment layers and shall be properly compacted by suitable means. In order to avoid contamination of filters with adjoining earth fill material, the top of filter be kept slightly higher than the adjacent embankment level and any contaminated portion shall be scrapped and removed before adding the new layer.

3.2.29.4. Measurement and Payment :

The measurement shall be in meters correct to 0.01 meter and volume shall be worked out to nearest 0.01 cubic meter. Payment shall be for one cubic meter of finished work at the rate quoted in Schedule 'A'.

3.2.30 Metal Filter :

a) Material : Provisions of schedule 'D' shall apply.

b) Scope : Formation of metal filters of specified thickness using approved quality of well graded metal of size 10mm to 75mm at the specified placed including cost and conveyance of metal, sampling, testing and laying with all leads, lifts, delifts, watering, compacting, seigniorage charges and all other incidental and operational charges necessary for complete the finished item of work as per drawings and as directed by the Engineering-in-charge.

c) Placing :

i. The Coarse aggregate filter shall be laid to the lines and grades and dimensions shown on the drawings.

ii. Filter material shall be laid in layers of 150mm adequately watered and compacted by any method approved by the Executive Engineer to get a dense and stable filter. When placing materials to obtain a fill free from lenses, layers and streaks of segregated materials.

iii. In case of horizontal filters, after being compacted, earth fill material shall be laid over it in layers of 150 m and compacted as directed by the Superintending Engineer/Executive Engineer sheep foot roller of DDR shall not be used till earth has been laid and compacted to a thickness of 600 mm over the filter blanket. However the construction of earth fill in the initial 600 mm thickness shall be subject to the same quality control regarding moisture content and dry density as for the rest of the embankment.

iv. In case of inclined filter, the filter shall be raised along the adjoining embankment layers and shall be properly compacted by suitable means. In order to avoid contamination of filters with adjoining earth fill material, the top of filter be kept slightly higher than the adjacent embankment level and any contaminated portion shall be scrapped and removed before adding the new layer.

3.2.31.Measurement and Payment :

The linear measurement shall be in meters correct to 0.01 meter and volume shall be worked out to nearest 0.01 cubic meter. Payment shall be for one cubic meter of finished work at the rate quoted in Schedule 'A'

3.2.32. Rock fill in Toe of embankment. (Rock toe)

a) Material: Provisions of schedule 'D' shall apply.

b) Scope: Formation of Rock toe using approved quality of well graded metal and stone size 75mm to 450mm including cost and conveyance of metal, sampling, testing laying with all leads, lifts, delifts & at least 225mm thick rough stone dry packing to the external face including labour charges for packing, Seigniorage charges & all other operational necessary to complete thefinished item of work as per drawings & as directed by the Engineering-in-charge.

c) Rock fill shall consist of sound; durable and well-graded broken rock obtained from approved excavation work and/or from quarries and shall be approved prior to being transported to the areas of deposition. The materials shall range in size from 75mm to 450mm. However, no load shall contain more than 15 percent by volume of rock fragments smaller than 75mm in size. All brush roots, or other perishable material shall be removed from rock fill during the spreading.

d) Placing:

i. The rock fill shall be constructed, true to the lines and grades shown in the drawings.

ii. The rock fill shall be placed and packed to obtain a suitable well-graded and free draining fill.
iii. The smaller rock fragments shall be placed adjacent to the filter of embankment and large rock fragments near the outer edge of the fill.
iv. The rock fill shall be placed and roughly levelled in layers not greater than one meter in thickness.
v. The stones shall be properly hand packed and the interslices shall be well filled with spalls and chips and tightly wedged to ensure firm packing so as to have dense well-graded fill with no larger voids and cavities.
vi. Contamination of rock toe with finer material from any other zones shall be avoided.
vii. Suitable outfall for draining out the seepage water collected in the rock toe shall be provided depending upon the site conditions.

3.2.33 Measurement and Payment:

The linear measurement shall be in meters correct to 0.01 meter and volume shall be worked out to nearest 0.01 cubic meters. Payment shall be for one cubic meter of finished work at the rate quoted in Schedule 'A'

3.2.34 Protection:

The contractor shall take all precautions necessary for the protection of the work by Diversion of stream local surface drainage, rain water etc., if these are likely to damage the work. Any damage to earth work due to any reason what so ever shall be made good by the contractor at his cost till the work is certified as completed and taken over by the Superintending Engineer/Executive Engineer.

3.2.35 Roads and Ramps:

The contractor shall construct operation and maintenances roads and earth ramps adjacent to the canal and structures at his own expense. Suitable material from excavation or borrow area shall be placed as embankment for the roads and ramps. The width of the road shall be not less than 4.25 M.

3.3.DRILLING AND BLASTING:

3.3.1. GENERAL:

a) Blasting where required will be permitted only when proper precautions have been taken for the protection of persons and property in accordance with I.S. 4081-1967 (Indian standard Specification for safety code for blasting and related drilling operations). While carrying out excavations, adequate precautions in accordance with IS 3764-1966 (Indian standard Specification for Safety code for excavation work) shall be taken.

b) Explosive such as gelatine, detonators and fuse coils etc required for the rock blasting are to be procured by the Contractor at his cost. It shall be responsibility of the Contractor to store the explosives purchased by him in accordance with the rules of the explosives act and other rules framed by Government of India.

c) He shall also furnish the following details: -

Capacity	License No. and date	Validity period.

d) The Contractor shall acquaint himself with all the applicable laws and regulations concerning storing, handling and the use of explosives. All such laws, regulations and rules, as prevalent from time to time shall be binding upon the Contractor.

e) The provisions detailed in the specifications are supplementary to the above laws, rules and regulations are also applicable. Further, the Engineer may issue modifications, alterations and new instructions from time to time. The Contractor shall comply with the same without these being made a cause of any claims.

A list I.S. Codes applicable is furnished below:

01 IS 4081-1986 Safety Code blasting and related drilling operations.

02 IS 4668-1985 Ammonium nitrate for explosive

03 IS 6609-19 (part 1 to 5) Method test for commercial blasting explosives and accessories.

04 IS 7632-1975 Detonators.

05 IS 5454-1986 Portable Pneumatic Drilling machine.

06 IS 3764-1966 Safety code for explosive work.

In addition to the above I.S.codes, revisions and , latest amendments of the codes ,the specifications of A.P.S.S and manual for Quality Control and Inspection. shall also be compiled with.

3.3.2. MATERIALS: the provision of schedule 'D' shall apply.

3.3.3. PERSONNEL

a) Excavation by blasting will be permitted only under the personal supervision of competent and licensed persons and trained workmen employed by the Contractor at his cost. All Supervisors and workmen in charge of, handling, storage and blasting work shall be adequately insured by the Contractor.

b) The person in charge of the explosive magazine shall be very reliable and shall be approved by the Engineer.

c) The Contractor shall make sure that his supervisor workmen are fully conversant with all the rules to be observed in storing, handling and use of the explosives. It shall be assured that the Supervisor in charge is thoroughly acquainted with all the details of handling and the blasting operations.

3.3.4 USE OF EXPLOSIVES:

a) For the transport of the explosives and detonators between the store and the site, closed and strong container made of soft materials such as timber, zinc, copper, leather shall be used.

b) Explosives and detonators shall be carried in separate boxes. For the conveyance of primer, special container shall be used.

c) The boxes and containers used, shall be kept closed. Explosives shall be stored and used chronologically, earlier received shall be used first. A make up house shall be provided at each working place in which cartridges will be made up by competent and licensed men as required for the work. The make up house shall be separated from other buildings. Only electric storage battery lamps shall be used in this house.

d) No smoking shall be allowed in the make up house or generally while dealing with explosives.

3.3.5.DISPOSAL OF DETERIORATED EXPLOSIVES:

All deteriorated explosives shall be disposed off in an approved manner the quantity of the deteriorated explosives to be disposed off shall be intimated to the Engineer prior to its disposal.

3.3.6 PREPARATION OF PRIMERS:

The primers shall not be prepared near open flames or fire. the work of preparation of primers shall always be entrusted to the same personnel. Primers shall be used as early as possible after they are ready.

3.3.7 CHARGING OF HOLES:

a) The work of charging of holes shall not commence before all the drilling work at the site is completed and the Contractor's supervisor shall satisfy himself to that effect by actual inspection. While charging, open lamps shall be kept away. For charging with powered explosives, a naked flame shall not be allowed. Only wooden tamping rods, without any kind of metal on the rod shall be allowed to be used. The tamping rods shall have cylindrical ends. Bore hole must be of such size that the cartridges can easily pass down them, they shall not however be too big.

b) Only one cartridge shall be inserted at a time and gently pressed into the hole with the tamping rods. The sand, clay or other tamping materials used for filling the holes completely shall not be tamped too hard.

3.3.8 BLASTING:

a) Blasting shall be carried during the fixed hours of the day which shall have the approval of the Engineer, the hours once fixed shall not be altered without prior written approval of the Engineer-in-charge.

b) The sire of blasting operation shall be prominently demarcated by red danger flags. The order to fire shall be given only by the contractor's supervisor in charge of the work and this order shall be given only after giving the warning signal three times, so as to enable all the labour, watchmen etc., to reach safe shelters.

c) A whistle/biggle with distinctive note shall be used to give the warning signals. The biggle shall not be used for any other purpose. All the labour shall be made acquainted with the sound of the biggle and shall be strictly warned to leave their work immediately at the first warning signal and to move for safe shelters. They are not to leave the shelters until all clear signals has been given.

d) All the roads and footpaths leading to the blasting areas shall be watched.

e) In special cases, suitable extra precautions shall be taken. The Engineer-in-charge may however permit blasting for under ground excavation, without restriction of fixed time, provided that he is satisfied that proper precautions are taken to give sufficient warning to all concerned and that the work o other agencies on the site is not hampered. For lightning the fuse, a lamp with a strong flame such as a carbide lamp shall be used.

f) The Contractor's supervisor shall watch the required time for the firing of the fuses and shall see that all the workmen are under safe shelters in good time.

3.3.9 ELECTRICAL FIRING:

a) Only the Contractor's supervisor in charge shall possess key of the exploder and short firing accessories and he shall keep it always with himself. Special apparatus shall be used as a source of current for the blasting operations; power lines shall not be tapped for the purpose.

b) The detonators shall be checked before use. For blast in series, only detonators of the same manufacture and of the same group of electrical resistance shall be used. Such of the electrical lines as could constitute danger for work of charging shall be removed from the site. The firing cables shall have a proper insulating cover so as to avoid short-circuiting due to contact with water, metallic parts of rock etc.

c) The firing cables shall be connected to source of current only when nobody is in the area of blasting. Before firing, the circuit shall be checked by a suitable apparatus. After firing with or without an actual blast, the contact between the firing cable and the source of current shall be cut off before any one is allowed to leave the shelters. During storm rain the blasting operations shall be suspended.

3.3.10.PRECAUTIONS AFTER BLASTING:

a) After the blast, the Contractor's supervisor must carefully inspect the work and satisfy himself that all charges have exploded. After the blast has taken place in the under-ground works, workmen shall not be allow to go to the place till the toxic gases are evacuated from the place.

b) **MISFIRES: -** If it is suspected that part of the blast has failed to fire or is delayed sufficient time shall be allowed to elapse before entering the danger zone. When fuse and blasting caps are used, a safe time should be allowed and then the Contractor's supervisor alone shall leave the shelter to see misfire.

c) None of the drillers are to work near this hole until one of the two following operations have been carried out by the supervisor.

Either (i) the supervisor should very carefully (when the tamping damp clay) extract the tamping with a wooden scraper or jet of water or compressed air (using pipe of soft materials) and withdraw the fuse with the primer and detonator attached after which a fresh primer and detonator with fuse should be placed in this hole and fired out or (ii) the hole may be cleared of 300mm, of caping and the direction and then be ascertained by placing a stick in the hole. Another hole may be drilled at least 225 mm away, and parallel to it. this hole should then be charged and fired. The balance of the cartridge and detonators found in the muck shall be removed.

d) Before leaving his work, the contractor's supervisor should inform the supervisor of the reliving shift of any case of misfires and should point out the position with red cross denoting the same, also stating what action if any, he has taken in the matter. A register of mis-fires and their location and how they were dealt with shall be maintained by the contractor.

e) The contractor's supervisor should also at once report at the Contractor's office all cases of misfires; the cause of the same and steps were taken in connection there with.

f) The names of the day and night shift supervisors of the contractor must be noted daily in the contractor's office. If misfire has been found to be due to a defective detonator, or dynamite, the whole quantity of box from which the defective articles was taken must be returned to the contractor's office for inspection, and shall be disposed off.

g) Drilling in the holes not completely exploded by blasting shall not be permitted

h) The Contractor should produce the fire's licence and furnish the particulars in the following statement.

Sl. No.	Name	No. of fire's licence & date	validity period

i) Blasting operation, when considered necessary shall be resorted to only with the written permission of the Engineer-in-charge. Prior inspection shall be carried out for the safety of the public property. Blasting operations in the proximity of over-head power lines, communication lines, utility lines or other structures shall not be carried out until the Operator or the owner or both of such lines have been notified and precautionary measures deemed necessary have been taken.

4.1.LIST OF APPLICABLE BIS SPECIFICATIONS:

All concrete, its constituents, methods and procedures of manufacture shall confirm to the specifications prescribed in the codes published by the **Bureau** of Indian standards. In addition to above IS codes the specifications of A.P.S.S. and manual for quality control and inspection shall be compiled with.

Sl. No	I.S. Number	Short title
1 (a)	456 – 1978	Code of practice for plain and Reinforced concrete
1 (b)	457–1963	Code of Practice for plain and reinforced concrete for Dams and mass concrete
2	2386 – 1977 (Part I to 8)	Methods of test for aggregates for concrete
3.	516 – 1959	Method for test for strength of concrete
4	4925 – 1968	Specification for concrete batching and mixing plant.
5.	1791-1985	Specification for batch type concrete mixers.
6.	650-1991	Specification for standard sand for testing cement.
7.	2330-1986	Methods for sampling of aggregate for concrete.
8.	2722-1964	Specification for portable swing weigh batches for Concrete (single and double bucket type)
9.	4634-1991	Batch type concrete mixers-methods test performance.
10.	5515-1983	Specification for compacting factor apparatus.
11.	5640-1970	Method of test for determining aggregates impact value Of soft & course aggregates.
12.	5816-1970	Method of test for splitting tensile Strength of concrete cylinder

13.	5889-1970	Specification for Vibratory plate compactor
14.	5892-1970	Specification for concrete transit mixers and agitators.
15.	6461-1972 & 1973 (Part 1 to 12)	Glossary of terms relating to cement concrete Aggregates, materials etc.
16.	6925-1973	Method of test for determination of water-soluble Chlorides in concrete admixtures.
17.	1838	Specification for performed fillers for expansion joints in concrete pavements and structures.
18.	7320-1974	Specifications for concrete slump test Apparatus.
19.	7861-1975 & 1981 (Part 1 &2)	Code of practice for extreme weather concreting.
20.	8142-1976	Method of test for determining setting time of concrete By penetration resistance.
21.	9013-1978	Method of making curing and determining compressive Strength of accelerated cured concrete test specimen.
22.	1984-1979	Method of test for abrasion resistance of concrete.
23.	1200-1974 (part 2)	Method of measurement of building & Engineering works, and concrete works.
24.	5751-1984	Specifications for precast concrete coping blocks.
25.	3085-1965	Method of test for permeability ofcement mortar and Concrete.
26.	3873-1978	Code of practice for laying in-situ cement concrete Lining of canals.
27.	2506-1985	General requirement for concrete vibrators screed board type.
28.	3363-1965	Specification for pan vibrators.
29.	1199-1959	Methods of sampling and analysis of concrete.
30.	3370-1965 & 1967 (Part 1 to 4)	Code of practice for concrete structures for the storage of liquids.
31.	2505-1980	General requirement for concrete vibrators, immersion Type.
32.	3558-1983	Code of practice for use of immersion vibrators for Consolidating concrete.
33.	4656-1968	Specifications for form vibrators for concrete.
34.	8989-1978	Safety code for erection of concrete framed structures.
35.	4990-1981	Specifications for plywood for concrete shuttering Works.
36.	6505-1985	Code of practice for installation of joints in concrete Pavements.
37.	3896-1991	Safety code of scaffolds and ladders.

In addition to the above I.S.codes, revisions and , latest amendments of the codes ,the specifications of A.P.S.S and manual for Quality Control and Inspection. shall also be compiled with.

4.2.0 GENERAL:

a) M5 and M7.5 grade of concrete shall be used for plain cement for laying screed layer (i.e. bed concrete) under the foundations of structures. The mix need not be designed and the nominal mix proportions given in the specifications shall be a adopted to produce the required grade of concrete.

b) M10 and above grade of concrete shall be used for plain cement concrete for casting the structural components of foundations and super structures.

c) M15 and above grade of concrete shall be used for Reinforced cement concrete for casting the structural components of foundations and super structures.

In both cases (b) and (c) above, the mix shall be of DESIGN MIX or NOMINAL MIX as the case may be as per the drawings and specifications. For Design mix, proportions shall be evolved in the laboratory and for the late, the proportions given in the specifications shall be adopted to produce the required grade of concrete.

4.3.0 SCOPE:

The specification covers the requirements of plain and reinforced concrete for various structures and comprised of: -

1. Cost of all materials of approved quality such as specified quality of cement, sand, graded coarse aggregate of specified MSA, admixture (if necessary), water, including the cost of seigniorage charges, sampling, testing of materials sales Tax and any other taxes imposed by the Government, required to manufacture a structural component of specified grade but excluding the cost of steel and its fabrication charges.

2. Conveyance of all materials with all leads.

3. Mixing of all ingredients by weigh hatching for the mix.

4. Hire and operational charges of all machinery (tools, plant and equipment)

5. Preparation of surface for placing of concrete.

6. Cost of initial dewatering, and dewatering during execution, diversion of stream and protection works as may be necessary during or after concrete works.

7. Designing and construction of form work for the structural component including scaffolding, shuttering and removing after curing

8. Transporting, the concrete with all leads, lifts,delifts either by labour or by placing in position, vibrating ,compacting , finishing and curing of the cement concrete, plain or reinforced and performing all other operations necessary and ancillary thereto, complete for finished item of works as specified in Schedule 'A' for M 7.5,M10,M 15, M 20 and above concrete mixes in any structural portion or its components as per the drawings and as directed by the Engineer-in-charge of the works.

9. Sampling testing, green cutting, repairing and finishing of concrete.

4.4.1 MINIMUM CEMENT CONTENT IN CEMENT CONCRETE FOR STRUCTURAL PURPOSE

For casting any structural component, keeping in view of durability requirements, whether it is a design or nominal concrete mix, the minimum cement content and Maximum water cement ratio should not be less than the following values for 20mm M.S.A. the cement content may be reduced by about 10% for 40mm M.S.A. and increased by 10 percent for 12.5 mm M.S.A.

	EXPOSURE	**PLAIN C.C.**		**R.C.C**	
		CEMENT (Kg/Cum)	**W.C.R.**	**CEMENT (Kg/Cum)**	**W.C.R.**
1.	Structural component completely protected against weather or aggressive conditions	220	0.70	250	0.65

2.	Structural component saturated with water buried concrete in soil and continuously under water	250	0.60	290	0.55
3.	Structural component exposed to sea water and subject to heavy corrosive fumes.	310	0.50	360	0.45
4.	Structural component of bridges	360	0.45	400	0.45
5.	Structural component of bridges(prestressed)	-	-	400	0.40
6.	Dams, spillways and mass concrete structures	150-230	-	355	-
7.	Cement concrete roads	350	-	-	-
8.	Cement concrete lining	250	0.6	-	-

In no case the cement content in a concrete mix for all cases should not exceed 540 Kg/cum

4.4.2. MAXIMUM NOMINAL SIZE OF COARSE AGGREGATE (MSA) FOR STRUCTURAL PURPOSES :

In the absence of specific mention in the drawings and contract documents, the maximum nominal size of coarse aggregate for different structural members are shown below :

STRUCTURAL COMPONENT :	**M.S.A.**
i) Structural components of buildings	20 mm
ii) Bridge works :	
1. RCC well curb	20 mm
2. RCC/PCC well steining	40 mm
3. Well cap or pile cap, solid type pier & abutments	40 mm
4. RCC work in girders, slabs, wearing coat, kerb, approach slabs, hallow piers and abutments, pier/abutment caps, piles	20 mm
5. PSC work	20 mm
iii)Foundations of structure and retaining walls Mass concrete)	40 mm
iv)Canal lining	
1. Lining of thickness 100 mm or more	40 mm
2. Lining of thickness 75 mm	20 mm
v) Cement concrete roads	25 mm
vi) Dams, spillways and Mass concrete structures	75,150-230 mm

Note : 1) The maximum size of coarse aggregate shall be as large as can be used practicably and economically under the given conditions, but shall not be large than any one of the following.

a) $1/4^{th}$, the narrowest dimension between the faces of forms.

b) $1/3^{rd}$, the depth of any slab.

c) $3/4^{th}$, the clear space between the reinforcement bars, and

d) $3/4^{th}$, the narrowest space through which the concrete shall have to be passed.

2) Maximum nominal size of aggregate shall also be restricted to the smaller of the following values.

a) 10mm less than the minimum lateral clear distance between the main reinforcements.

b) 10mm less than the minimum clear cover to the reinforcement bars.

4.4.3. Materials : The provisions made in schedule 'D' shall apply for cement, fine aggregate, coarse aggregate, water, admixtures, etc.

4.5.CONCRETE MIX PROPORTIONING :

The mix proportions shall be selected to ensure that the workability of fresh concrete is suitable for the conditions of handling and placing, so that it surrounds all reinforcements (in case of R.C.C.) and completely fills the formwork. when concrete is hardened, it shall have the required strength, durability and surface finish. The mix proportions shall be as follows.

4.5.1.DESIGN MIX CONCRETE :

The mix shall be designed in a laboratory to produce the grade of concrete having the required workability and a characteristic strength not less than values given in the following table. The procedure to design and produce the concrete, the standards given in IS: 10262-1982 Recommended guide lines for concrete mix design and SP:23 Hand book on concrete mixes published by B.I.S. shall be adopted.

GRADE OF CONCRETE	SPECIFIED CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 DAYS (N/SQ.MM)
M 10	10
M 15	15
M 20	20
M 25	25
M 30	30
M 40	40
M 45	45
M 50	50

4.5.2. NOMINAL MIX CONCRETE :

The following proportions shall be adopted for the nominal mix concrete.

GRADE CONCRETE	TOTAL QUANTITY OF DRY AGGREGATE PER 50 KG OF CEMENT (COARSE AGGREGATE + SAND)	MAXIMUM QUANTITY OF WATER PER 50 Kgs. OF CEMENT
M 5	800 KG	60 LITRES
M 7.5	625 KG	45 LITRES
M 10	480 KG	34 LITRES
M 15	350 KG	32 LITRES
M 20	250 KG	30 LITRES

Note :

a) Graded coarse aggregate shall be used.

b) For an average grading of fine aggregate to coarse aggregate the proportions shall be
1 : 1.5 for 10 mm M.S.A.
1 : 2.0 for 20 mm M.S.A. and
1 : 2.5 for 40 mm M.S.A.

c) In all cases, fine aggregate should conform to the grading of ZONE-II or ZONE-III of IS : 383-1970.

d) To overcome the difficulties of placement and compaction, if the quantity of water in a mix is increased, the cement content of the mix specified in the above table shall be proportionately increased, so that water cement ratio as specified is not exceeded.

e) In cash of vibrated concrete, the water content shall be suitably reduced to avoid segregation.

f) When, nominal maximum size of aggregate is 20 mm, a rough guide for the nominal mix proportions volume will be 1:3:6, 1:2:4 and 1:1.5:3 for M 10, M 15 and M 20 concretes respectively. For other sizes of aggregates adjustments in the ratios of the weight of coarse and fine aggregates shall be done.

4.6.0. PRODUCTION OF CONCRETE

4.6.1. BATCHING OF MATERIALS :

All materials entering into the concrete shall be batched by weight except water which shall be in litres. When the weight of cement is determined on the basis of weight of cement per bag, a reasonable number of bags should be weighed periodically to check the net weight. Admixtures if permitted by the Engineer-in-charge should be added to the concrete by weight.

All measuring equipment and weigh batching machinery shall be approved by the Engineer-in-charge and maintained in a clean serviceable condition and their accuracy shall be periodically checked. The batching and mixing plant for concrete is to be designed to suit the local conditions and output requirements as per IS: 4925-1968 specification of batching and mixing plant for concrete.

The aggregates of different sizes should be stocked in separate stock pile, the same shall be blended in right proportions to ensure a uniform grading of aggregate as determined by the Engineer-in-charge.

In case uniformity in the materials used for concrete making has been established over a period of time, the proportioning may be done by volume batching, provided periodic checks are made on weight/volume relationships of materials.

Where weigh batching is not practicable, the quantities of the coarse aggregate (not cement) may be determined by volume.

If the aggregate (sand) is moist and volume batching is adopted, allowance shall be made for bulking in accordance with IS: 2386 (part III)-1963 Methods of test for aggregates for concrete.

The amount of the added water to concrete shall be adjusted to compensate for any observed variations in the moisture contents determined by the above tests for both design and nominal mix of concrete making for weight and volume batching.

4.6.2. MIXING :

Concrete shall be mixed in a mechanical mixer complying with IS: 1791-1968 specification of batch type concrete mixtures. The mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. If there is a segregation after unloading from the mixer, the concrete should be remixed.

The Mixing time may be 1.5 to 2 minutes for all normal cements.

In exceptional circumstances, such as (i) mechanical break down, (ii) work in the remote areas (iii) when the quantity of concrete work is small. Hand mixing is permitted subject to adding 10 percent extra cement.

The Hand mixing shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

4.6.3. WORKABILITY

Workability of concrete should be controlled by direct measurement of water cement ratio. Workability should be checked at frequent intervals as per the procedure laid down in IS : 1199-1959 methods of sampling and analysis of concrete.

Slump test of check workability :

The slump test for concrete shall be adopted only for concretes of medium to high workabilities (i.e. slump 25 to 100mm), for every stiff mixes having zero slump, the slump test does not indicate any difference in concrete of different workabilities.

	TYPE	**SLUMP**
1.	a) Structure with exposed inclined surface requiring low slump concretes, to allow for proper compaction	25 mm

b) Plain cement concrete	25	mm
2. RCC structures with widely spaced reinforcement; e.g. solid columns, piers, abutments, footings, well steining	40-50	mm
3. RCC structures with fair degree of congestion of reinforcement e.g. pier, abutment caps, box culverts, well curbs and caps, walls with thickness greater than 300 mm	50-75	mm
4. RCC and PSC structures with highly congested reinforcement e.g. deck slab girders, box girders, walls with thickness less than 300 mm	75-125	mm
5. Under water concreting through tremie e.g. bottom plug, cast-in-situ piling	100-200	mm

VEE-BEE test method to check workability :

VEE – bee test shall be done for stiff concrete mixes having 'low' or 'very low' workability. The ranges for VEE-BEE-TIME method for some placing conditions are given in clause : 6 of IS : 456-197, which shall be followed.

4.7.0. FORM WORK :

4.7.1 General

The form work shall conform to the shape, lines and dimensions as shown on the plans and be so constructed as to remain sufficient rigid during the placing and compaction of the concrete and shall be sufficiently water tight to prevent loss of cement slurry from the concrete. The form work shall be made leak proof by providing Kraft paper.

Form work or centering shall be constructed of steel or timber and adequately designed to support the full weight of wet concrete without deflection and retain its form during laying, ramming, vibrating and setting of concrete. Timber used shall be properly seasoned to avoid deformation when wetted.

All rubbish, particularly chippings, shavings and sawdust, shall be removed from the interiors of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted (in case of timber) or treated by coating with a non staining mineral oil or other approved material. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

The forms shall be removed after expiry of the following periods in the normal circumstances and when O.P.C. is used for making concrete.

i)	Walls, columns and vertical faces of all structural members	24 to 48 Hrs. or as directed by the Engineer-in-charge.
ii)	Slabs (props left under)	3 days
iii)	Beam soffits (props left under)	7 days
iv)	Removal of props under slabs	
	i) Spanning up to 4.5 meter	7 days
	ii) Spanning over 4.5 meter	14 days
v)	Removal of props under beams and arches	
	i) Spanning up to 6.0 meter	14 days
	ii) Spanning over 6.0 meter	21 days

However the above periods may be increased or decreased at the discretion of the Engineer-in-charge.

All form work shall be removed without shock or vibration and shall be eased off carefully in order to allow the structure to take up load gradually. Forms shall not be disturbed until concrete has adequately hardened to take the superimposed load coming on to it and in no circumstances shall forms be struck until the concrete reaches a strength of at least twice the stress to which the concrete may be subjected to at the time of striking.

After removal of form work, in any case no concrete work shall be finished, plastered or made good in any form unless and until the Engineer-in-charge, inspect and certify the surface for such finishing, plastering or making good.

4.7.2. (b)COVER REQUIREMENTS :

Unless other wise specified in drawings and directed by the Engineer, the cover requirements for cast-in-situ structural members shall be as follows:

a) At each end of reinforcing bar not less than 25 mm nor less than twice the diameter of such rod or bar.

b) For a longitudinal reinforcing bar in a vertical member or a column not less than 40 mm nor less than the diameter of bar. In the case of columns of minimum dimensions of 200 mm or under whose reinforcing bars do not exceed 12 mm the cover of 25 mm shall be used.

c) For longitudinal reinforcing bar in a beam, not less than 25 mm, nor less than the diameter of such bar.

d) For R.C.C. members immersed in sea water, the cover shall be 50 mm more than specified in (a),(b) and (c) above.

e) For footing, resting directly on soil the minimum clear cover shall be 50 mm and in the case of concrete in contact with earth faces contaminated with chemicals, it shall be 75 mm.

f) Lesser thickness than those specified above shall be permissible for precast construction with the permission of the Engineer-in-charge.

g) For water retaining structures, the cover requirements are

i) for liquid faces minimum 25 mm or the dia of bar which ever is greater.

ii) for the faces away fromthe cover as prescribed above in the liquid (a) to (f) with respect to structural member

All reinforcement shall be placed and maintained in position as shown in the drawings as directed by the Engineer-in-charge adopting chairs and cover blocks with the tolerance limits specified in clause : 11.3 of IS : 456-1978.

The bars shall be supported/held in position by suitable means until concrete is poured. Any one of the following devices shall be used for the purpose. (i) Providing steel reinforcement supports/spacers, (ii) providing of mortar supports/spacers and (iii) providing plastic supports / spacers.

The steel support/spacers shall be used for slabs except in case of form finished surfaces. The Mortar units can be used for slabs, beams and columns as well as platered or form finished surfaces.

Use of pebbles, broken stone, metal pipe, brick, wooden blocks etc., as devices for positioning reinforcement will not be permitted.
(part 1 to 4)

Suitable shape and size of cement mortar cover block with proportion of (1:1) shall be used on the work as per the drawing and as directed and approved by the Engineer-in-charge.

4.7.3. FORM WORK
FINISHING :

The following specifications shall apply for the various types of formed surfaces.

4.7.3.1 General :

The classes of finish for formed concrete surfaces shall be designated by the use of symbol F1,F2,F3,F4 and shall be as described below.

Finish F1 shall apply to formed surface upon which or against which backfill of concrete is to be placed. The surface requires no treatment after removal of forms except removal and repairs of defective concrete. Correction of surface irregularities shall be done only for depressions which when measured exceed 25 mm.

Finish F2 shall apply to all permanently exposed formed surfaces for which finishes F3 and F4 are not specified. Surfaces for which finish F2 is specified will need no filling of Pits or Sack-rub and no grinding other than that needed for repair of surface. Imperfect surface, irregularities, measured shall not exceed 6mm for abrupt irregularities and 12mm for gradual irregularities.

Finish F3: Immediately after removal of forms from surfaces designated for F3 finish, all required patching, clean up and correction of major imperfections shall be completed and the surfaces shall be given a sack rubbed mortar finish as described below. The surfaces shall be thoroughly wetted and permitted to approach surface drying before starting the sack rubbing. The surfaces shall be finished in areas sufficiently large and shall prevent complete drying of any part before the sack-rubbing is completed for that area. The mortar used for the sack-rubbing shall consist of one part of cement to two parts, by volume, of sand passing in IS sieve 100 and enough water so that the consistency of the mortar is that of thick cream. The mortar shall be rubbed thoroughly over the area with clean brush be a sponge rubber float, completely filing all pits and irregularities.

4.7.3.2.UNFORMED SURFACES

The classes of finish for unformed concrete surfaces are designated by the symbols U1,U2 and U3. Interior surfaces shall be stopped for drainage where shown on the drawings. Surfaces which will be exposed to the weather and which would normally believed, shall be sloped for drainage. Unless the use of other slopes or level surfaces, is specifies narrow surface such as tops of walls and curbs, shall be sloped approximately at 3.0 cm per meter. Border surfaces such as walls, road way platforms and decks, shall be approximately at 1.5 cm per meter.

4.7.3.3. The classes of finish to be applied shall be as detailed below.

Finish U1 (Screeded Finish) shall apply to unformed surfaces that are to be covered by back fill or by concert, and surfaces of sub-floors which will be covered by concrete floor topping, Finish U1 is also used as the first stage for finishes U2 and U3. Finishing operation shall consist of sufficient levelling and screening to produce even and uniform surfaces. Surface irregularities, measured shall not exceed 10mm.

4.7.3.4. Finish U2 (Floated finish) shall apply to unformed surfaces that are to be covered by back fill or by concrete are unformed surfaces for which finishes U1 and U3 are not specified, and shall include floors of sumps, top of walls. Parking areas parapet walls, surfaces of gutter, side walls and outside entrance slabs. Finish U2 is also used as the second stage for finish U3. Floating may be performed by use of hand or power driven equipment. Floating shall be started as soon as the screeded surface has stiffened sufficiently, and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Finish U3 is to be applied, floating shall be continued until a small amount of mortar irregularities, shall not exceed 6 mm joints and edges of gutters, side walls, entrance slabs, and other joints and edges shall be tooled where necessary, dry ingredients of the mortar, in the same proportions shall be rubbed over the area. After the mortar has stiffened adequately to prevent smear but before it hardened the excess mortars shall be removed by rubbing with clean burlap. After the final sack rubbing a light fog spraying shall be applied to the coated surface, the moisture thus applied being just sufficient to damp the surface with out all owing water to run down the face of the walls. All sack-rubbed areas shall be kept continuously damp for at least 72 hours after the final sack rubbing or until completion of the curing period for the concrete. When measured abrupt irregularities shall not exceed 6 mm for irregularities parallel to the direction of flow, for irregularities exceeding these limits shall be reduced by grinding on a level of 1 to 20 ratio of height to length.

4.7.3.5. Finish F4 shall apply to formed surfaces where absorptive form lining is used surfaces provided by absorptive form lining shall not be rubbed or treated in any way except for cleaning by finish U3 (troweled finish) shall apply to unformed surfaces such as slabs to be covered with built up roofing or membrane water proofing, and stair treads. When the floated surface has hardened sufficiently to prevent excess of final materials from being drawn to the surface steel troweling shall be started. Steel troweling shall be performed with firm pressure so as to flatten the sandy texture of the floated surface and produce a dense uniform surface, free from blemishes and towel marks, light steel troweling will be permissible on surfaces of slabs to be covered with or membranes waterproofing, in which light trowel marks are not considered objectionable. Surface irregularities, measured shall not exceed 6 mm.

4.7.3.6. The following finishes shall be provided for the concrete used in the various works.

1.	Spillway crest	F3 or U2
2.	Spillway stilling basin	F3 or U2
3.	Spillway pipe	F3 or U2
4.	Spillway bridge road slab	F2 or U2
5.	Elevator tower exterior face	F4
6.	–do Interior	F2 or U2
7.	Around sluice	F3 or U2
8.	Around galleries, adits, sump well	F2 or U2

9. Face concrete in retaining wall F3 or U2
divide wall, or retaining wall (water side).

4.7.3.7. Tolerances for concrete construction :

Permissible surface irregularities for the various classes of concrete surface finishes specified and defined as finishes are to be distinguished from tolerance described herein

ii) Tolerance in Dams and Appurtenant works

1) All structures.

a) Variation of constructed line outline from established position in plan

In 6m 12 mm

In 12m 18 mm

b) Variation of dimension to individual structural features from established position.

In 24 meters or more 30 mm

In buried construction: twice the above amount.

c) Variation from the plumb from the specified batter or from the curved surfaces of all structures, including the lines and surfaces of columns, walls, piers and vertical joint grooves.

In 3 meters	12 mm
In 6 meters	20 mm
In 12 meters or more	30 mm

In buried construction: twice the above amount.

d) Variation from level from the grades indicated on the drawing in slabs, beams, soffits and horizontal joint grooves and visible areas.

In 3 meters	6 mm
In 10 meters	12 mm

In buried construction: twice the above amount.

e) Variation in cross sectional dimensions columns, beams, piers

Minus 6 mm to Plus 12 mm

f) Variation thickness of slabs, walls and similar members

Minus 6 mm to Plus 12 mm

g) For sills and side walls for gate and similar water tight joints variation from the plumb and level should not be greater than 3 mm in 3 meters.

h) Tolerance for placing reinforcement steel.

i) Variation of protective covering

With 5 cm cover	6 mm
With 7.5 cm cover	12 mm

ii) Variation from indicated spacing

10 mm for spacing	Greater than 15 cm
5 mm for spacing	Less than 15 cm

General requirements.

4.7.3.8. Forms shall be used where ever necessary to confine the concrete, shape it to the required lines, or to ensure against, contamination of the concrete by materials caving or sloughing from adjacent excavations or other features of the work. All exposed concrete surfaces having slopes of 1 to 1 or sleeper shall be formed where the side slopes of walls of an excavation for concrete structure can be trimmed to the prescribed lines without sloughing, the sloughing the use forms will not be required. Forms shall have sufficient strength to with stand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in correct position. Forms shall be tight to prevent loss of mortar from the concrete. Moulding strips shall be placed in the corners of forms so as to produce levelled edges at formed surface and edges are formed joints will not require beveling unless so indicated on the drawings. Forms for concrete surfaces for which finished F3 and F4 are specified shall be reset and tightened at construction joints, so that, unless they fits firmly against the hardened concrete when concrete replacement is resumed. Additional forms ties shall be as necessary to ensure against spreading of the reset forms under pressure of the subsequently placed concrete and consequent off-set from the previously formed face.

Tongue-and-groove sheathing :
Tongue-and groove sheathing, where used for forming shall be 10 cm to 15 cm common T & G and shall be placed horizontally.

4.7.3.9. Forms for warped surfaces designated for F4 finish :

Forms for warped surfaces shall be constructed so as to conform accurately to the required curvatures of the sections. Intermediate sections shall be interpolated as necessary for the type of form construction being used and the forms shall be constructed so that the curvatures will be continuous between sections. Where necessary to meet requirements of curvature the form sheathing built of laminated splices be cut to make tight and smooth form surface. The forms constructed such that the joint marks on the concrete surfaces inside of principle water conduits shall as far as possible follow the line of water flow. After the forms have hidden and any roughness and all angles on the surfaces of the forms caused by matching the form materials shall be dressed to the required curvatures.

4.7.3.10. Forms sheathing and lining :

Wood sheathing or lining shall be of such kind and quality or shall be treated or coated that there will be no chemical deterioration or discoloration of the formed concrete surfaces. The type and condition of form sheathing and lining, the ability of the forms to withstand distortion caused by placement and vibration of concrete and the workman ship used in form construction shall be such that the formed surfaces, after being finished will conform with the applicable requirements of these specifications pertaining to finish of formed surfaces. Where finish F3 is specified, the sheathing or lining shall be so placed that the joint marks on the concrete surfaces will being general alignment both horizontally and vertically. Except where otherwise specifically provided, materials used for form sheathing or lining shall conform with the following requirements.

Required	Wood sheathing or lining	Steel sheathing or lining finish of formed surface
F1	Any grade Steel sheathing permitted	Steel lining permitted.
F2 No. 1	common ship-lap Steel sheathing permitted	steel lining permitted if necessary
F3 No. 1	common tongue & grooved except where plywood lining or sheathing is specifically required	Steel sheathing not permitted Steel lining not permitted.
F4 No. 1	common tongue & grooved	Steel sheathing not permitted for plane or cylindrical surfaces.
	Thin plywood lining for warped surfaces	Steel lining not permitted.
F5	Absorptive form lining backed With No. 1 common ship-lap	Steel sheathing not permitted Steel lining not permitted

Note : **"**steel sheathing" denoted sheets not supported by backing of wooden boards. "steel lining" denotes thin steel sheets supported by backing of wooden boards.

4.7.3.11 Absorptive form lining :

Absorptive from lining, where directed to be used, shall be of the type and quality approved by the Executive Engineer. The form lining shall be highly absorptive to air and water and through its absorptive capacity able to eliminate voids, pits and other common effects from the concrete surface. The lining shall be readily removable from the concrete without damage to the surface. It shall produce dense concrete surface of uniform and satisfactory texture and colour. The lining itself and treatment employed in its manufacture shall not discolour the concrete nor interfere with normal chemical reaction of the cement. The backing to which absorptive lining

is attached shall be sufficiently smooth, even and free from cracks, knot holes, and other imperfections to avoid unevens in the finished surface. The lining shall be in sheets of uniform length and width, location and direction of joints shall be approved by the Executive

Engineer. The joints between sheets shall be fitted smoothly and accurate and patching shall be avoided. Cutting and trimming shall be true and shall be done with tools well adopted to this work so that sharp, smooth, square edges are produced. The lining shall be attached to the forms in such a manner that it is held securely and smoothly in place. Nails or tacks, if used, shall be spaced in uniform pattern and shall be drive flush. Dents and hammer marks in the surface of the lining shall be avoided. After then lining has been attached to the form, the joints shall be rubbed with a smooth tool to press down any projecting fibres. Where absorptive form lining is in contact with the face of previous pour, care shall be used in setting and sufficient pressure shall be applied in tightening form anchors to produce continuity and evenness at the face, free from offset, and streaks, and other irregularities. The lining shall be kept dry and shall not be reused.

4.8.0. TRANSPORTATION OF CONCRETE :

Concrete shall be transported from the mixer to the form work as rapidly as possible by methods approved by the Engineer-in-charge, which will prevent the segregation or loss of any of the ingredients and maintaining the required workability. The concrete shall be transported laid and compacted in its final position with in 30 minutes of its discharge from the mixer unless carried by in properly designed agitators. Where the time of haul exceeds 20 minutes mixed concrete shall be transported in a suitable agitators or transit mixer as directed and approved by the Engineer-in-charge.

4.9.0 PLACING OF CONCRETE :

All surfaces upon or against which concrete is to be laid shall be prepared, in accordance with the drawings.

No concrete shall be placed until all form works, installation of parts to be embedded and preparation of surface involved in the placing have been approved by the Engineer-in-charge. No concrete shall be placed in water except when specifically so permitted. All surfaces of forms and embedded materials have become in crusted with dried mortar from previously placed shall be cleaned before surrounding of adjacent concrete is placed.

If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again. The contractor shall notify the Engineer-in-charge at least 24 hours before batching begins for placement of concrete.

All absorptive surfaces against which concrete is to be laid shall be moistened thoroughly so that moisture will not be withdrawn from the freshly placed concrete. The concrete shall be deposited as nearly as possible in its final position and compacted before setting commences and should not be subsequently disturbed. Methods of placing should be such as to preclude segregation.

Care should be taken to avoid displacement of reinforcement or movement of form work.

Placing is allowed with a limitation of free fall of 1.5 meter.

All concrete shall be placed in continuous and approximate horizontal layers, the thickness of which shall not more than 450 mm for mass concrete and 150 mm for R.C.C. and plain cement concrete works.

Concrete shall not be placed faster than the placing crew can compact it properly. On sloping surfaces, concrete should be placed at the lower end of the slope first, progressing upwards, and thereby increasing natural compaction of the concrete.

High velocity discharge, which may cause segregation of the concrete, should be avoided. Recommended methods of placing concrete in segregation prone locations are :

4.9. a) **In narrow forms :** If very wet concrete is to be placed in narrow, deep form work, water content in the upper layers should be gradually reduced to compensate for water gain.

b) **Placing through side ports in column form work :**

Concrete shall be dropped vertically in to the outside pockets under each form work opening (port) so that concrete stops and then flows easily into the column form work.

c) **Placing on sloping surfaces :**

Concrete shall not be discharged from free end of a chute on to a sloping surface, as the heavier coarse aggregates are separated and carried down the slope. The chute should be fitted with a baffle and a drop at its end, so that concrete remains on slope.

d) **Temperature**

Concrete when deposited shall have a temperature of not less than 5 degree Celsius, and not more than 40 degrees Celsius.

Weather Conditions :

Concreting operations shall temporarily suspended during excessively hot or rainy weather when conditions are such that. The concrete cannot be placed and cured. during the hot weather, no concrete shall be deposited when the temperature with in the forms is more than 49 degree Celsius. When ever necessary exposed surface of fresh or green concrete shall be shaded from the direct rays of sun and immediately protected against premature setting or drying by being cured under continuous fine spray of water.During continued rainy weather or heavy downpour all freshly placed concrete shall be covered and protected against surface wash. Then all badly washed or stressed surface shall be removed and washed before depositing the next course.

e) **PREPARATION OF FOUNDATION SURFACE** :

Immediately before placing concrete all surfaces of foundations upon or against which concrete to be placed shall be free from standing water mud, debries, free from oil, objectionable coatings, loose, semi detached or unsound fragments of rock. Surface of rock shall be cleaned with the use of high velocity air jet, wet sand blasting, stiff brooms, picks or by effective means.

f) **PREPARATION OF CONCRETE SURFACE** :

Concrete surface upon which fresh concrete is to be placed shall be chipped and roughened to a depth of not greater than 25 mm. The roughening shall be performed by chipping or other satisfactory methods and in such a manner as not to loosen, crack or shatter, any part of the concrete beyond the roughened surface. After being roughened, the surface of the concrete shall be cleaned thoroughly of all loose, dirt and other objectionable substance and shall be sound and hard and in such condition as to assure good mechanical bond between old and new concrete. All concrete which is not hard, dense and durable shall be removed to the depth required to secure a satisfactory surface.

g) **CEMENT SLURRY AND MORTAR LAYER :**

After surfaces have been prepared satisfactorily, rock, old concrete and old masonry shall be coated with a thin layer of cement slurry (comprising 1 cement to 2/3 water by volume) and covered with a layer of mortar not less than 12 mm, not more than 20 mm thick. The mortar shall be similar to the mortar in the regular concrete mixture having the same cement sand ratio of the mortar used in concrete unless otherwise directed. The cement slurry and mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface, concrete shall be placed immediately up on the fresh concrete.

4.1 0.0.COMPACTION OF CONCRETE :

4.10.1 General : Compaction should preferably be achieved by mechanical vibration. But in isolated locations, it can also be achieved if approved by the Engineer-in-charge by manual methods, namely rodding, spading and tamping. The mechanical tamping and use of shock are restricted to special situations as approved by the Engineer-in-charge.

Under-vibration is harmful & should be avoided. Over-vibration may cause

(i) Settlement of the coarse aggregate **(ii)** heavy bleeding of the concrete,

(iii) Excessive form work deflection and from work damage.

The following vibrators shall be used for compaction as per directions of the Engineer-in-charge.

4.10.2 IMMERSION VIBRATORS :

Immersion vibrators as per IS:2505-1980 shall be used for consolidation of plain as well as reinforced concrete. They shall be of either

a) Flexible shaft type, powered by different types of motors or
b) Moor-in-head type, electrically or pneumatically driven.

While compacting with internal vibrators, concrete should be deposited in layer of 300 to 450 mm thick and the vibrator inserted vertically at uniform spacing over the entire area of placement. The vibrator should penetrate rapidly to the bottom of the layer and at least 150 mm into the preceding layer, if there is any. It should be held (generally 5 to 15 seconds) until the compaction is considered adequate and then withdrawn slowly at the rate of about 80 mm/second.

Operational frequency : 8000 to 12000 per minute.

4.10.3 SCREED BOARD TYPE VIBRATORS :

Concrete vibrators of screed board type as per Is:2506-1964 shall be used for compaction of concrete roads, floors, pavements and thin slabs, where the area to be compacted is large or the thickness is too small (less than 200 mm) to allow the use of immersion vibrators.

Operational frequency : 3500 per minute (under no load state)

4.10.4 FORM WORK VIBRATORS :

Formwork vibrators as per Is:4656-1968 shall be used for compaction of concrete, precast concrete moulds, gullies and deep post-tensioned beams. They shall be used for compaction of in-situ concrete is small and narrow sections of very heavily reinforced section where immersion of vibrators cannot be used. There are two types :

a. The fixed or clamped type, and

b. The manual type

Operational frequency 2800 per minute (under no load state)

4.10.5. VIBRATING TABLE :

Vibrating table as per IS:2514-1963 shall be used for compaction of concrete in moulds for the manufacture of precast products and structural elements.

They compact concrete through rapidly altering horizontal, vertical or circular vibrations which are transmitted to moulds filled with concrete and placed or clamped on the table top.

Operational frequency : 3000 to 6000 cycles per minute.

Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes and drying out.

4.11.0. CONSTRUCTION JOINTS GREEN CUTTING AND SAND BLASTING :

4.11.1 CONSTRUCTION JOINTS :

Construction joints are the stopping places in the process of placing of concrete as it is impracticable to place concrete in a continuous operation. The position and arrangement of joints are predetermined as shown in the drawings and as directed by the Engineer-in-charge as per the site and conditions of placing.

The Spacing of construction joints shall be determined by the design parameters, construction limitations, type of work and site conditions and shall be as few as possible. These shall be provided at proper places where they may be carefully constructed with attention to workmanship. From the strength of structure consideration, it is desirable to position construction joints at points of MINIMUM SHEAR (Clause 12.4, 1 and 12.4.2 of Is:456 1978).
If directed by the Engineer, joint should be supplemented by dowels to provide adequate bond between the old and new concrete.

When the work has to be resumed on a surface which has hardened, such surface shall be roughened. It shall then be swept clean and thoroughly wetted. For vertical joints neat cement slurry shall be applied on the surface before it is dry. For horizontal joints the surface shall be covered with a layer of mortar about 10 to 15 mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This cement slurry or mortar shall be freshly mixed and applied immediately before placing of the concrete.

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 aggregate. the surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry. On this surface, layer of concrete not exceeding 150 mm in thickness shall first be placed and shall be well rammed against old work, particular attention shall be paid to corners and close spots, work thereafter shall proceed in the normal way.

4.11.2 GREEN CUTTING :

The surface of the respective lift shall be thoroughly green cut with an air water jet. Green cutting is usually done 8 to 12 hours after the top surface of a concrete lift had been

completed and sufficiently hardened. The actual time for taking up the green cutting operation shall depend upon the following factors.

a. Concrete placement temperature;
b. Atmosphere temperature;
c. Concrete mix; and
d. Slump.

The air water jet will remove the thin surface film of laitance and grout to expose clean surface.

Green cutting, if done at the proper time, shall yield very good results. When started too early, it shall result in over cutting and removing too much mortar. It is also liable to loosen the aggregate particles and leaving too poor a surface to bind the fresh concrete. On the other hand, if green-cutting is delayed too long, the cutting action of the air and water jet would be ineffective for proper removal of laitance. It therefore, requires much greater care and judgment for proper use at proper time.

Skill of Jet Operator: Besides determining the proper time for initiating green cutting, the process will require constant attention on the part of the air water jet operator. By correct manipulation of the high velocity air-water jet, a trained operator can ensure the removal of the thin surface film of laitance and grout effectively and at the same time, leaving the aggregate stones, already embedded in the mortar, undisturbed.

Proper Air-water Gun : In addition to the skill of the jet operator, a proper air water gun also a vital requirement for effective green-cutting, the issuing nozzle must be about 460 mm (18 inches) long to ensure the requisite cutting force close to the concrete surface.

Quantum of compressed air and Water for effective green-cutting, it is essential that the air pressure should be around 6.33 to 7.03 kg/cm^2 · It should not be allowed to fall below 6.33 kg/cm^2. The water pressure, of course should be sufficient to bring the water into effective influence of the air pressure. As an approximate estimate, the quantity of compressed air required by the green-cutting gun is 2 cubic meters per minute and the quantity of water is 60 gallons (273 Litres) per minute.

An important aspect to be taken note of is that green-cutting as an exclusive operation shall be fully useful only if the next lift of concrete is placed within 3 to 4 days (or a maximum of 5 days) of the placement of the previous lift. If there be a delay in concrete placement beyond this period, the laitance will come up to the concrete surface again at some places. Removal of such laitance shall then be not possible by the ordinary green-cutting operation alone. Light sand blasting of even the green-cut lifts shall have to be resorted to. However, if there is excessive delay in concrete placement, it will require either "Wet sand blasting" or the application of high pressure "water blaster" to remove the laitance for effective binding with the fresh concrete. The effect to achieve this will be considerably less if green cutting has already been done.

4.11.3. SAND BLASTING :

Sand blasting is the process of roughening and cleaning the surface of old and set concrete by means of coarse sand and air applied under pressure of 6.33 to 7.03 kg/cm^2 through a nozzle, so as to erode the laitance and grout from the old concretes. Sand blasting of rock is also done so that concrete may be placed on or against a clean surface of rock as required according to specifications.

There are two types of sand blasting, namely "wet sand blasting" and "dry sand blasting". In wet sand blasting water is also used along with sand and air under pressure, while in the later, only sand and sir under pressure are used. Normally the concrete and rock surface etc., are wet sand blasted to keep down the dust.

The percentage of different sizes of sand particles for efficient sand blasting shall be as follows :

Size	Percentage
8 mesh per inch (25.40 Millimetres)	26
16 mesh per inch (25.40 Millimetres)	30
30 mesh per inch (25.40 Millimetres)	23

For effective sand blasting, it is essential that pressure of air should be between 6.33 to 7.03 KG/CM^2. If pressure falls below 6.33 KG/CM^2, sand blasting becomes ineffective, If sand having large percentage of fines is used, it will not provide the requisite cutting power and the whole effort goes waste. A good quality well graded sand (sand-blast-sand) is needed for achieving the objective of sand blasting.

High Pressure Water Blasters Green cutting is far cheaper than sand blasting. Proper quality sand (known as sand-blast-sand) is most expensive item and special efforts are needed to arrange such sand. A high pressure water blaster offers a workable alternative to sand blasting.

Summary : Green-cutting offers the most economical methodology in the preparation of good construction joints. It has, however, to be initiated at the proper time and with a proper air-water gun to yield the best results. It is far cheaper than sand blasting. If a delay of more than 3 to 5 days is anticipated in placing the concrete over the previous lift, the concrete surface of the lift should be properly "green cut" and thereafter (say one day prior to placement of concrete) it should be light sand blasted or water blasted in order to remove the "re-appeared" laitance.

4.11.4. OTHER REQUIREMENTS OF CONCRETE CONSTRUCTION :

4.11.4.1 All Concrete construction shall conform to the permissible tolerance and technical provisions as described in the section. All structures shall be built in a workman-like manner, to the lines, grades and dimensions shown in the drawings or as prescribed by the Engineer-in-charge. The location of all the construction joints shall be subject to the approval of the Engineer-in-charge. The dimensions of each structure shown on the drawings shall be subject to such changes as may be found necessary by the Engineer-in-charge to adopt the structure to the conditions disclosed by the excavation.

4.11.4.2 Concrete in various components of Bridges, under tunnels, Aqueducts etc.

Expansion joints shall be constructed as shown on the drawings or as directed. Premoulded bituminous fibre type expansion joint material shall be placed in the expansion joints. Lighting recesses shall be constructed in the parapets as directed by the Engineer-in-charge. Open joints or false joints shall be constructed as shown on the drawings or as directed by the Engineer-in-charge . Performed expansion joint filter shall be placed in the road way and side walls where shown on the drawings or as directed by the Engineer-in-charge.

4.11.4.3.Concrete in Block Outs :

(a) Care shall be taken in placing the concrete in block outs in order to ensure satisfactory bond with the concrete previously placed and to secure compete contact with all metal work in the block outs.

(b) The roughening of the concrete surface of the block outs shall be performed by chipping or sand blasting as approved by the Engineer-in-charge and in such a manner as not to loosen, crack or shatter any part of the concrete beyond the roughened surface. The surface of the concrete shall then be cleaned thoroughly of loose fragments, dirt and other objectionable substances in order to ensure good mechanical bond between the existing and new concrete. All concrete which is not hard, dense and durable shall be removed to the depth required to the satisfaction of the Engineer-in-charge.

4.11.4.4 Embedment in Concrete :

In some of the locations of structures a few conduit openings shall have to be provided through RCC/PCC as shown in the drawings. Placement of concrete shall be suitably carried out around such conduits or openings. No extra claim shall be entertained.

4.12.0 CURING :

4.12.1 General :

All equipment material etc., needed for curing and protection of concrete shall be at hand and ready for installing before actual concreting begins. Detailed plans, methods and procedures and protection shall be settled and got approved in writing from the Engineer sufficiently in advance of the concreting. The equipment and method proposed to be utilized shall avoid interruption or damage to the work.

The vertical and sloping concrete surfaces shall be kept saturated with a system of perforated pipes / mechanical sprinklers / porous hoses / any other suitable method which will keep all surfaces continuously wet.

4.12.2 Moistcuring :

Exposed surfaces of concrete shall be kept continuously in a damp or wet condition (to avoid formation of surface cracking due to alternate wetting and drying) by ponding or by covering with layer of sacking, canvas, hessain or similar materials and kept constantly wet for at least SEVEN DAYS from the date of placing of concrete, if O.P. Cement is used in the concrete.

It may be reduced to3 to 4 days when rapid hardening Portland cement is used, but greater care shall be exercised, particularly at early stages when rate of hydration is high.

4.12.3. Membrane curing :

Approved curing compounds shall be used in lieu of moist curing with the permission of the Engineer-in-charge. These compounds shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set and the free water on the surface has disappeared and no water sheet is seen. But not so late that, the compound will be absorbed into the surface pores of the concrete.

4.13.0 SAMPLING AND STRENGTH OF CONCRETE :

4.13.1 General :

The sampling shall be done as per the specifications laid down in IS: 1199-1959 specification for sampling and analysis of concrete, and testing of concrete shall be carried in accordance with IS: 516-1959 specification for testing strength of concrete.

For relatively small and unimportant buildings and structure in which quantity of concrete is less than 15 cum, the strength tests may be waived by the Engineer-in-charge.

The sampling scheme given in clause : 14 and the acceptance criteria given in clause : 15 of IS:456-1978 are applicable to both design mix and nominal mix concrete. In the case of the later, the preliminary tests for establishing the mix proportions are not necessary.

Concrete of each grade shall be assessed separately.

The concrete under acceptance shall be notionally divided into lots for the purpose of sampling, before commencement of work. The delimitation of lots shall be determined by the following:

i. No individual lot shall be more than 30 cum in volume

ii. At least one cube forming an item of the sample representing the lot shall be taken from concrete of the same grade and mix proportions cast any day.

iii. Different grades of mixes of concrete shall be divided into separate lots.

iv. Concrete of a lot shall be used in the same identifiable component of the structure.

4.13.2.SAMPLING AND TESTING :

a) Concrete for making 3 test cubes shall be taken from a batch of concrete at point of delivery into construction according to procedure laid down in IS:1199.

b) A random sampling procedure to ensure that each of the concrete batches forming the lot under acceptance inspection has equal chance of being chosen for taking cubes shall be adopted.

c) 150 mm cubes shall be made, cured and tested at the age of 28 days for compressive strength in accordance with IS:516. The 28-day test strength result for each cube shall form an item of the sample.

d) Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or for any other purpose.

e) The test strength of the sample shall be the average of the strength of 3 cubes. The individual variation should not be more than + 15% or – 15% of average.

f) Frequency : The minimum frequency of sampling of concrete of each shall be :

QUANTITY OF CONCRETE IN WORK, Cum / NO. OF SAMPLES

1-5	1
6-15	2
16-30	3
31-50	4
51 and above	4+one additional sample for each additional 50 cu.m or part thereof.

At least one sample shall be taken from each shift of work.

4.13.3 : Test procedure In order to get a relatively quicker idea of quality of concrete, optional tests on beams for modulus of rupture at 72+2 hours or at 7days, or compressive strength tests at 7days may be carried out in addition to 28 days compressive strength tests. For this purpose, the values given in tables may be taken for general guidance in the case of concrete made with ordinary Portland cement. In all cases, the 28 days compressive strength specified in Table shall be alone be the criterion for acceptance or rejection of the concrete. If, however, from tests carried out in a particular job over a reasonably long period, it has been established to the satisfaction of the engineer that a suitable ratio between 28 days compressive strength and the modules of rapture at 72+2 hours or 7 days or compressive strength at 7days may be accepted, the engineer may suitably relax the frequency of 28 days compressive strength provided the expected strength values at the specified early age are consistently met.

OPTIONAL TESTS REQUIREMENTS OF CONCRETE

Grade of concrete	Compressive Strength on 15 cm cubes min at 7 days	Modules of Rupture By Beam Test,Min at 72 + 2H	at 7 days
(1)	(2)	(3)	(4)
	N/mm^2	N/mm^2	N/mm^2
M-10	7.0	1.2	1.7
M-15	10.0	1.5	2.1
M-20	13.5	1.7	2.4

4.13.3.1.Standard Deviation

(i)**Standard Deviation Based on Test Results :**

a) Number of test results : The total number of test results required to constitute as acceptable record for calculation of standard deviation shall be not less than 30. Attempts should be made to obtain in the 30 test results, as early as possible, when a mix is used for the first time check additional condition of about 5 samples.

b) Standard deviation to be brought upto date: The calculation of the standard deviation shall be brought up to date after every change of mix design and at least once a month.

(ii)**Determination of Standard Deviation:**

(a) The Standard deviation of concrete of a given grade shall be calculated using the following formula from the results of individual tests of concrete of that grade.

Estimated standard deviations = Sqrt [(sigma (delta sqr)]/(n-1) =
where Delta = deviation of the individual test strength from the average
n = number of sample test results

(b) When significant changes are made in the production of concrete batches (for example changes in the materials used, mix design, equipment or technical control), the standard deviation value shall be separately calculated for such batches of concrete.

4.13.3.2 Assumed Standard Deviation :

Where sufficient test results for a particular grade of concrete are not available, the value of standard deviation given in the following table may be assumed.

ASSUMED STANDARD DEVIATION

GRADE OF CONCRETE DIFFERENT	STANDARD DEVIATION FOR DEGREES OF CONTROL IN N/MM^2		
Very Good	Good	Fair	
M 10	2.0	2.3	3.3
M 25	2.5	3.5	4.5
M 20	3.6	4.6	5.6

However, when adequate past records for a similar grade exist and justify to the designed a value of standard deviation different from the shown in the above table, it shall be permissible to use that value.

4.13.3.3. **ACCEPTANCE CRITERIA** :

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 through less than the characteristic value; is in each case not less than the greater of

1) the characteristic strength minus 1.35 times the standard deviation; and

2) 0.80 times the characteristic strength : and the average strength of all the samples is not less than the characteristic strength plus [1.65 – 1.65 / Sqrt. (number of samples)] times the standard deviation. The concrete shall be deemed not to comply with the strength requirements if :

a) the strength of any sample is less than the greater of :

1) the characteristic strength minus 1.35 times the standard deviation; and

2) 0.80 times the characteristic strength :

b) and the average strength of all the samples is not less than the characteristic strength plus [1.65 – 3 / sqrt. (number of samples)] times the standard deviation.

Concrete which does not meet the strength requirements as specified but has a strength greater than that required may, at the discretion of the designer, be accepted as being structurally adequate without further testing.

If the concrete is deemed not to comply the structural adequacy of the parts affected shall be investigated and any consequential action as needed shall be taken.

Concrete of each grade shall be assessed separately.

Concrete shall be assessed daily for compliance.

Concrete is liable to be rejected if it is porous or honey-combed; its placing has been interrupted without providing a proper construction just (or) tolerances have not been met. However, the hardened concrete may be accepted after carrying suitable remedial measures to the satisfaction of the Engineer-in-charge.

4.13.3.4: CORE AND LOAD TESTS :

Inspection : Immediately after stripping the form work, all concrete shall be carefully inspected and any defective work or small defects either removed or made good before concrete has thoroughly hardened.

In case of doubt regarding the grade of concrete used, either due to poor workmanship or based on results of cube strength tests, compressive strength tests of concrete and or load test may be carried out.

a) Core Test:

The points from which cores are to be taken and the number of cores required shall be at the discretion of the Engineer-in-charge and shall be representative of the whole of concrete concerned. In no case, however, shall fewer than three cores be tested.

Cores shall be prepared and tested as described in I.S : 516-1959.

Concrete in the member represented by a core test shall be considered acceptable if the average equivalent cube strength of the cores is equal at least 85 percent of the cubes strength of the grade of concrete specified for the corresponding age and no individual core has a strength less than 75 percent.

In case the core test results do not satisfy the requirements of or where such tests have not been done, load test may be resorted to.

b) LOAD TESTS ON PARTS OF STRUCTURES :

Loading tests should be carried out as soon as possible after expiry of 28 days from the time of placing of concrete. The structure should be subjected to a load equal to full dead load of the – structure plus 1.25 times the imposed load for a period of 24 hours and then the imposed load shall be removed.

NOTE : Dead load includes self weight of the structural members plus weight of finishes and walls or partitions, if any, as considered in the design. The deflection due to imposed load only shall be recorded. If within 24 hours of removal of the imposed load, the structure does not recover at least 75 percent of the deflection under superimposed load, the test may be repeated after a lapse of 72 hours. If the recovery is less than 80 percent, the structure shall be deemed to be unacceptance.

The contractor is to conduct the tests prescribed the Department by impounding water over the slab for a sufficient period for ensuring that the slab of the structure (UT, Super Passage or aqueduct) is leak proof.

4.13.4. ACCEPTANCE CRITERIA :

Two sets of criteria for demonstrating that the concrete as produced and casted either completes or does not comply with the IS : 456 – 1978 requirements for concrete quality.

a) requirements of strength and
b) requirement of workmanship.

COMPRESSIVE STRENGTH : When both the following conditions are met, the concrete compiles with the specified compressive strength.

a) The mean strength determined from any group of four consecutive samples should exceed the specified characteristic compressive strength.
b) Strength of any sample is not less than the specified characteristic compressive strength minus 3 MPa.

4.13.5. REJECTION CRITERIA : concrete is liable to be rejected if it is

a) Porus or honey-combed, (due to incorrect mix proportions or improper compaction techniques).

b) Its placing –has been interrupted without providing a proper construction joint.

c) The reinforcement has been displaced beyond the tolerance limit.

d) If the core tests/ load test does not yield the results.

e) If the strength of the concrete produced and casted does not yield the strength requirements of the code.

f) If the test results of the test cubes obtained as per I.S. 1199 and tested as per IS: 516 does not yield the strength requirements of the code acceptance criteria, the Engineer-in-charge with the consultation of the designer will consider the technical – consequences such as durability, strength, serviceability, economic consequences, cost replacement, cost of strengthening the weak point etc.,

However, the hardened concrete shall be accepted only after carrying out suitable remedial measures to the satisfaction of the Engineer-in-charge.

4.14. UNACCEPTABLE WORK:

All defective concreting work including-but not limited to defects arising out of honey-combing, under sizing, under strength etc., are liable to be demolished and rebuilt by the contractor, at his cost. In the event of such work being accepted by carrying out repairs etc., as specified by the Engineer-in-charge the cost pf repairs shall be borne by the contractor. Acceptance of such works will be in accordance with the provisions of IS:456-1978.

Visible defects noticed in the workmanship and quality which could be rectified through remedial measures, shall be rectified to the satisfaction of the Engineer-in-charge.

Deficiency in workmanship which is considered to be attributable to some inadequacy in concrete production or concrete haulage, or concrete placement method, or compaction should be got remedied from the contractor by the Engineer-in-charge through additional input and up gradation of methodology and work taken up subsequently only when the needed augmentation has been done. If the subsequent work is within acceptable level,

steps should be taken to remedy the defects noted in the earlier work through appropriate measures. After the defects have been remedied to the satisfaction of Engineer-in-charge and provided that the inputs (cement, aggregate, water etc.,) are within the specified quality standards, the concerned work shall be accepted.

In case the Engineer-in-charge observes basic and serious deficiencies in the quality of inputs and outputs as well as workmanship, revealed through perusal of test records and visual inspection as well including say, examination of cores (taken from in situ concrete lining). as also serious inadequacies in construction equipment and job facilities in enforcing the technical specifications, such portions of works shall be rejected and not accepted for any payment. In the absence of any positive measures to strengthen these structures/works, the Engineer-in-charge may arrange for their demolition and reconstruction.

There could be portions of work/works, where some sort of slight transgression of specifications / quality levels has been taken place and which is not feasible of rectification in full. In case it is determined that the integrity of such portions of work is not significantly impaired and that the functional capability can be assured, consideration may be given by the Engineer-in-charge (subject to full satisfaction of the Engineer-in-charge) to accept these at reduced payment to the contractor instead of demolishing the concerned portion of work and re-constructing it.

5.0 CANAL LINING

5.1 **General :**

a) **These specifications apply to :**
Clearing site, preparation of sub grade in soils and rock, providing under drainage, pressure relief arrangements, anti salt treatment, placing model sections, laying plain cement concrete with machine crushed hard broken graded quartzite granite/otherthan granite metal of 40 mm/20 mm maximum nominal size and using cement level of not less than 250 kgs per cubic meter of concrete to yield a 28 days characteristic compressive strength specified based on laboratory tests for bed and sides respectively using conventional placement of concrete lining.

b) If during construction, it is found necessary to alter the canal sections and side slopes without altering the thickness of lining, the contractors shall be informed in writing of such change. The rates quoted being on one square meter basis for specified thickness, the contractor shall have to execute the work at the same tender rates as quoted in Schedule-A without any extra claim for change in the section of canal.

c) The scope of work also includes the following :

i. Dewatering the canal section for preparing the base for lining and for laying concrete lining.

ii. Providing necessary, under drainage arrangements consisting of longitudinal and transverse drains, pressure relief valves as per drawings.

iii. Providing filter materials of approved quality as per design.

iv. Bed and side lining of the grade as specified in the schedule 'A' i.e., cement concrete with machine crushed hard broken graded Quartzite/granite/other than granite metal of 40mm/20mm nominal size and using cement of not less than 250 kgs/cum of concrete to yield a characteristic compressive strength specified based on laboratory tests respectively.

v. Providing grooves for joints by cutting the concrete to the required depth and width as per drawings.

vi. Curing

vii. Filling joints.

5.2 Applicable Publications :

All concrete, its constituents, methods and procedures of manufacture shall conform to Indian Standard Specifications and other publications listed below unless otherwise specified.

Indian Standards.

1.	IS:456-1978 (Second Revision-Amendment No.1)	Code for practice for plain and reinforced concrete.
2.	Is:3873-1978 First Revision	Code for practice for laying in-situ cement concrete lining of canals.
3.	IS:2505-1980	General requirements for concrete vibrators (immersion type).
4.	IS:2506-1985	General requirements for screed board concrete vibrators.
5.	IS:3366-1965	Specifications for pan vibrators
6.	IS:3558-1983	Code of practice for use of immersion vibrators for Consolidating, concrete.
7.	IS:4558-1983 (First Revision)	Code of practice for under drainage of lined canals.
8.	IS:5256-1968	Code of practice for sealing joints in concrete lining on canals.
9.	IS:3085-1965	Methods of test for permeability of cement mortar and concrete.
10.	IS:1199-1959	Method of sampling and analysis of concrete.
11.	IS:516-1959	Method of tests for strength of concrete. (Amendment No.1)
12.	IS:5529-1985 (Part 1 & 2)	Code of practice for In-situ permeability test.
13.	IS:9103-1979	Specifications for admixtures for concrete.
14.	IS:2720-1980 (Part. 7) Second Revision)	Methods of test for soil Determination of water content dry density relation using light compaction.
15.	IS:9451-1985	Guidelines for placing lining for canals in expensive soils.

In addition to the above I.S.codes, revisions and , latest amendments of the codes ,the specifications of A.P.S.S and manual for Quality Control and Inspection. shall also be compiled with.

5.3. Preparation of Subgrade :

5.3.1 Scope : Preparation of sub grade (Back filling) to canal side and bed lining with CNS soils of approved quality obtained from available canal spoil including cost and conveyance of soils, clearing the site, dewatering if necessary, treatment of the soil in moistening compacting to 98% proctor's density with suitable compacting of equipment, trimming, all water leads, lifts, delifts and all the operations necessary to complete the finished item of work to specifications as per drawings or as directed by the Engineer-in-charge.

5.3.2 Clearing site :

The area proposed for lining the canal as a whole shall-be cleared of all objectionable material. Any waste material contained from such site clearance shall be disposed of in a manner directed by the Engineer-in-charge. The cost of this operation shall be deemed to having covered under the rates quoted for canal lining.

5.3.3 General :

The provisions of this Para shall apply to the preparation of all sub grade upon which concrete lining is to be laid.

The work of trimming canal section up to the under side of concrete lining and preparing for sub-grade for concrete placement includes removal of proud section. Proud equivalent to thickness of lining on sides and in bed on the underside of lining

should be left un-excavated and the removal of this proud should be done prior to laying of lining but in no case, should the time interval exceed 3 days in normal weather and two days in adverse weather conditions.

It shall be ensued that the sub grade is made thoroughly moist with fine water spray. through development of proper nozzles, to a depth of about 15 cms to prevent it from absorbing water from the freshly laid concrete.

Soil in all reaches should be tested for salt content before lining is started. Where the salt content is over one percent or sodium sulphate is over 0.36 percent, the sub grade should first be covered with about 2 mm thick layer of bitumen if ordered by the Engineer-in-charge. It shall be treated in accordance with Para 4.3 of IS:3873-1978.

Preparation of sub grade for concrete lining shall conform to clause 4.1 to 4.5 of IS:3873-1978

Where ever rock is over excavated it shall be filled as specified under subsequent paras. At the end panels of existing lining against which lining is to be placed under these specifications. all these materials shall be removed in voids beneath the existing lining shall be refilled and thoroughly compacted.

5.3.4 SUB-GRADE :

(i)Preparation of sub grade consisting of earth.

a) The sub grade shall be prepared, dressed and rolled true to level and according to the required cross-section of the canal to form a firm compacted bed for lining.

b) The contractor shall place selected bedding material, test profile true to the cross-section of the canal at time and places designated by the Engineer to show the adequacy of these construction procedures for laying bedding material. The test sections shall conform to clause 4.5.2 of IS:3873-1978. The cost of this operation shall be deemed to have covered in the rates quoted for side and bed lining.

c) In other than predominantly sandy reaches where the dry density of the natural soil is not less than 1.8 gm per cubic centimetre, initial excavation shall be done upto about 300 mm above the final section and the cutting to final shape shall be done immediately before lining. The compaction shall conform to Clause 4.5.6 of IS:3873-1978.

d) If at any point material of prepared sub grade has been excavated beyond the neat lines required to receive lining, the excess excavation shall be filled in horizontal layers with suitable semi previous soil material compatible with the sub grade material moistened and thoroughly compacted in accordance with CI.4.5.5 and 4.5.6 of IS 3873-1978. Where placing and compacting bedding materials is on sloping foundation.

If at any point, the foundation material is disturbed or loosened during the excavation process or otherwise, it shall be moistened if required, and thoroughly compacted by tamping, rolling or other approved methods to form firm foundation for placing the concrete lining. slope compactors may also be used for effective compaction of sub grade.

e) In bed, where the dry density of the natural soil is less than 1.8 gm per cubic centimetre and sub soil water is near the sub grade, the consolidation shall be done by under cutting the bed by 7.5 cm and then ploughing up to 15.0 cm below the sub grade level. The loosened soil shall then be recompacted with suitable devices. All along the canal alignment the rain cuts on the banks shall be filled up with approved soil and shall be compacted adequately to required lines, dimensions and levels.

f) In bed where the sub soil water is low, requiring no dewatering and the dry density of the natural soil is less than 1.8 gm per cubic centimetre, the consolidation shall be done by digging the canal up to sub grade level and after loosening the earth below sub grade up to 15.0 cm by disc harrows, or ploughing and compacting the same to a layer of 11.0 cm. After

that, the second layer of 15.0 cm of earth shall be laid over the compacted layer by taking earth from lip cutting and compacting this to a depth of 11.0 cm. The compacted layer of 7.0 cm above the sub grade level shall be removed and the sub grade brought to design profile before laying the lining.

g) Consolidation on sides shall be done by suitable slope compactors to obtain a minimum dry density of not less than 90-98% of the density at optimum moisture content obtained in accordance with IS:2720(Part vii) 1965. Compaction by manual labour shall not be permitted.

(ii) **Preparation of sub grade consisting of rock**.

a) The sub grade in rock shall be excavated to the required cross section. Final cutting for 450-600 mm in hard rock shall be carried out by wedging, barring, controlled blasting or trimming with the help of suitable equipment. No extra payment will be made to this.

b) The bed and side slopes of the canal excavation profile over which the bedding-material, under drainage and pressure relief arrangements are to placed and over laid with lining shall be finished accurately to true and even surfaces and to the dimensions shown on the drawings.

c) All excavation including over breakages below the lines of the under side of lining shall be back filled as follows:-

IN SLOPES : In slopes, the selected bedding material shall be semi previous materials forming, the bulk of back fill with smaller aggregate filling the voids, and a layer of gravel as binding material duly compacted with rammers to form a firm backing for the lining (IS:3873-1978).

IN BED : In case of bed, the selected bedding material shall be rock spalls and chips available from canal cutting duly compacted with Diesel Road Roller to form a firm backing to lining (IS:3873-1978).

Tolerance in Excavation : Excavated profile provides the final base for lining and tolerances should be comparable to the following.

Departure from established alignment.
(+) or (-) 2 mm on straight section
(+) or (-) 50 mm on tangents, and
(+) or (-) 100 mm on curves.
(+) or (-) 20 mm Departure from established alignment

The above tolerance shall be negotiated gradually, through smooth transition in a length of 50m. No over-run in excavation. Filling with the materials as directed by the engineer, shall be paid to the contractor.

The selected bedding material in the cases of bed and sides of canal profile in normal soils shall be graded filter material compatible with sub grade material and thoroughly compacted.

(iii) **Preparation of sub grade consisting of expansive soils (IS:9451-1995)**

a) Field and laboratory experiments shall be carried out to determine the physical, textural, Engineering and chemical properties of the black cotton soils/expansive soils and evaluate the swelling pressures of soils in various reaches to establish the thickness of CNS layer required so that the determination is within the permissible limit.

In respect of the provision of CNS layer is worked out from the consideration of swelling pressure. However the thickness of CNS layer to be provided on slopes shall in addition, be governed by the construction consideration viz., from roll able width consideration for achieving effective compaction. However making due allowance for field controls, variations in the properties of CNS materials in the field an optimum thickness of 600 mm normal to the slope shall be used in the channels of discharge more than one cumec. The thickness shall be appropriately decreased to 300 mm (150mm in small section of less discharges) channels. Filling and compaction of CNS material in such channels shall be done by pad/file and cut method as specified in the drawings.

5.3.5 C.N.S. BACK-FILL

Formation of CNS soils backing to lining for bed and sides of the canal including breaking clods, sectioning, watering, and consolidation with 8-10 ton power roller to 98% proctor,

density at optimum moisture content including spreading of horizontal layers of not more than 100 to 150 mm thick up to the top level of P.C.C. lining.

The surface to receive the filling shall be first cleared free from all roots, vegetation or spoil and when wetted and rolled thoroughly. The C.N.S. soils to be used for filling shall be free from salts or organic or other deleterious matter. All clods of the soils selected shall be broken to small pieces less than 100 mm size. No stones cobbles having maximum dimensions more than 100 mm size shall be placed in the fill. Filling shall be done in layers not exceeding the compacted thickness of 100mm to 150mm each layer being watered and compacted before succeeding layer is laid. If the moisture is below the optimum moisture content for the given compaction. Then the required water shall be added by sprinkling. If the moisture content in the soils is more than optimum moisture content than it shall be allowed to dry down to the optimum moisture content. The moisture content shall be uniform throughout the layer of material. Compaction shall be achieved by using appropriate power roller. The number of passes shall be determined by testing the density of the compacted soil as site after taking trial compaction for specified passes of the roller. The roller shall be taken close to the sides of the trench. In cases where the compaction by roller is not possible compaction shall be done as specified by the Engineer-in-charge. Care shall be taken to ensure that over compaction does not take place. The CNS material shall be filled in layers not exceeding the compacted thickness of 100 to 150 mm up to T.B.L. and shall be consolidated with 8 to 10 ton power roller to the proctor's density of 98% at optimum moisture content. Serrations should be provided in expansive soil to present contact slides between CNS materials and expansive soil. The work shall be tackled in continuous horizontal layers. On resuming work each day or after an interval of few days or when work is not done in continuity the previous layer shall be well raked and water sprinkled over it before the fresh layer is laid and compacted. Special precautions shall also be taken while rolling the spread soil near structures, conduits, sluices etc.,

Quality control tests shall regularly be carried out to determine the suitability of the soil used for filling and to control moisture content to ensure that the specified density is obtained. All tests shall be done in accordance with the relevant Indian Standards. The frequency of the test shall be as determined by the Engineer-in-charge. The work shall be done to the construction profile.

The canal section including the thickness of the lining shall be excavated in CNS soils and canal sides and bed are trimmed to receive PCC slab lining and cast-in-situ lining respectively.

The soils excavated shall be rehandled and used for forward reach as directed by the Engineer. No extra payment will be made for the excavation of CNS soil in canal section and rehandiling the soil as above separately.

i) **Gradation of C.N.S. Soil**

1. Clay (less than 2 microns) — 15 to 20 %
2. Silt (0.06mm-0.002mm) — 30 to 40%
3. Sand (2mm-0.06mm) — 30 to 40%
4. Gravel (Greater than 2mm) — 0 to 10%

ii) The CNS material shall be non-swelling, with a maximum selling pressure of 10 KN/m2 when tested in accordance with IS:2720 (Part-41) – 1977 at field moisture content oven dry condition and minimum cohesion.

iii) **Index Properties :**

1. Liquid Limit Less than 50% but greater than 30%
2. Plasticity Index Less than 30% but greater than 15%

(b) If the expansive clay is in thin layers or in small pockets in an otherwise suitable sub grade shall be over excavated as determined by the Engineer-in-charge and replaced with suitable non-expansive soil and compacted suitably.

(c) After the canal prism has been shaped to a reasonably true and even surface, selected bedding materials shall be placed on thoroughly wetted surfaces in layers of 15 CM maximum thickness to bring the bedding material to a height where it can be trimmed to form a true and even surfaces upon which to place the concrete lining, each layer shall be moistened and thoroughly compacted as per specification 3.2. Where the bedding material is placed and compacted on a slopping ground layers may be placed parallel to the surface of the foundation. The moisture content of the bedding material at the time of

compaction shall be optimum. The compaction procedures used shall be as described below:-

i. The Contractor shall place demonstration or test sections of selected bedding material at time and places designated by the Engineer-in-charge to show the adequacy of his construction procedures for placing and compacting the bedding material. The test section shall conform to clause 4.5.2 of IS:3873-1978.

ii. The bedding material shall be placed to sufficient thickness in the test sections to allow practical density testing of the compacted material. The dimensions and densities of the compacted bedding materials shall be acceptable to the Engineer-in-charge. The procedures shall then be used to compact the selected bedding material on the remaining work.

iii. When placing and compacting selected bedding materials on a sloping foundation, the layers may be placed parallel to the surface of the foundation. If at any point the foundation material is disturbed or loosened during the excavation process or otherwise it shall be moistened if required and thoroughly compacted by tamping, rolling or other approved methods to form firm foundations upon which to place the concrete lining. The bottom and side slopes, including the surfaces of compacted embankment, compacted selected bedding materials and compacted back fill over which concrete lining is to be placed shall be furnished accurately to true and even surfaces to the dimensions shown on the drawings. The loading, handling, transporting and placing of the selected bedding material is subject to approval of the Engineer-in-charge and shall be suck as will result in a uniform mixture of the material being placed without separation or segregation. Selected bedding materials required shall be obtained from excavation in areas where material in excess of that required to construct the adjacent embankments is available or the material approved by the Engineer-in-charge.

iv. Immediately prior to placing the first lift of bed ding material, the surfaces of excavation and embankment to receive the material shall be adequately wetted to a depth of 15 cm or to impermeable material whichever is less as approved by the Engineer-in-charge.

v. Suitable material trimmed from the canal shall be used to complete canal embankments, to construct road embankment , for selected bedding material in the forward areas. Where material is suitable for selected bedding as determined by the Engineer-in-charge is encountered during trimming operations and cannot be placed in one continuous operation, such materials shall be stockpiled along the right-of-way where designated by the Engineer-in-charge.

5.3.6 Measurement and Payment

All linear measurements shall be in meters corrected to 0.01 M and volume shall be worked out to nearest 0.01 Cum. Payment shall be for ten cubic meters of finished work. The unit for CNS breaking to lining includes.

1) Mark out
2) Cost and conveyance of CNS soil to the site of work.
3) Filling the C.N.S. soil in layers of not exceeding 100 to 150 mm thick and consolidation with appropriate power rollers to a proctor's density of 98% at optimum moisture content.
4) Cutting the canal section, including the thickness of lining in the compacted C.N.S. soil
5) Rehandling the extra excavated CNS soil to the forward reach.
6) Forming and removal of steps and ramps, benching battering, formation of temporary tracks for diversion of surface flows, bailing out seepage water and such other temporary arrangements unless otherwise specified.
7) Shrinkage allowance.

5.3.7 MODEL SECTIONS:

Model sections or templates of size 200mm X 200mm or other size specified shall be constructed up to bottom of lining at 18m interval in straight reaches and at 9M interval at curves as directed by the Engineer-in-charge so as to achieve a smooth curved surface free from us slightly kinks and depressions. The model sections in the bed and sides shall be constructed in cement concrete M10 grade conforming to IS 383 standard specification. The top level of template will be the bottom level of lining.

Since the model sections are to be used as reference for exaction and trimming of sub grade for the seating to the lining initially and for laying and finishing to required profile and grade to a very close tolerance of 3mm in a length of 3M any undulations in the model sections beyond the permissible tolerance will have to be removed and redone at the contractors expense.

5.4. Under drainage.

5.4.1 General

For a lined canal where the ground water level is higher or likely to be higher than the water level inside the canal so as to cause damaging differential pressure on the lining or where the sub grade is sufficiently impermeable to prevent free drainage of the under side of lining in case of rapid draw-down, pressure relief arrangements for under drainage shall be provided suitably as indicated in the drawing in accordance with IS:455-1968.

5.4.2 FILTER DRAINS :

a) Scope : Forming longitudinal/transverse filter drains of specified size bed with 10 mm to 40 mm machine crushed metal of specified variety and sand including cost and conveyance of all materials, labour charges for laying with all leads, lifts, delifts, seigniorage charges, sampling and testing, dewatering, packing and all other incidental and operational charges necessary to complete the finished item of work as per drawings and as directed by the Engineer-in-charge.

b) Whenever necessary, longitudinal/transverse filter drains shall be laid in the concrete lining true to the canal grade as shown in the drawings or as directed by the Engineer-in-charge. The number of layers comprising the filter, thickness of each layer and the materials to be used shall be as shown in the drawings. The filter material shall be clean, round and well graded sand or coarse aggregate the requirements of grading of which will be established in the field laboratory on the basis of mechanical analysis of adjacent materials. Particles of decomposed rock debris, wood, vegetable matter or other deleterious materials shall not be permitted in the filter. Before placing the filter the bed shall be prepared as explained in the above paragraphs.

c) The longitudinal drains shall be laid on the grade of the canal while the transverse drains in bed shall have a fall towards the centre of the canal bed from the edge as shown on the drawing.

The sand shall be clean, round and well graded. Before placing the filter, the bed shall be prepared as specified in paragraph above.

d) Measurement and Payment : Payment for filter drains described above shall be made at the unit rate per linear meter bed, in the schedule "A", which unit rate should included the cost of providing longitudinal and lateral drains in bed and filled with porous concrete blacks and sand as per drawings including the cost of excavation of drain and cost and conveyance of all materials including leads, lifts, delifts, packing and dewatering complete for finished item of work.

5.4.3 Pressure relief arrangement :

a) Scope : Laying and fixing of porous concrete plugs flap valves in position in filter pockets including (a) manufacturing of plugs, using 20 mm size machine crushed/hand broken aggregate of specified variety and cement of specified quantity for each plug (or) manufacturing of flap valves consisting specified internal diameter with P.V.C. pipe, with P.V.C. flange and rubber flap with all accessories and (b) excavation of pit for laying filter pocket and filling the filter pocket with filter materials, including cost and conveyance of cement and all other materials seigniorage charges, labour charges for manufacturing of plugs/flap valves, excavation of filter pocket, filling of pocket with specified grade of filter material, form work, moulds, machine mixing, manufacturing, curing, sampling and testing laying and fixing in position with all leads, lifts delifts, dewatering, all water leads and all other incidental and operation charges necessary to complete the finished item of work as per drawings and as directed by Engineer-in-charge.

b) The porous Plug/flap valve shall be installed in position in the filter drains in the bed, normal to the canal slops in the local filters in the side at the location shown in the drawings or as directed by the Executive Engineer.

c) Flap valves :

Flap valves consisting of 40 mm internal diameter Polyvinyl chloride (P.V.C.) pipe with P.V.C. flange and rubber flap shall be fabricated with all accessories as shown in the drawings. The

flap valve shall be designed as to open automatically at a differential head of not more than 100 mm of water. The contractor shall arrange the performance test of all the flap valves and those that do not conform to the specified functioning shall be rejected. Installation of flap valves shall not be permitted without the acceptance test of the same.

The flap valves shall be installed in position in the filter drains in the bed and normal to canal slope in the local filters in the side at the location shown in the drawings or as directed by the Engineer-in-charge.

The tendered unit price for this item of schedule 'A' shall be inclusive of the cost of manufacture, handling, testing and installation in position with excavation of pocket and filling with filter material complete and shall be inclusive of all those operations as well as those defined in the nomenclature of the item.

d) 1) Porous Plug :

Wherever specified, the porous concrete shall be composed of one part of cement and 4 parts of coarse aggregate (viz no fine concrete) by weight of not more than 20mm size. Only so much water shall be used in concrete as required to produce a paste which will coat the particles without filling the voids. In placing porous concrete in moulds, care shall be taken to ensure that it is not over tamped or compacted so as to reduce its porosity. The porous plugs after hardening (i.e. attains final setting) should be sprinkled and kept moist for at least 14 days. The compressive strength of porous concrete at 7 days age as determined by tests on 15 cm diameter, 30 cm height cylinder should not be less than 70kgs/sq.cm and the porosity at 7 days be such that water shall pass through slab of concrete 30 cm thick at a minimum rate of 500 litres/min/square meter of the flap with a constant 10 cm depth of water on the slab.

2) Precast porous concrete plugs (cylinders) 100 mm dia and 375 mm long shall be provided in bed and sides as shown in the drawings with filter materials.

3) The porous plugs shall be so inserted into the lining that their porosity is not lost or reduced when the concrete for the lining is vibrated.

4) Measurement and Payment : Measurement and payment for porous plugs shall be made on the basis of numbers at the unit rate in the schedule 'A'. The rate shall include the cost of manufacturing, curing, excavation and refilling the pits inclusive of materials and labour as per drawings and incidental operations necessary to execute the work as per specifications as well as those defined in the nomenclature of the item.

5.5 Anchor Bolts :

In hard rock anchor bolts of 700 mm long manufactured with HYSD steel bars of size 25 mm diameter, as shown in drawing shall be taken to a depth of 600 mm into rock and 100 mm to be embedded inside each panel of concrete lining.

Measurement and payment for the anchor bolts shall be made on the basis of number at the unit rate in schedule 'A'. The rate shall include the cost of steel rod, cutting, bending, splitting and drilling holes in rock, fixing and labour as per drawings and incidental operations necessary to execute the work as per specifications as well as those defined in the nomenclature of the item.

5.6.Laying of C.C. lining :

a) Scope : Laying cement concrete lining of specified thickness in M 10 grade using a minimum cement of 250 kg/cum, of concrete and 40 mm MSA machined crushed graded metal of specified variety including cost and conveyance of cement and all other materials of approved quality, seigniorage charges, sampling and testing preparing the base for laying concrete, batching, machine mixing, conveyance of concrete, placing of concrete in position either by using machinery or by manual labour as specified in schedule "A" vibrating, finishing, cutting grooves for panel joints, dewatering, curing with water with a net work of pipeline system, hire and operational charges of machinery, all leads, lifts, delifts, all water leads and all other incidental and operational charges necessary to complete the finished item of work of cast-in-site lining in bed./sides as per drawings and as directed by the Engineer-in-charge.

b) The work of laying in-situ cement concrete canal lining shall generally conform to IS:3873-1978 and all concrete shall be governed by IS:456-1978 concrete canal lining shall be done in the canal prism as shown in the drawing using well graded aggregate for 10 cm thick lining shall be 40 mm. It shall be 20 mm for lining thickness of 7.5 cms.

c) Concrete shall be produced in a stationary weight batching and mixing plant/plants of adequate capacity installed at a suitable place by the contractor and concrete conveyed to the placement site/sites in transit mixes. The slump of concrete at placement site shall range from 50 mm to 65 mm with a water cement ratio of less than 0.6.

Alternatively :

ii) Mobile self loading-weigh batching-mixing transporting equipment with adequate capacity of mixer drum, shall be deployed by the contractor for production of controlled concrete and transportation to the placement site/sites. Number of such equipment to be deployed shall be such as to achieve the construction schedule targets.

Alternatively : The Engineer-in-charge may allow the use of standard portable/stationary concrete mixes along with weight-batching and measuring arrangement for proportioning and production of concrete and placement of concrete with conventional (manual) method.

5.6.1. Testing :

Concrete cubes at random shall be collected during laying concrete and shall be tested in the labs. If results are sub standard , the entire work of the day which cubes were collected shall have to be replaced by the contractor at his own cost.

Core Test: Securing and preparing test specimens from hardened concrete :
As specified in clause 4.1 of IS:1119-1959 (Bureau of Indian Standards Methods of sampling and analysis of concrete) cores shall be taken at random so as to ascertain the strength, permeability, thickness of concrete layer and cement content used. As the canal lining work progresses, testing of output shall be on regular basis. Accordingly, to evaluate the quality of concrete lining completed and cores shall be determined by the Engineer-in-charge. Broadly it could be one core each from bed lining completed and cured for 28 days in respective reaches, cores shall be taken. Frequency of drill cores shall be determined by the Engineer-in-charge. Broadly it could be done core each from bed lining per 200 square meters (or even more at the discretion of Engineer-in-charge) of in-situ lining.

The cores shall be tested for compressive strength and if needed for permeability, and cement concrete etc. as well. The cores shall be tested, for 28 days compressive strength. The contractor shall allow all facilities and co-operation towards collection of cores. The testing of cores shall be carried out at the testing laboratories set up at the site or at any other laboratory that the Engineer may so decide and the results given there by shall be considered correct and authentic by contractor. The contractor shall be given access to all operations and tests that may be carried out as aforesaid so that he may satisfy himself regarding the procedure and methods adopted. The payments shall be made only after satisfactory core test results acceptable to the Engineer-in-charge.

A standard test cylinder has a diameter one-half of its height (viz the length-L, diameter-D ratio is 2). However, the cores taken from in-situ lining shall not have these relative dimensions and consequently L/D ratio not be 2. Accordingly the test strengths of the cores shall need to be corrected. The curve in Attachment-1 may be used to correct the indicated strengths to make them comparable with those obtained from standard specimens. The contractor shall stack the cores properly in the shed.

The criteria of acceptance of core strength shall be as outlined in IS:456-1978.

5.6.2. Placing and compaction :

Sub-Grade :- Well in advance for placement of lining, the sub-grade over which concrete is to be laid should be moistened adequately through very fine water spray so as to be thoroughly moist (but not muddy) so that, water cannot get withdrawn from freshly placed concrete. Spray nozzles should be used to assure an even applications of moisture and to prevent local erosions.

5.6.2.1. a) Placing of concrete shall not be started until all form work, installation of parts to be embedded and preparation of surface upon which concrete is to be laid have been completed. All absorptive surfaces against which concrete is to be laid shall be moistened thoroughly so that moisture will not be withdrawn from freshly placed concrete. The surfaces, however shall be free from standing water and mud.

b) In the placement register containing the list of various work items in sequential order, the contractor or his representative shall write, "completed preparation of sub grade, earth

work, installation of parts to be embedded as per specifications and ready for placing concrete", and sign. Then the authorized representative of the Engineer-in-charge shall inspect and write in the Register against the item allowed for concreting" and sign. Then only, placing of concrete shall be commenced by the contractor, If concreting is not started within 24 hours after approval, it shall be got approved again.

c) Concrete shall be placed only in the presence of a duly authorized representative of the Engineer-in-charge.

d) Hand mixing of the concrete shall not be permitted under any circumstances.

e) Concrete shall be deposited in all cases as neatly as practicable in its final position and shall not be allowed to flow in a manner to permit segregation. Excessive separation of the coarse aggregate caused by allowing the concrete to fall freely from too great height or at too great angle from the vertical shall not be permitted and where such separation would otherwise occur the Contractor shall provide suitable means to convey the concrete without allowing such separation.

f) Concrete shall be deposited and spread on the bed of the canal as indicated on the drawings. Concrete may be so laid as to facilitate placing, vibration, finishing and curing operations. Concrete required for keys as shown on the drawings shall be laid after placing side panels PCC as directed by the Engineer-in-charge.

g) The design mix for lining shall to secure dense concrete of required strength for that grade.

h) The compaction shall be with suitable vibrators approved by the Engineer-in-charge and it shall be effective so as to have durable impermeable concrete.

i) The concreting near the joints shall be done with utmost care so as to avoid segregation and collection of loose place of aggregate along form work which may result in honey combing.

j) The concrete near the junction of the side concrete panels and bed concrete shall be done as shown in drawings such that both shall rest firmly against each other to resist any back kick from external hydrostatic forces.

k) When concrete placing operations are stopped for the day, interrupted because of the break down or delayed by other causes of where the contractor selects to construct a joint such as would result from constructing one of the lining in one pass, the edge of the fresh concrete lining shall be bulk headed to a surface normal to the lining along transverse and longitudinal lines. Before placing operation are resumed the surface of the hardened concrete shall be prepared as construction joint. Whenever is substantial break down occurs in the concrete production or concrete transportation system, a joint shall be formed as close to the face of the fresh concrete as possible.

l) The fresh concrete shall than be placed against the existing concrete with the full groove for required contraction joint formed in between them. The completed groove shall be sealed with sealing compounds as per clause 6.3 of IS:3873-1978 and as shown in the drawings.

m) If mention is made in the schedule 'A' wording for machinery, the contractor should use stationary weigh batching plant, transit mixtures, conveyer belt or any other machinery for transporting concrete and pavers for laying concrete. The quoted rates shall include hire operational charges of all the machinery, setting of the machinery, dismantling of machinery and any other contingent works for the movement of machinery and making good after laying of lining. The quoted rates should include all the above costs. No separate payment shall be allowed other than the quoted rate for respective item in schedule 'A'.

n) COMPACTION : The concrete shall be compacted with vibrators to give a dense concrete which is durable and impermeable ensuring the desired strength. Concrete shall not be over vibrated. The vibration shall be sufficient to remove all undesirable air voids from the concrete including air voids trapped against the forms. After consolidation, the concrete shall be free from aggregate pockets and honey comb areas and shall be closed against all surfaces of forms and embedded materials. All concrete shall be properly consolidated before initial setting and should not be subsequently disturbed.

Form vibrators shall be used in conjunction with slip form lining machines for consolidation. The Engineer-in-charge may remove samples of hardened concrete for testing and examination and contractor shall replace at no extra cost to the department from which such concrete sample are removed.

5.6.3. FINISHING :

a) The contractors shall notify the Executive Engineer before commencing concrete finishing. Unless inspection is waived in each specific case, finishing of concrete lining shall be performed only when a representative of the Engineer-in-charge is present concrete surfaces will be tested by the Engineer-in-charge in accordance with para 5.6.1., where necessary to determine whether the concrete surface is within the specified tolerances. Finished concrete which is not in the specified tolerances shall be repaired as detailed below.

b) Immediately on the removal of forms, unsightly ridges or lips shall be removed and desirable local bulging on exposed surfaces shall be remedied by tooling and rubbing. All exposed concrete surfaces shall be cleaned of impurities lumps of mortar or grout and unsightly stains.

c) Repairs to concrete surfaces and additions where required shall be made by cutting regular openings not less than 70 mm depth into the concrete and placing fresh concrete to the required lines. The chipped openings shall be sharp. The fresh concrete shall be reinforced and chipped and troweled to the surface of the openings, the mortar shall be placed in layers not more than 20 mm in thickness after being compacted and each layer shall be compacted thoroughly.

d) The surface of concrete finished against forms shall be even, smooth and shall be free from projections, pockets, honey combing and other objectionable defects.

e) The top portion of the side slopes of the canal lining extending 1.5 meter vertically below the top of the lining shall receive a nonskid, longitudinal brush finish as approved by the Engineer-in-charge.

f) Use of any finishing tool in areas where water has accumulated shall be prohibited and all finishing operation shall be delayed until the water has been absorbed evaporated or removed by draining, mopping or such other means.

g) The contractor is not entitled for any extra payment for the work under finishing paragraph as the tender rates in the schedule 'A' are inclusive of finishing the lining.

5.6.4. TOLERANCES :

The permissible tolerances for the canal lining shall be as under in accordance with section 5.3 of IS:3873-1978.

a)	Departure from Established	$\pm$ 20mm on straight reachesm & $\pm$ 50mm alignment on partial curves or tangents.
b)	Departure from Established	$\pm$20mm on small canals Grade
c)	Variation in thickness of lining	$\pm$ 10% provided average thickness is not less than specified.

5.6.5. CURING : The bed lining shall be water cured for 28 days through provision of earth bunds of small height so that a column of water is available above the lining. The joints of plain cement concrete slabs lining on side slopes shall be watered cured through sprinkling of water at regular water intervals for at least 21 days.

The Engineer-in-charge may instruct contractors to provide pipe line system and sprinklers for curing of the lining work, if the Engineer-in-charge feels that the manual curing is not sufficient. The contractor shall abide by the instructions and erect the pipe line system the quoted shall include for erection of pipe line system and dismantling of the pipes after curing instead of manual curing if the work involved is more in length and quantity. No separate payment will be allowed and the quoted rates for respective schedule 'A' item shall include the erection of pipe line system, pumping of water, dismantling of pipe line system after curing.

If the contractor fails to do curing to the satisfaction of the Engineer-in-charge, the latter shall make arrangement for curing at the risk and cost of the contractor or the lining work will be pulled down. The lining so pulled down shall be rebuilt by the contractor at his own cost.

The contractor is not entitled for any extra payment for curing as the tender rates for lining in schedule 'A' are inclusive of curing.

5.6.6. Testing of Cement and Acceptance of Work :

a) General :

Systematic testing of the raw materials for concrete as well as the concrete shall be done both while it is fresh and after it has hardened by the Quality Control and Inspection Division on representative samples taken at the site of laying the concrete in accordance with relevant Indian Standard Specifications.

b) Sampling Procedure and Frequency :

i) Sampling Procedure : A random sampling procedure shall be adopted to ensure that each concrete batch has a reasonable chance of being tested that is, the sampling should be spread over the entire period of concreting and over all mixing units.

ii) Frequency : The minimum frequency of sampling of concrete of each grade shall be in accordance with the following :

Quantity of Concrete (Cubic meters)	Number of Samples
1-5	1
6-15	2
16-30	3
31-50	4
51 and above	4 plus one additional for each additional 50 cubic meters or part thereof.

Note : At least one sample shall be taken from each shift.

iii) **Test specification :**

Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes, such as to determine the strength of concrete at 7 days or at the time of striking from work, or to determine the duration of curing or to check the testing error. Addition cubes may also be required for testing by accelerated methods as described in IS:9013-1978. The specimen shall be tested as described in IS:516-1959.

iv) **Test Strength of Sample :**

In all cases, the 28 days characteristic compressive strength specified based on laboratory tests shall be the criteria for acceptance or rejection of the concrete in so far as the strength of plain cement concrete lining is concerned.

The test strength of the sample shall be the average of three specimens. the test strength shall be grater than the specified strength. The over all coefficient of variation shall not be more than (+) 15 percent of the average for the three consecutive samples tested, not more than 20 percent of the specimen strength shall be less than 80% of the specified strength.

Contractor shall provide necessary unskilled labour and facilities for transport, collection of samples, cores etc., and shall remain present at the time, when the samples, cores etc., are taken. Testing shall be carried out at the testing laboratory at the nearest Lab, or at any other laboratory that the Engineer may decide upon and the results given thereby shall be considered as correct and authentic and acceptable to the Contractor. The contractor shall be given access to all operations and tests that may be carried out as aforesaid. All testing charges are to be borne by the contractor.

v) **Core Test** :

The points from which cores are to be taken and number of cores required shall be at the discretion of the Engineer-in-charge. In no case however shall fewer than three cores be taken and tested. Core shall be tested as described in IS:516-1959.

5.6.7 Acceptance Criteria :

a) The cores shall be tested for 28 days compressive strength. These shall be inspected examined for segregation / honey combing and checking the thickness of lining. The Engineer-in-charge may also arrange to test the core for permeability and cement content, if considered necessary. Concrete in the member represented by core test shall be considered acceptable if the average equivalent cube strength of cores is equal to at

least 85 percent of the cube strength of the grade of concrete specified for the corresponding age and no individual core has a strength not less than 75 percent.

b) The density of concrete shall not be less than 85 percent of specified density of 2400 kg/m^3.

c) In case the concrete does not conform to the accepted criteria for strength as specified above, the Engineer-in-charge reserves the right to reject the work or accept the same at a reduced rate derived from tendered rate and as approved by him after examining all aspects and provided structural integrity is not effected. In case, the cores taken from concrete lining panels exhibit heavy, segregation or honey combing the engineer shall reject the concerned panels and the contractor shall have to dismantle the same and have to cast new panels at his expense.

Whenever necessary for the purpose of obtaining economy, workability, density, impermeability, durability, strength or an account of variation in the quality and gradation of aggregates or other materials, except cement the Executive Engineer shall based on laboratory tests make necessary changes in the proportion of mix and vibrators. Contractor shall have to effect these changes and will not be entitled to any compensation on account of such changes. Relevant para of IS:456-1978 shall apply.

Regarding particular canal reach/reaches, though the lining be fully completed to acceptable quality levels, such reach/reaches will not qualify for acceptance and payment till the associated works necessary for safety of lining during rains, such as dowel banks, drainage are also completed along with.

d) The final payment shall be made only after satisfactory core tests acceptable to the Engineer-in-charge as per IS:456-1978.

5.6.8 Construction Joints :

a) The concrete for sides and bed lining should be placed in alternative bays of no more than 3 mts., bays remaining in between may be filled after a gap of at least one day with premier one litre per four square meters.

b) The shuttering should be clean, well-oiled, smooth and firmly fixed to the sub-grade and concrete near the shuttering properly placed and specially compacted.

c) Faces to be painted with sealing compound.

d) The concrete shall be laid continuously and the construction joints shall be left at the close of the day (or) 45 meters which ever is less vide clause in column 26.3 of IS:456-1978.

5.6.9 Measurement and Payment :

All linear measurements shall be in meters, correct to 0.01 meter. Areas shall be computed in square meters, correct to 0.01 square meters. Payment for lining shall be made for the thickness shown on the drawings and on-one square meter basis of the superficial area (peripheral area). The thickness of lining shall be determined in relation to final sub grade on which lining is to be laid. The thickness shall be cross checked by (i) Volume of concrete placed and area covered (ii) use of probe when concrete is given and (iii) cores if required. Any over run in lining shall not be paid to the contractor.

5.6.10 Rate :

The unit rate for lining includes :

1) Preparation of sub-grade.
2) Form work.
3) Plants and equipment.
4) Mixing and conveying.
5) Placing
6) Compaction with vibrators.
7) Curing.
8) Finishing.
9) Dewatering the sections during placing of canal lining where required.
10) Cost of all ingredients of concrete.
11) Cost of cutting grooves for contraction and expansion joints, cost of construction joints and their treatment.
12) Cost of producing samples for testing.

13) All incidental operations, equipments, labour, tools etc., required for carrying-out this work.
14) Cost of sampling and testing of materials and concrete.

5.6.11. Steps in canal lining:

Access steps into the canal shall be constructed in cement concrete M10 grade using 40mm maximum size metal conforming to I.S.3873-1978 as shoen in the drawings or as directed by the Engineer-in-Charge at 500m intervals staggered or at the junction of the structures.

5.7 R.R. Lining :

a) Scope : Construction of R.R. side lining of specified thickness using specified variety of stone in cement mortar of specified proportion including cost and conveyance of cement and all other materials, sampling and testing, mixing of mortar, labour charges all leads, lifts, and delifts, seigniorage charges, dewatering, curing, all water leads and all other operations necessary to complete the finished item of work to specifications as per drawings and as directed by the Engineer-in-charge.

b) Construction operations : The provisions of specification-6.0 shall apply.

c) Measurement and Payment : The provisions of specification-6.1 shall apply.

5.8 Joints :

5.8.1 Expansion Joints :

a) Scope : Expansion joints of 12 mm width shall be provided on each template where adjacent panels rest. The joint shall be filled in by 12 mm thick asphaltic pads., when concrete lining is laid for canals in embankment or in cutting where sub grade does not get physically bonded with the joints. Where concrete lining is in physical bond with sub grade such as in case of hard rock reaches, expansion joints need not be provided. The details of joint are shown in the drawings. Sealing compound in the joint shall conform to IS:5256-1968, including cost and conveyance of all materials, labour charges, all leads, lifts and delifts complete for finished item of work to specifications as per drawings and as directed by the Engineer-in-charge.

b) Expansion joint shall not be provided except where structure intersects the canal lining.

c) In case of sandy soils it is preferable to provide felt/asphalt pad over template and in the vertical joint between the panels to prevent leakage through joint as shown in the drawings.

5.8.2.Contraction Joints :

a) Scope : Providing contraction joints in bed, side lining including painting the groove with approved primer and filling groove with hot pour sealing compound of approved quality conforming to IS:5256-1968 including cost and conveyance of all materials, cleaning of groves, placing, dewatering, labour charges, all leads, lifts and delifts complete for finished item or work to specifications as per drawings and as directed by the Engineer-in-charge.

b) Contraction joints shall be provided at places shown in the drawings or as directed by the Engineer-in-charge in accordance with the provisions laid down.

c) When lining is cast in panels, before laying cement concrete slabs, the top of the sleepers both in bed and side slopes shall be treated with two layers of sealing compound as prescribed in IS:5256-1968 and as shown in drawings to reduce the leakage across the joints. Slabs shall be laid in alternate compartments with an interval of at least one day for setting and construction. The faces of the previously placed concrete shall be painted with sealing compound as prescribed inIS:5256-1968 to ensure that no bonding takes place.

d) The grooves at the joints shall be of the size and shape as prescribed in (b) and filled with hot-applied sealing compound.

e) Filling of the joint with hot-applied sealing compound should be taken up after curing period is over. In the mean time the joints are liable to be filled with earth, which will be difficult to clean,. It is, therefore, advisable to fill these joints with coarse sand during the curing period. The sand can be easily blown out from the joints when required.

5.8.2.1 Filler :

a) The grooves in canal lining shall be filled with sealing compound conforming to IS:5256-1968.

b) The grooves shall be clean and free from foreign substances when sealing compound is filled.

c) Grooves shall not be filled while it is raining or when there is free water in the grooves. The grooves shall be filled as soon as the concrete has become sufficiently stiff to prevent appreciatable distortion of groove shape or damage to the concrete.

d) The expansion joint shall be filled with the mixture of following materials with proportion specified against each.

Maxphalt 80 – 100	30% by volume
Sand	51% by volume
Cement	17% by volume
Hemp cut into length	2% by volume
Not exceeding 3 mm	———100% by volume

5.8.2.2 Measurement and Payment :

The unit for measurement and payment shall be one running meter corrected to 0.01 meters for finish item of work.

5.9 PRECAST CEMENT CONCRETE LINING FOR SIDES OF THE CANAL :

a) **SCOPE OF WORK** :

The work covered under this section consists of lining the sides including manufacturing of PCC slabs including cost of all materials, construction of platforms for manufacturing of PCC slabs, construction of curing ponds, curing, stocking, conveyance to the site and also laying lining including cost of cement mortars, pointing as directed by the Engineer-in-charge.

Precast lining the sides of the canal with precast cement concrete slabs of size 550X550X50 mm or any other size specified by the engineer, manufacturing the slabs using a cement content of 250 kg/cum giving a 28 days characteristic compressive strength specified based on laboratory tests using 20 mm maximum size hard broken machine crushed metal obtained of approved quality including cost and conveyance of all materials, form work, machine mixing, air entraining agents, laying vibrating, curing of PCC slabs and conveyance of slabs to work side, handling, laying slabs over a bed of 12.5 mm thick cement mortar (1:5), using not less than 3.75 kgs of cement per one square meter for first layer and 10 mm thick cement mortar (1:3), using not less than 6 kgs of cement per one square meter for second layer and fixing the PCC slabs in 6 mm thick cement mortar (1:3) using not less than 3.6 kgs of cement per one square meter including curing the lining and all other operations necessary to complete the finished item of work as directed by the Engineer-in-charge for side lining of canal.

b) **SLUMP** :

The amount of water used in the concrete shall be changed as required to secure concrete of proper consistency and to adjust for any variation in the moisture content or grading the aggregates as they enter the mixture. Addition of water to compensate the stiffening of the concrete resulting from over mixing or objectionable drying before placing shall not be permitted. Uniformity in consistency from batch to batch shall be required. To have close control of consistency and workability of the concrete, the slump of concrete shall not vary more than 20 mm which would otherwise interfere with the aggregate and quality of the work.

5.9.1 Manufacturing PCC Slabs :

(A) Construction of platform and curing ponds :

PCC slabs are cast at one or more places as directed by the Engineer-in-charge and transported to the site of construction after curing as needed. A cement concrete platform shall be constructed for manufacturing centres make it into required compartments to manufacture the required PCC slabs per day in a compartment. The other compartments shall be used for the other days work by using the same moulds used on the 1^{st} day curing pond should be constructed adjacent to the platforms fro curing the PCC slabs. The platform and curing ponds shall be constructed preferably at a central place of the work site or at a place as directed by the Engineer-in-charge. The land required for platform, curing ponds, stock yard, manufacture yard, shall be acquired by the contractor at his cost. Construction of curing ponds and platform shall be at the expense of the contractor and no extra payment

will be made for their construction. The rates quoted by the contractor shall include the cost of construction of curing ponds and platforms.

(B) Moulds :

Adequate no of steel moulds shall be procured for casting PCC slabs of sizes 550X550X50 mm as indicated in the drawing or as directed by the Engineer-in-charge.

(C) Casting of P.C.C. Slabs:

The edges of the moulds shall be cleaned, and burnt oil shall be applied to the inner edges of the moulds and the platform. The moulds shall be arranged in rows keeping sufficient way for walking and working between the moulds and rows. The machine mixed concrete shall be placed only in the presence of an authorized representative of Engineer. The concrete shall be placed and compacted before setting commences. The method of placing should be such as to preclude segregation. The size and shape of the slabs grooved can be varied by the use of different moulds. The slabs shall have all sides and faces true and square and shall be at right angles to the faces to each other. Proper consolidation of concrete in the moulds through provision of "shaking tables" (vibration table) is essential.

The moulds shall be straight and sufficiently strong so that while concrete is laid and vibrated, they retain their shape having neat and straight edges when the moulds are removed.

All exposed concrete surface shall be cleaned off from impurity, lumps of mortar or grout and unsightly stains. The finished surface shall be equivalent in evenness, smoothness and free from pockets and surface to that obtainable by effective use of a long handed steel trowel. The P.C.C. slabs thus manufactured shall be stacked after curing at the stock yard on edge vertically on a level ground over 50mm sawdust or hust so as to avoid damage to edges. Packing not less than 12mm thick with saw dust or husk shall also be given in between slabs at stock yard. Stacking and packing shall be to the satisfaction of Engineer – in – Charge.

The slabs shall be provided with tongues and groves as given below.

i) A tongue on one side and groove on the opposite side of the slab shall be provided in the middle of the side running throughout the length of that side.

ii) The tongue shall be a projection with a semi circular cross section of radius 13mm.

iii) The grooves shall be a depression with semi circular cross section of radius 12mm.

iv) The position of tongue and grooves shall be similar on all the slabs with respect to each other.

5.9.2 CURING

a) After 24 hours of casting the P.C.C. slabs, the moulds shall be removed and the slabs shall be kept in the curing ponds for atleast 28 days for curing. After 28 days curing P.C.C. slabs shall be taken out of curing ponds, stacked carefully for use as directed by Engineer. After about four to six hours of casting, the moulds shall be properly covered by the Hessian cloth rolls which are to be kept continuously wet till the moulds are removed and P.C.C. slabs are put in the curing tanks (moulds to be placed in shed).

b) Testing of concrete and acceptance

<u>The permissible tolerance on the length and width shall be as follows:-</u>

	For Slabs 550x550x50mm	for Slabs 550x275x50mm
In the length	±3 mm	±3mm
In the width	±3 mm	±1.50mm
In the diagonals	±4.50 mm	±2.25mm
In the thickness	±2 mm	±2 mm

The contractor shall provide all facilities and cooperation towards collection of samples, cores etc., and shall be present at the time when samples, cores etc., are taken. The tests shall be carried out at the testing laboratories setup at the site or other laboratory that the Engineer – in charge may decide and the results given there shall be considered correct and authentic by the contractor. The contractor shall be given access to all operations and tests that may be carried out as aforesaid so that he satisfied himself regarding procedure and methods adopted.

5.9.3 LAYING P.C.C. SLABS

5.9.4 Special care shall be taken while transporting P.C.C. slabs from stock yard to work site and stacked near P.C.C. slabs either damaged or cracked or broken shall not be used for lining. Compacted canal slope shall be wetted and first layer or 12.5mm thick cement mortar (1.:5) shall be applied, leveled, and compacted using wooden steel or any approved screed board to form uniform surface. The second layer of 10 mm thick with cement mortar (1:3) shall be applied when the first layer of mortar is used for one day. The surface of second layer of mortar shall be leveled and P.C.C. slabs are fixed in 6mm thick cement mortar (1:3) . The slabs shall be pressed gently so that the mortar squeegees through joints. These joints are neatly finished flush with top surface of the slabs. The P.C.C. slab lining shall be done from bottom to the top in a stretch not more than 10mts length and vertical break joints shall be ensured in P.C.C. slabs. The lining surface shall be uniform and smooth.. After completion of P.C.C .lining in a length of not less than 100 meters the in-situ bed lining top lug shall be laid in the next 100 mts. reach cast in-situ cement concrete with a cement level of not less than 250kgs/cum. The line surface shall be even true to the face smooth to give designed co-efficient of rugosity.

Tolerance in alignment and grade

a) Departure from established +20 millimeters on alignment straight reaches.
+ 50 millimeters on curves or tangents.

b) Departure from established + 20 millimeters on small canal.

5.9.4. Measurement and Payment:

All linear measurements shall be in meters, correct to0.01m Area shall be worked out to nearest 0.01 square meters. Payments shall be for one square meter of finished work at the quoted rate in schedule 'A'.

5.9.5. Rate:

The unit rate for P.C.C. Slab lining include.

(i) Construction of casting platforms curing ponds, manufacturing yard, stock yards and including acquisition of lands for the same.

(ii) Manufacture of P.C.C. slabs includes the cost of materials machine mixing vibrating etc.as specified by the Engineer-in –charge.

(iii) Curing in ponds for 28 days.

(iv) Stacking at the stock yard including cost of packing materials.

(v) Conveyance of P.C.C. slabs to the site of work.

(vi) Dewatering the section during placing P.C.C. slabs lining where required.

(vii)Cost of all ingredients required for CM (1:5), first layer, CM (1:3) for second layer and CM(1:3) for third layer for fixing slabs.

(viii)Cost of producing samples for testing.

(ix) All incidental operations, equipment labour for fixing curing tools etc., required for the finished item of work.

(x) Engraving letters ;as per the standards specified by the Engineer-in-charge.

(xi) Testing of all materials and concrete.

6.0 STONE MASONRY FOR STRUCTURES:

6.1 General

The section detailed specifications for: Random Rubble Masonry and Coursed Rubble Masonry in cement mortar including scaffolding, curing etc. for sub-structure and super structure. This also includes dewatering wherever necessary.

6.2 A list of IS codes applicable is furnished below:

1.	IS:1121-1974 (Part 1 to4)	Methods of test for determination of strength properties of natural building Stones.

2.	IS:1122-1974	Methods of test for determination of true specific gravity of natural building stones.
3.	IS:1123-1975	Method of identification of natural building stones.
4.	IS:1124-1974	Method of test for determination of water absorption apparent specific gravity and porosity of natural building stones.
5.	IS:1125-1974	Method of test for determination of weathering of natural building stones.
6.	IS:1126-1974	Method of test for determination of durability of natural building stones.
7.	IS-1127-1970	Recommendation for dimension and work-manship of natural building stones for masonry work.
8.	IS:1129-1972	Recommendation of dressing of natural building stone.
9.	IS:1542-1977	Specification for sand for plaster.
10.	IS:1597-1967 Part-I Part-II	Code of practice for construction of stone masonry. Rubble Stone masonry Ashlar Masonry
11.	IS:1706-1972	Method of determination of resistance to wear by abrasion of natural building stones.
12.	IS:2116-1980	Specification for sand for masonry mortars.
13.	IS:2250-1981	Code of practice for preparation and use of masonry mortars.
14.	IS:4101-1967 (Part-I)	Code of practice for external facing and veneers stone masonry.
15.	IS:4121-1967	Method of test for determination of water transmission rate by capillary action through natural building stones.
16.	IS4122-1967	Method of test for surface softening of natural building stones by exposure to acidic atmosphere.
17.	IS:4348-1973	Method of test for determination of permeability of natural building stones.
18.	IS:5218-1969	Method of test of toughness of natural building stones.
19.	IS:8381-1977	Recommended practice for quarrying stones for construction purpose.
20.	IS:1200-1976 (Part-IV)	Measurement of building and civil engineering works stone masonry.
21.	IS:11216-1985	Code of practice for permeability test for masonry (during and after construction)
22.	IS:3696-1978 (Part-I)	Safety code of scaffolds and ladders
23.	IS:3696-1991	Safety code of scaffolds and ladders.

In addition to the above I.S.codes, revisions and , latest amendments of the codes ,the specifications of A.P.S.S and manual for Quality Control and Inspection. shall also be compiled with.

6.3 Materials:-

Provisions of schedule 'D' shall apply for cement , sand, stone, water etc.

6.4 Mortar.

a) Cement and sand shall be mixed in specified proportion given on the drawings. Cement shall be ;proportioned only by weight by taking the unit weight as 1440 Kg per cubic meter and the sand shall be proportioned by volume after making due allowance for bulkage.

b) The mortar shall be mixed intimately in mechanical mixes of tilting type having calibrated water tank for storing water. The ;first batch of mortar at the commencement of work with any mixer shall be made richer by mixing 10 per cent more cement over and above that required for the particular mix. In case of mechanical mixing, the mortar shall be mixed for at least 3 minutes after addition of water. Hand mixing shall not be allowed. However, in exceptional circumstances such as mechanical break down of mixer, work in remote areas or when the quantity of work is very small hand mixing shall be permitted and it shall be done on a smooth watertight platform, large enough to allow efficient turning over of the ingredients before and after adding water. Mixing platform shall be so arranged that neither foreign material shall get Mixed with mortar nor does the mixing water flow out. Dry sand And cement shall be mixed thoroughly by turning over to get a mixture of uniform color. Enough water shall then be added gradually and mixing continued until.

Mortar of required consistency of 90 to 100 milli-meters as required in Clause 9.1.1.of IS:2250-1981 is obtained.

All ingredients shall be fed to the mixer simultaneously. The required quantity of water to achieve the required consistency shall be predetermined by trial mixes, and portion of water from 5 to 10 percent shall precede and the like quantity shall follow the introduction of other materials. The remainder of water quantity shall be added during mixing operation.

The wet mortar shall be used within 30 minutes of mixing. Mortar remaining unused, after above time shall be rejected and shall not be allowed to be used. The cost of rejected mortar shall be borne by the Contractor.

In case of cement mortar, that has stiffened because of evaporation of water, the same be re-tempered by adding water as frequently as needed to restore the requisite consistency but this retempering shall be permitted only within thirty minutes from the time of addition of water at the time of initial mixing. The cost of retempering of mortar shall be borne by the Contractor.

c) Necessary tests to determine compressive strength of the mortar, for consistency of the mortar and its water retentivity shall be carried out in accordance with IS:2250. Tests for compressive strength of mortar shall be in accordance with the procedure laid down in IS:2250 appendix-A as amended from time to time. A minimum of 3 tests specimens shall be made for each 120 cms of each class mortar for given age. There shall be atleast 3 test specimens of mortar for each day of masonry work even if only a few cum of particular mortar is manufactured in a day.

6.5 TYPES OF MASONRY

6.5.1 SCOPE :

R.R. masonry / CRS masonry in cement mortar of specified proportion/grade using R.R. stone/CR stone of specified variety/specified sort including cost and conveyance of cement and other materials, sampling, testing, mixing of mortar, labour charges, all leads, lifts and delifts, seigniorage charges, scaffolding, dewatering, curing, all water leads, and all other operations necessary to complete the finished item of work to specifications as per drawings and as directed by the Engineer-in-charge.

6.5.2. The type of masonry used for structures shall be random rubble masonry(coursed or uncoursed) or coursed rubble masonry. The actual type of masonry used for different parts of structures shall be as specified on the drawings.

6.6. Construction Operations

6.6.1. General requirements

a) The dressing of stone shall be as specified for individual type of masonry work and it shall also conform to the general requirements for dressing of stone covered in IS: 1129. Other specific requirements are covered separately with respect to particular type of rubble stone work.

b) Stone shall be sufficiently wetted before laying to prevent absorption of water from mortar. The bed which is to receive the stones shall be cleaned wetted and covered with a layer of fresh mortar. All stones shall be laid full in mortar both in bed and in vertical joints and settled carefully in place with a wooden mallet

Immediately on placement so that it is solidly bedded in mortar before the same has set. Clean chips and spalls shall be wedged into the mortar joints and beds where ever necessary , to avoid thick beds or joints of mortar. When ever foundation masonry is laid directly on rock, the face stones of the first course shall be dressed to fit into the rock snugly when pressed down in the mortar bedding over the rock. No dry or hollow space shall be left any where in the masonry and each stone shall have all the embedded faces completely covered with mortar.

c) Course of the masonry shall ordinarily be ore-determined. They shall generally be of the same height. Where there is variation in the height of courses. Larger courses shall be placed at lower levels, with height of courses decreasing gradually towards the top.

d) Vertical joints shall be staggered as far as possible.

e) All necessary chases for joggles, dowels and cramps shall be formed in the stones before hand.

f) Sufficient transverse bond shall be provided by the use of bond stones extending from the front to the back of the masonry. In case of thick walls bond stones shall overlap each other in their arrangement.

g) Bell shaped bond stones or headers shall not be used. The position of bond stones shall be marked on faces for identification and verification.

h) At all angular junctions stones at each alternate courses shall be well bonded into the respective course of the adjacent wall.

i) All connected masonry in structure shall be carried out at one uniform level throughout as far as possible, but when breaks are unavoidable, the masonry shall be raked in sufficient long steps to facilitate joining of new work with old. The steeping of ranking shall not be more than 45 degrees with the horizontal Wing walls, abutments and piers, etc., shall be carried out to truly plumb or to the specified batter.

j) Face work and heating shall be brought up evenly. The top of each course, however, shall not be leveled up by use of flat chips.

k) After the day's work, the face and top of masonry shall be cleaned well with brushes or boom-sticks to remove all the dead mortar on the stones.

l) Green work shall be protected from rain by suitable covering. Masonry work in cement or composite mortar shall be kept consistently moist on all faces for a minimum period of fourteen days. The top of the masonry work shall be left flooded with water at the end of the day. During hot weather all finished or partly completed work shall be covered or wetted in such a manner as to prevent rapid drying. The racking of joints where necessary shall be done at the end of day's work when mortar is green.

m) When fresh masonry is to be placed against existing surface of structure, the old surface shall be cleaned of all loose material, roughened and wetted as directed by the Engineer in charge so as to achieve a good bond with the new work.

n) Stone shall be sufficiently wetted before laying to prevent absorption of water from mortar. The bed which is to receive the stones shall be cleaned wetted and covered with a layer of fresh mortar.

o) The scaffolding shall be sound and strong to withstand all loads likely to come upon it, the holes which provide resting space for horizontal members shall not be left in masonry less

than one meter wide. The holes left in the masonry work for supporting the scaffolding shall be filled and made good.

6.7 Uncoarsed Rubble or Random Rubble Masonry

6.7.1 Dressing

The face stone shall be hammer dressed on the face, side and the beds to enable it to come into close proximity with the neighboring stone. The bushing in the face shall not project more than 40mm on an exposed face and 12mm on a face to be plastered. Stones with round surface shall not be used in construction.

6.7.2. Size of Face Stones

a) The width of face stones shall be not less than 150mm for walls of 400mm thick, 200mm for walls of 450mm thick, 250mm for walls of 600mm thick or more. Half the quantity shall not be less than 1/70 cum, 1/50 cum and 1/35 cum in volume for walls of the above thickness respectively. No stone less than 150mm in height shall be used on the face.

b) Face stone shall be laid headers and stretchers alternatively so as to break joints by at least 75mm, care is to be taken to break joints vertically. The stone shall be solidly bedded with joints not exceeding 20mm in thickness, further dressing being done if necessary to ensure this. No pinning what so ever shall be given on the face and face stones shall extend well back into hearting. Height of stones shall not exceed breadth at face nor length in wards.

6.7.3. Chips

Chips and spalls of stone may be used where ever necessary to avoid thick mortar beds or joints and it shall also be ensured that no hollow spaces are left anywhere in the masonry. The chips Shall Not be used below hearting stones to bring these up to the level of the level of interstices between the adjacent stones in hearting and they shall not exceed 10 percent of the quantity of stone masonry.

6.7.4. Hearting Stones

The hearting or interior filling of Wall face shall consists of rubble stones not less than 15 cm in any direction, carefully laid, hammered down with a wooded mallet into position and solidly bedding in mortar. The hearting should be laid nearly level with facing and backing.

6.7.5 Bond stones

Through bond stones shall be provided in masonry upto 60cm thickness and in case of masonry above 60cm thickness , a set of two or more bond stones overlapping each other at least by 15 cm shall be provided in a line from face to back. Incase of highly absorbed types of stones (porous limestone and sand stone, etc)the bond stone shall extend only about two-third into the wall as through stones in such cases may give rise to penetration of dampness and, therefore, for all thickness of such masonry a set of two or more bond stones overlaping each other by at least 15 cm shall be provided one bond stone or a set of bond stones shall be provided in each layer at 1.5 to 1.80 m interval.

6.7.6 Quoin Stone

The stone Specially and neatly dressed for forming an internal angle in masonry work shall not be less than 0.03 cubic meter in volume.

6.7.7. Plum Stone

The plum stones are selected long stones embedded vertically in the interior of masonry to form a bond between successive courses and shall be provided at about 90 cm interval.

6.7.8. Laying

The masonry shall be laid with or without courses as specified. The quoins shall be laid header and stretcher alternately. Every stone so as form neat and close joint face stone shall extend and bond well in the back. These shall be arranged to break joints, as much as possible, and to avoid long vertical lines of joints.

6.7.9. Joints

The face joints shall not be more than 20mm thick, but shall be sufficiently thick to prevent stone-to-stone contact and shall be completely filled with mortar.

6.8 Coarsed Rubble Masonry

6.8.1. Dressing

Face stones shall be hammer dressed on all beds and joints so as to give them approximately rectangular shape. These shall be square on all joints and beds. The bed joints shall be chisel dressed for at least 8cm back from the face and for at least 4cm for the side joints. No portion

of the dressed surface shall show a depth of gap more than 6mm from straight edge placed on it. The remaining unexposed portion of the stone shall not project beyond the surface of bed and side joints. The requirements regarding bushing shall be same as for random rubble masonry.

6.8.2. Hearting stone

The hearting or interior filling of the wall shall consist of flat bedded stone carefully laid on their proper beds in mortar. The use of chips shall be restricted to the filling in interstices between the adjacent stones in hearting and these shall not exceed 10 percent of the quantity of masonry. While using chips it shall be ensured that no hollow spaces are left anywhere in the masonry.

6.8.3. Bond Stones

The requirements regarding through or bond stone shall be same as for random rubble masonry but these shall be provided at 1.5 metre to 1.8 metre apart clear in every course.

6.8.4. Quoin Stones

The quoins which shall be of the same height at the course in which these occur, shall be formed of header stones not less than 45 cm in length. They shall be laid lengthwise alternately along each face, square in their beds which shall be fairly dressed to a depth of at least 10cm.

6.8.5. Face Stones

a) Face stone shall tail into the work for not less than their heights and at least one-third of these stones shall tail into the work for a length not less than twice their height. These shall be laid headers and stretchers alternately.

6.8.6. Laying

The stones shall be laid on horizontal courses and all vertical joints shall be truly vertical. The quoin stones shall be laid stretchers and headers alternately and shall be laid square on their beds, which shall be roughly chisel dressed to a depth of at least 10cm.

6.8.7. Joints

The face joints shall not be more than 10mm thick but shall be sufficiently thick to prevent stone – to stone contact and shall be completely filled with mortar.

6.9. Tests

At least three sets of test specimen of cement mortar used be taken from each day's work and it shall be tested for 28daya strength in accordance with Appendix –A of IS: 2250-1965 , code of practice for preparation and use of masonry mortars given below:

Mix	**Grade**	**Minimum Compressive Strength**
1.	MM 3	30 Kgs / CM^2
2.	MM 5	50 Kgs / CM^2
3.	MM 7.5	75 Kgs / CM^2

a) From the design mortar mix, cubes shall be cast in the laboratory at suitable intervals and their strengths found out.

1) The average strength of any 3 consecutive sample strength shall be greater than specified strength.
2) The overall co-efficient of variation for any 10 consecutive samples shall not be less than 15% .
3) Not more than 10% of the specimen strength shall be less than 85% of the specified strength.

6.9.1. Additional tests shall be carried out as and when directed. These strengths shall be deemed as the standard strength for that mortar. The strengths of the test cubes shall be found out and that strength shall not be less than 80 percent of the standard strength mentioned above. For acceptance, the 28 days strength of tests cubes shall be the criterion.

80 percent of the test cubes should satisfy the above criteria. All laboratory testing work shall be carried out by Quality Control and Inspection Division as per relevant Indian Standards and the Contractor shall be permitted to watch the test if he so desires. The cost of testing shall be borne by the Department. However, arrangements for taking test samples and transporting the same to the laboratory shall be the responsibility of the contractor.

6.9.2. The Engineer in charge may direct the contractor to conduct percolation tests in the masonry in accordance with IS-11216-1985. These tests shall be conducted at regular intervals as the masonry work progress and that if the water loss is more than 2.5 lug eons in the upstream portion of masonry and 5.0 lug eons in the rear potion, remedial measures like drilling and grouting shall be taken to achieve the acceptance standards duly backed up with confirmatory tests.

6.10. Curing

a) Watering shall be done carefully so as not to washout the mortar joints or disturb the masonry in any manner. The top masonry work shall be left flooded with water at the close of the day. All masonry built with cement mortar shall be kept watered continuously for a minimum period of two weeks from the date of construction.

b) If the contractor fails to do the curing to the satisfaction of the Engineer in charge the latter will either make arrangements for curing the masonry at the risk and cost of the contractor or order, the masonry to be pulled down. The masonry so pulled down should be rebuilt by the contractor at his cost.

6.11 Measurement and Payment

a) Stone masonry shall be measured in cubic meters and shall be to the pay lines shown in the drawing. 450 mm thickness from face will be measured as coursed Rubble Stone Masonry in cement mortar mix MM5 grade and the balance thickness of wall will be measured as Random Rubble Masonry in cement mortar mix MM5 grade.

b) Payment for stone masonry shall be made at the quoted rate in the schedule-A for 1 cubic meter of finished work.

The rate is inclusive of quoins, cost and conveyance of stone, seigniorage charges, dressing of stone, chisel drafting, smooth rubbing of joints, stacking of stones, mortar mixing, cost and conveyance of cement and all other materials, sampling cost of materials, testing charges of materials and the work, construction charges, scaffolding charges, labour charges, flush pointing with same mortar, curing, all water leads. Labour charges, all leads, lifts and delifts and all other operations necessary to complete the finished item of work as per drawings as per specifications and as per instructions of the Engineer –in – charge.

7.0 PLASTERING AND POINTING

7.1 General

7.1.1. The surface of masonry shall be finished by "pointing" or by "plastering". For a surface which is to be subsequently pointed or plastered, the joints shall be squarely raked out to depth not less than the width of the joint or as directed while the mortar is still green. The raked joints shall be well brushed to remove dust and loose particles and the surface shall be thoroughly washed and cleaned and wetted.

7.1.2. Scope: Plastering of specified thickness with specified mortar proportion to the exposed faces of R.R. masonry/ brick masonry / concrete including cost and conveyance of cement and all other materials, sampling, testing mixing of mortar, labour charges, all leads, lifts, delifts, seigniorage charges, scaffolding, curing, all water leads, and all other operations necessary to complete the finished item of works as per drawings and as directed by the Engineer-in-charge.

7.1.3. Materials :- Provision of schedule "D" shall apply for cement, sand, water etc.

7.1.4. MORTAR, REPARATION OF MORTAR FOR PLASTERING, AND POINTING: WORK:

Unless otherwise specified, the cement mortar used in plastering, pointing work shall be of cement mortar mix MM7.5 grade, or any other specified grade using minimum 360 kgs. Of cement per cubic meter of mortar. The other specifications and conditions enunciated in paragraph 6.4 shall apply for mortar for plastering work.

7.1.5. PLASTERING WITH CEMENT MORTAR MM 7.5 GRADE OR AN OTHER SPECIFIED GRADE:

7.1.6. PREPARATION OF SURFACE:

The roughening of the back ground improves the bond of plaster. All joints shall be thoroughly racked. After roughening the surface, care shall be taken to moisten the surface sufficiently before plastering as otherwise freshly exposed surface may tend to absorb considerable amount of water from the plaster. The surfaces shall be wetted evenly before applying the

plaster. A fog spray may be used for this work as far as possible, the plaster work shall be done under shade.

7.1.7. LAYING OF PLASTERING:

a) The mortar used for plastering shall be stiff enough to cling and hold when laid. To ensure even thickness and true surface, plaster shall be applied in patches of 150mm x 150mm. Of the required thickness at not more than 2 meters intervals horizontally and vertically over the entire surface to serve as guides. The surface of these guides shall be truly in the plane of the finished plaster surface and truly plumb. Plastering shall be started from top and worked down. All the potlog holes shall be properly filled in advance of the plastering. The mortar shall then be applied to the surface to be plastered between the guides with a trowel. Each trowel full of mortar shall overlap and sufficient pressure shall be used to force it into thorough contact with the surface. On relatively smooth surfaces, the mortar shall be dashed on with the trowel to ensure adequate bond. The mortar shall be applied to a thickness lightly more than that specified, using a string, stretched out between the guides. This shall hen be brought to a true surface by working with a long wooden float with upward and side ways motion 50 mm or 75 mm at a time. The surface shall be periodically checked with a string stretched across it. Finally the surface shall be rendered smooth with a small wooden float over working shall be avoided. All corners arises and junctions shall be neatly finished. Metal floats shall not be used, I.S. 1661 – Code of practice for application of cement lime plaster finishes shall be applicable for this section.

b) If it is necessary to suspend the work at the end of the day it shall be left in a clean horizontal or vertical line not nearer than 150 mm from any corner or arises or parapet tops or copings etc. When recommencing the work, the edges of the old work shall be scraped clean and wetted and treated with cement slurry before the new plaster is laid adjacent to it. After the first coat is done it shall be kept undisturbed for the next 24 hours and thereafter kept moist and not permitted to dry until the final rendering is applied.

c) After the plaster has sufficiently hardened cement slurry with cream like consistency shall be applied evenly and rubbed to a fine condition.

d) No portion of the surface shall be left out initially to be plastered up later on. The plaster shall be finished to a true and plumb surface and to proper degree of smoothness as required by the Engineer –in-charge.

e) The average thickness of plaster shall not be less than the specified thickness but shall not be thicker than 25mm in any case. Any cracks which appear on the surface and all portions which sound hollow when tapped or found to be soft or other-wise defective,shall be cut–out in rectangular shape and redone as directed by the Engineer-in-charge at no extra cost. Plastering shall be cured for 10days.

7.2 POINTING TO C.R. MASONRY WITH CEMENT MORTAR MM 7.5 GRADE

7.2.1. Scope:

Flush pointing with cement mortar of specified proportion to the exposed faces of CRS masonry including cost and conveyance of cement and all other materials, sampling, testing, mixing of mortar, labour charges, all leads, lifts, delifts, seignior age charges, scaffolding, curing all other operations necessary to complete the finished item of work as per drawings and directed by the Engineer –in-charge.

7.2.2. PREPARATION OF SURFACE:

The joints in the masonry shall be raked out to a depth not less than the width of the joint or as directed when the mortar is green. Joints are to be brushed to clean the dust and loose particles with a stiff brush. The area shall then be washed and joints thoroughly wetted before pointing is commenced.

7.2.3. LAYING FLUSH POINTING:

a) Flush pointing shall be done with cement mortar mix MM 7.5 grade or any other specified grade. The mortar shall be pressed into the raked out joints. The mortar shall not be spread over the corners, edges or surface of the masonry. The pointing shall then be finished as detailed below. The mortar shall be finished off flush and level with to edges of the stones. So as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and straight edge.

b) The pointing shall be cured for seven days.

7.2.4 MEASUREMENT AND PAYMENT:

a) The work of plastering and pointing shall be measured in square meters of the surface treated.

b) Payment for plastering and pointing shall be made at ten Square meters at tender rate in schedule-A, which shall include the cost of all labour, material, sampling, testing, tools, scaffolding, curing and other expenses incidental to the work.

VERTICAL/RADIAL GATES

8.1 SCOPE OF WORK:-

The scope of work includesmanufacturing, fabrication, painting, packing, supply, transportation, handling, storage at site, erection, testing, commissioning and other operation which are necessary for the E M parts of Vertical/Radial Gates, Vertical/Radial Gates, hoist supporting structure, E M parts of River sluice service & emergency gates, River sluice service & emergency gates, hoist bridge & rope drum, hoist as per drawings approved by the CE, CDO.Hyderabad.

Necessary gate for fish ladder shall be provided as perapproved drawings.

8.2 Materials for Vertical gates:

The materials generally used for different components are given in Table-I of IS 4622:2003.

S.No.	Component	Recommended Material	Reference
i)	Wheel	Cast steel	1030:1998
		Cast iron	210:1993
		Wrought steel	
		Forged steel	2004:1991
ii)	Bearing/ Bushing	Anti-friction, bearing/bronze, phosphor bronze, aluminium bronze, self lubricating bushing of high strength brass castings	318:1981 305:1981
iii)	Wheel pins of axles	Chrome nickel steel or corrosion resistance steel, mild steel with nickel or hard chromium plating	2004:1991 2062:1999 1068:1993 1337:1993
iv)	Structural parts of rate leaf, track base etc.,	Carbon steel, structural steel	1875:1992 2062:1999 8500:1991
v)	Seal	Rubber	11855:1986
vi)	Wheel track	a. stainless steel b. corrosionresistance steel	1570(Part-5): 1985
vii)	Seal seat	Stainless steel plate	1570(Part-5): 1985
viii)	Seal base, seal seat base, sill beam	Structural steel of convenient shape	2062:1999 8500:1991
ix)	Seal clamp	Structural steel Stainless steel	2062:1999 8500:1991 6603:2001
x)	Guide	Structural steel or corrosion resistance steel or stainless steel	2062:1999 8500:1991 6603:2001
xi)	Springs	Spring steel	6527:1995
		Stainless steel	2062:1999
xii)	Anchor bolts	Structural steel	6527:1995
xiii)	Guide rollers and guide shoes	Structural steel or corrosion resistance steel, case iron, cast steel or forged steel	2062:1999 8500:1991 210:1993 1030:1998 2004:1991

The Grade of material confirming to the specification mentioned above will be speciied by the CE,CDO,Hyderabad to suit the particular requirement.

In all the references cited above, the latest revised edition of Indian Standard or equivalent shall be followed. Any change in the technical specification of materials shall have to be got approved from Engineer in charge before taking up fabrication or at thetime of processing.

RADIAL GATES.

8.1.0 SCOPE OF WORK

These specifications cover the requirements of Supply, fabrication including shop & field painting, shop assembly, transportation, supply, erection and successful commissioning of the equipment.

RADIAL GATESwith all accessories such as guide rollers, seals, lifting brakets, trunnion brakets, trunnion tie beams and any other appurtenances etc and embedded parts for radial gate such as wall plates, sill beam, seal seats., Yoke/trunnion girders, load carrying anchor rods and walk way at trunnion level, ladders on the top arms and between horizontal girders etc. including 1st stage and 2nd stage anchor bolts including all mechanical equipment, electrical & remote control equipment consisting of wire ropes, rope drums, reduction gears, central drive unit including gear reducer, E.M.brake, motor, gate position indicator, arrangement for manual drive & auxiliary power unit etc. Metal covers for the hoist machinery shall also be provided.

8.2 **Materials**

All the materials shall be of tested quality, new, unused, free from defects and of the grade/classification envisaged in the designs. The contractor shall furnish the test certificate for each lot of material, if so required by Engineer in charge. Plates with laminations discovered during welding or during inspection shall be rejected. Materials not supplied according to the approved designs/drawings shall be rejected, removed and replaced. Approval of Engineer in charge shall not relieve the contractor of the responsibility of supply of suitable materials.

Recommended materials for main components are given below.

Sl.No.	Component/part	Recommended materials	Reference
1	Skin Plate	Structural steel	IS.2062 Gr: E-250- B
2	All structural members such as stiffeners,horizontal girders, arms bracings, Yoke/turnnion girders, load carrying anchor roads, trunnion brackets, trunnion tie beam, hoist connection brackets,sill beam, wall plates, seal seat bases, seal clamps, etc.	Structural steel	IS.2062
3	Trunnion bearings	Self lubricating bushings of high strength brass castings	ASTM B 22/ 271 with self lubricating inserts of standard made like DEVA, LUBRITE OILESS AND TENMAT or Equivalent
4	Trunnion Pin	Stainless steel	IS.1570(Part-5) Gr: 20 Cr 13 or IS: 2004 CL - V
5	All pins including guide roller pins, lifting pins etc.	Corrosion resisting steel	IS.1570 20 Cr 13 (part-5)
6	Seal seats	Stainless steel	IS.1570 (Part-5)
7	Guide rollers, trunnion hubs	Cast steel	IS.1030
8	Seals	Natural or synthetic rubber	IS.11855
9	Screws/Bolts for seals	Stainless steel	IS.1570 (Part-5)

In all the references cited above, the latest revised edition of Indian Standard or equivalent shall be followed. Decision regarding adopting particular equivalent standard/make shall be made by the Engineer in charge and shall be binding on the contractor.

8.3 Warranty

The contractor shall furnish warranty of the equipment for a minimum period of five years after completion of the entire work including two years defect liability period. The contractor shall warrant among other things the following items.

a. Quality and strength of the materials used.
b. Satisfactory operation of the equipment.
c. Safe stresses in all parts under all conditions of operation
d. Protection of equipment against vibration and corrosion.

The contractor shall correct, at his own expense the defect if any, during the warranty period. The contractor shall assume all responsibility for direct damages causing personal injury or property damage caused by any manufacturing defect under these specifications.

8.4 ROPE DRUM HOIST FOR VERTICAL/ RADIAL CREST GATES:

8.4.1General

The hoisting equipment to be furnished by the contractor will be used to operate spillway service gates, the scour sluice service and Emergency gates shall include a driving motor, a gear reducer, rope drums, ropes, shafts, gears, couplings, brakes, emergency manual operation arrangements, limit switches, gate position indicator, covers etc., all mounted on a fabricated steel frame.

all the hoist equipment parts i.e driving motor, a gear reducer, rope drums, ropes, shafts, gears, couplings, brakes etc.,shall be identical and shall be interchangeable to any of the spill way gates.

Electrical controls and all necessary and mechanical accessories shall be provided for the satisfactory operation of the hoist. All machinery is to be supported on the hoist supporting structure placed on piers.

The hoist shall be capable of fully opening/ closing the gates, and holding the gates in its fully opened or in any intermediate position during either the opening or closing operations. Suitable ladder for access shall be provided to approach the hoist components and sufficient space shall be provided around them for repair/maintenance.

8.4.2 Materials for Rope Drum Hoist

All the materials shall be of tested quality, new, unused free from defects and of grade/classification envisaged in the designs. The contractor shall furnish the test certificate for each lot of materials, if so required by the Engineer in charge. Plates with laminations discovered during welding during inspection shall be rejected. Materials not supplied according to the approved designs/drawings shall be rejected, removed and replaced. Approval of Engineer in charge shall not relieve contractor of his responsibility of supply of suitable materials recommended materials for such of the components are given below.

Sl.No.	Component/part	Recommended materials	Reference
1	All structural members for hoist supporting structure, walkway etc.,	Structural steel	IS:2062
2	Rope drum	Cast steel	IS:1030
3	Wire rope	Improved plough steel	IS:2266
4	Wire rope socket	Forged steel	IS:2004 IS:1875
5	Gears/Pinions	Cast steel Forged steel	IS:1030 IS:1875
6	Shafts	Forged steel/Alloy steel	IS:1875
7	Sheaves/pulleys	Cast steel/ Forged steel	IS:1030 IS:1875
8	Equalizer bars/turn buckles	Structure steel/ Forged steel	IS:2062 IS:1875
9	Bushings	Aluminium Bronze	IS:305 IS:318
10	Keys	Forged steel	IS:2048
11	Motor	As per standard and as per requirement	IS:325

Decision regarding adopting particular equivalent standard/make shall be made by the Engineer in charge, and shall be binding on the contractor.

8.4.2.1 Hoist Capacity :

i.Hoist with a capacity as per CE, CDO approved designs/drawings shall be supplied.

ii. Operating speed: 0.3 m/min to 0.7 m/min or as per IS 6938(latest) or as per CE, CDO approved designs/drawings

iii. Hoist mechanism : As per IS 6938 Latest.

For barrages and spillways hoist capacity is to be calculated without considering Teflon cladding for side seals.

8.4.2.2 HOIST SUPPORTING STRUCTURE

a)The hoist supporting structure shall be fabricated out of IS structural steel sections or built up sections (weldable) conforming to BIS 2062 (latest edition) as per CE,CDO,Hyderabad approved drawings.

8.4.2.3 Wire Ropes

The Wire rope of required size and specification and number, fiber core, improved plough steel, galvanized, Lang's lay conforming to IS 2266(latest) to be supplied.

8.4.2.4Drum, pulleys, gearing , shafts, bearings & gear boxes

The above all components shall be supplied conforming to BIS 6938 (latest edition)

8.4.2.5Worm reducer

Self locking reversible work/helical reducer of standard make such as Radicon, Allenroyd, Allenberry, Elecon or any other BIS standard quality shall be supplied. The reducer shall match with ratings of motor.

8.4.2.6Couplings and clutches:

Standard made such as Allenberry, Stromcraft or any other BIS standard quality and suitable for the torque transmitted shall be supplied..

Coupling between drive unit and end reduction unit: Flexible coupling.

8.4.2.7 Motor

T.E.F.C. reversible squirrel cage, operating on 415 V, 3 phase, 50 Hz A.C power supply of standard make such as GEC, Siemens, Kirloskar, NGEF, Crompton Greaves or any other BIS make shall be supplied. The shaft of the motor shall be of extended type to accommodate arrangements for manual drive. The rated speed of motor shall not be more than 1000rpm. The motor shall have high starting torque, low starting current and shall be suitable for operation in highly humid atmosphere. The breakdown torque shall not be less than 200% of the rated torque of motor. The central drive unit shall be mounted on a portable frame Suitable covers shall also be provided.

8.4.3 Electrical Equipment

8.4.3.1 Electromagnetic Brake:

Single phase, solenoid release, shoe type, electromagnetic brake (having rated torque of 1.5 times the output torque of motor) of standard made such as Technocraft, Electromag, Stromcraft or any other BIS standard make shall be supplied..

8.4.4 Manual drive

The manual operation shall be provided with electrical interlock to prevent operation by electric power when the manual drive is engaged. Effort per person shall not be more than 10Kg at a crank radius of 400mm operating at a speed of 24 rpm.

8.4.5 Covers

All the components of the hoist i.e. drums, gears, brakes, motors, shaft couplings and clutches etc. shall be provided with individual covers of M.S.sheet of minimum 3mm thickness. The covers shall be such that it is easily possible to lubricate the machinery without removing them.

8.4.6 Control panel and protective devices

T.P. air breakers, fuses, thermal protective relays etc. of suitable ratings shall be provided in the motor circuit and D.P. air circuit breaker, single phase preventer, limit switches (for lowest and highest positions of gates) shall be provided in the control circuit. All the contacts, relays, push-

buttons etc. shall be of adequate ratings of standard make and of tested quality one step-down transformer of adequate capacity shall be used to get 110 volt A.C.supply for the control equipments. Limit switches shall also be provided to ensure that the motors do not start while the gates are being operated manually. Suitable anti-condensation heaters shall be provided in all control panels. In addition to the equipment for local control of the gates, all equipment for remote control of each gate shall be provided. For the purposes of remote control, local gate control cabinets shall provide an electrical interface for remote control including remote position indicator. These features shall be furnished for each gate. All interface wiring shall be wired to one terminal block for individual gate.

All the components of hoists shall be checked for the breakdown torque of motor selected. Actual breakdown torque or pull out torque as indicated in the motor catalogue supplied has to be adopted limiting of BDT/POT of motor by using a torque limiter or by effecting any local change in the motor circuit will not be permitted.

8.4.7 Manufacture and Fabrication:

All the works shall be performed and completed in a thorough workman-like manner as per the best modern practice in vogue in the manufacture and fabrication of equipment of the type covered by these specifications. The work shall in all cases be of high grade and carefully performed to the satisfaction of the Engineer in charge. The contractor shall warrant all materials and workmanship furnished by him to be free from injurious and defective materials or workmanship and shall bear all cost of the repair in case of any error for which he is responsible workmanship shall conform to the relevant standards laid down by the Bureau of Indian Standards. All sharp corners, which can Barrageage the matching parts, shall be rounded and chamfered.

8.4.8 Tolerances

Where tolerances or fits are not specified on the drawings, the contractor shall follow the best modern shop practices for apparatus of the type covered by these specifications and drawings, due consideration being given to the special nature of function of the parts and to the corresponding accuracy required to secure proper operation.

8.4.9 Machine Finish

Where finished surfaces are not specified on the drawings, the type of finish shall be that most suitable for the part to which it applies and shall be as per IS: 3073(latest edition). A smooth finish (two delta, i.e., 1.6 to 6.3 microns) will be required for all surfaces in sliding or rolling contact and for surfaces in permanent contact, where a tight joint is required. A finish (single delta, i.e. 6.3 microns and above) shall be given to all other machined surfaces where selective assembly for matching parts is specified on the drawings or otherwise required. The parts shall be ground, if necessary, to obtain the limiting tolerances.

8.4.10 Castings

While making patterns for the castings, care shall be taken to avoid sharp corners or abrupt changes in cross section and ample fillets shall be used. All castings shall be true to patterns and the thickness of the metal shall not vary at any point by more than 5mm from that shown in the drawings. Care shall be taken in the foundry to cool the castings properly so that they will not warp or twist. No casting will be accepted if it is warped or twisted to such an extent that machined surfaces cannot be properly finished to the dimensions shown on the drawings. All castings shall be sound, clean, and free from cracks, blow holes or sand holes and other casting defects. These shall have a workman like finish. Castings shall not be repaired, plugged or welded without the permission of the Engineer-in-Charge. Such permission shall be given only when the defects are small and do not affect the strength, use or machinability of the castings. No welding shall be done after the castings are finally annealed. No defect shall be removed and paint or oil be applied to the surface of any casting until the Engineer-in-Charge or his authorized representative has inspected it. The treatment for casting involves heating slowly up to about 40^0c above it's a critical temperature, holding it at the temperature just only long enough for a uniform temperature to be attained throughout the casting and then allowing it to cool slowly in furnace. During the process, the requisite annealing temperature shall not be exceeded and overheating shall be avoided. End products shall conform to the requirements of relevant Indian Standards. All castings shall be ultrasonically tested to ascertain their soundness.

8.4.11 Forging

All forging shall be done in accordance with the latest practice and shall exhibit physical and chemical properties envisaged in the corresponding Indian Standards. Only those forging shall be used whose working is well known without doubt.

8.4.12 Fabrication of Structural steel

The contractors are expected to perform fabrication in the best possible manner to meet the requirements of designs and drawings. However, some specific guidelines are given herein under.

8.4.12.1. Straightening of Members

Before being laid off or worked in any manner, structural steel shall be straight, without twists, bends or kinks, and if straightening is necessary, it shall be done by a method which shall not injure the metal to ensure good welding and fittings of members. All steel shall be cleaned of dirt, mill scale and rust prior to fabrication.

8.4.12.2. Shearing, chipping and Gas cutting

Shearing, chipping and gas cutting shall be performed carefully and all portions of the work, which will be exposed to view, shall present a neat appearance. Finishing of sheared or cut edges of plates or shapes will not be required except as noted in these specifications.

8.4.12.3 Edges to be welded

The edges of plates and shapes to be joined by welding shall be properly formed to suit the type of welding selected. Where plates and shapes have been sheared, edges to be joined by welding shall be machined or chipped to sound metal. Plates and shapes to be field welded shall have their edges prepared in the shop for the type of weld selected.

8.4.13.4. Bent Plates and Shapes

Where bending or forming of plates or shapes is required, the plates or shapes shall bent by cold forming. Heating and hammering to correct bends will not be permitted.

8.4.13 Welding

8.4.13.1 Preparation for Welding

Members to be joined by welding shall be cut accurately to size and where required shall be rolled or pressed to the proper curvature in accordance with dimensions shown on the drawings. The edges of the members to be joined by welding shall be sheared, flame cut or machined to suit the required type of welding and to allow through penetration. The cut surfaces shall expose sound metal free from laminations, surface defects caused by shearing off flame cutting operations, or other injurious defects. The surfaces of the plates to be welded shall be free from slag, rust, grease, paint and other foreign matter for a distance of at least 2 inches back from the edges of the weld. In assembling and during welding, the component parts of built up members shall be held in place by sufficient clamps or other adequate means to keep all parts in proper position. All materials over 25 mm in thickness shall be preheated before welding is commenced. Before the commencement of welding, the contractor shall submit a complete program for welding sequence and distortion control for approval of the department. The molten metal and where applicable automatic machine with correct procedure control shall be used. All welding performed in the fabrication and erection of steel structures and equipment shall conformed to the requirement of IS 816 except as modified in these specifications and shall be performed by a code qualified welder. After being deposited, welds shall be cleaned of slag or flux and shall show uniform sections, smoothness of weld metal, feather edges without overlap and freedom from porosity and clinkers. Visual inspection at the edges and ends of welds shall indicate good fusion with the base metal. When the weld metal is deposited in successive layers, such layer except the last shall be cleaned moderately with a tool before the next layer is applied. Particular care shall be taken in aligning and separating the edges of members to be joined by butt welding so that complete penetration and fusion at the bottom of the joint will be assured. All pin holes, cracks and other defects shall be repaired by chipping or grinding the defects to sound metal and re welding. Where fillet welds are used, the members shall fit closely and shall be held together during welding. The welding rods used for manual welding shall be heavily coated type, and shall be suitable for all position welding where required. In welding, precautions shall be taken to minimize stresses due to expansion or contraction and distortion due to heat by using the proper sequence in welding by preening the welds while hot or by other satisfactory methods. Correctors of distortions by bowls, after welding is completed and the piece is cold, will not be permitted.

All skin plate welds shall be continuous and water tight and shall develop the full strength of the plate joint. Welding electrodes shall conform to the applicable provisions of the I.S.I. specification.

The contractor shall prepare a shop and field welding procedure including stress relieving, annealing and preheat requirements and shall submit this procedure shall submit Engineer-in-Charge for approval. The procedure shall be in accordance with best modern welding practice and shall be such as to minimize residual stresses and distortion of the finished members of the structure. Approval of any procedure, however, will not relive the contractor of the sole responsibility for

producing a finished product meeting all requirements of the specifications. Welds in contact will rubber seals shall be rounded.

8.4.13.2 Welding Technique

All welding shall be done by the electric arc method by a process which will exclude the atmosphere from the molten metal, except where otherwise specifically permitted. All welding electrodes required shall be furnished by the contractor. Correct selection of electrodes shall be done taking due care of welding method and base metals of components. The welding electrodes shall be of the heavily coated type designed for all position welding. The make, type and size of all welding electrodes shall be subject to the approval of the Department.
In assembling and during welding, the component parts of built up members shall be held in place by sufficient clamps or other adequate means to keep all parts in proper position. The surface to be welded shall be cleared of scale, slag, rust, paint, and other foreign matter, except that thin coat of linseed oil need not be removed before welding. Where weld metal deposited in two or more layers, each layer shall be brushed with a wire brush or otherwise cleaned before the subsequent layer is deposited. In welding, precautions shall be taken to minimize stresses due to heat by using the proper sequence in welding.
Upon completion, the welds shall be brushed with wire brush and shall show uniform section smoothness of weld metal. Edges and ends of fillets and butt joint welds shall indicate good fusion and penetration into base metals. Specific requirements for butt joints and fillet joints are given below.
i) Butt Joints
In principle, butt joints should be made with back run. The joints in the skin plate shall be staggered & preferably located near the point of contra flexure. The edges of skin plate shall be prepared in shop. Skin plate joined by butt welding shall be without any back plate so as to facilitate radiography. Joints, if required in horizontal girders and hoist bridge girders shall be located sufficiently away from location of maximum bending moments. They shall also be butt welded in such a way as to facilitate radiographic testing of welded joints.
All butt welds in gate components shall be 100% radiographically tested for their soundness. However, the extent of radiography for joints in skin plate alone shall be limited to 10% of total weld length suitably selected. However other tests like ultrasonic, dye-penetrant or magnetic particle test should be conducted for full length of butt joints in the skin plate. All butt joints in hoist bridge shall also be 100% radiographically tested for their soundness. Dye-penetrant test shall be carried out after each pass of the weld.
ii) Fillet joints
All fillet welds shall be continuous. For the main members, no fillet welding should be made on members whose thicknesses differ substantially. Fillet weld at 'T' joints should be made, as a rule, on each side of the joint, unless it is otherwise agreed due to some practical reasons. All fillet welds shall be tested ultrasonically for soundness.

8.4.13.3 Qualification of Welding Process

A specification of the welding process, that is proposed to be used, shall be established and recorded and, if required, a copy of such specification together with a certified copy of report of results of tests made in accordance with the process and specifications shall be furnished.
The qualification of the welding process shall be atleast equal to that required by 'Standard Qualification Procedure' of the Indian Standards and the minimum requirement of the tests shall be at least as stated in the said, 'Standard Qualification Procedure'.

8.4.13.4 Qualification of Welders

Every welder, unless he is holding a valid IBR certificate, shall be tested and pre-qualified by Engineer-in-Charge before he is employed on the job. Using the qualified process, the welder to be tested shall prepare test specimens for both fillet and butt welding in positions, namely, flat, horizontal, over head, etc., for which he is required to be pre-qualified. Tests to be conducted on the specimens shall be in accordance with IS 817 and the number of tests to be conducted shall be as decided by the Engineer-in-Charge. Those welders who are required to be pre-qualified to do butt welding shall prepare specimens to satisfy transverse tensile test and radiography tests in addition to those specified in IS 817. Routine tests on welders shall be required every six months. Engineer-in-Charge reserves the right to test any welder employed by contractor at any time and at any frequent intervals.
The welder is deemed to be qualified to do welding only if these tests are successful. Should the welder fail in the first test, two further tests shall be undertaken immediately and the welder, to qualify, must satisfactorily pass both these tests. All cost towards testing of welders shall be borne by the contractor.

8.4.13.5 Electrodes:
All electrodes used for welding shall be of approved make and shall conform to IS: 814 and AWS FSA 5.1 specifications.In addition, the electrodes used for various applications shall conform to the following classifications of AWSFSA 5.1. Electrodes used shall be amenable to radiographic testing.

Fillet welds:Thickness of plate less than or equal to 19mm

Size of weld 6mm	E 6013
Size of weld greater than or equal to 8 mm	E 7016 for root run and E 7018 for subsequent runs
Thickness of plate greater than 19 mm and Size of weld greater than or equal to 8 mm	E 7016 for root run and E 7018 for subsequent runs

Butt weld:

Thickness of plate lesser than or equal to 19 mm	E 7016 for root run and E 7018 for subsequent runs
Thickness of plate greater than 19 mm	E 7016 for root run and E 7018 for subsequent runs

All electrodes shall be stored in ovens as per manufacturer's instructions. Electrodes for shielded –arc manual welds shall comply with the requirements of IS: 814 and shall be of following or any other make of approved quality and shall be amenable to radiographic testing.

a) M/s D and H Secheron Electrodes (P) Ltd.,
b) M/s Indian Oxygen Ltd.,
c) M/s Advani Oerlikon
d) M/s Philips India Ltd., / their subsidiary 'PIECO'.

The electrodes for manual arc welding shall be suitable for use in the position and type of work as laid down in the above specifications and as recommended by the manufactures.
The filter wire and flux combination for submerged arc welding shall confirm to the requirements for the desired application as laid down in IS: 3613. The weld metal deposited by the submerged arc process shall have mechanical properties not less than that specified for American welding Society's classification 5.17 F 60 for steel conforming to IS : 2062 and AWS classification 5.17 F 70 for steel conforming to IS : 8500.
Electrodes flux covering shall be sound and unbroken. Broken or Barrageaged coating shall cause the electrodes to be discarded. Covered electrodes for manual arc welding shall be properly stored in an oven prior to use in a manner recommended by the manufacturer and only an hour's quota shall be issued to each welder from the oven.
Electrodes larger 5mm dia meter shall not be used for root runs in butt – welds.
Welding plant and accessories shall have capacity adequate for the welding procedure laid down and shall satisfy appropriate standards and be of approved make and quality. The Contractor shall maintain all welding plant in good working order. All the electrical plant in connection with the welding operation shall be properly and adequately earthed and adequate means of measuring the current shall be provided.
All welds shall be made only by welders and welding operators who have been properly trained and previously qualified by tests to perform the type of work required as prescribed in the relevant applicable standards.

8.4.13.6Tests:
All the tests for soundness of welds shall be carried as per BIS 822 and as per other relevant BIS codes applicable.
a) 100% of fillet welds shall be checked by ultrasonic test & dye penetration test.
b) All butt welds in gate components shall be 100% radio graphically tested for their soundness. However the extent of radiography for joints in skin plate alone could be limited to 10% of total weld length suitably selected.
c) Other tests like ultrasonic, dye penetrant or magnetic particle test shall have to be conducted for full length of butt joints in the skin plate.

d) Butt welds in the web and flanges of horizontal girders shall be checked by magnetic particle impression test for soundness.
e) All butt joints in Hoist Bridge shall also be tested radio graphically 100% for their soundness.
Engineer in charge reserves the right to order for any additional tests for the gate components & Hoists supporting structures.
Incase of welds of multiple runs root welds shall be tested by liquid penetrant/ dye penetrant tests and certified by Engineer in charge before welding on subsequent runs are taken up.

8.4.14. Riveting

Rivets shall be driven by power riveters, employing pneumatic, hydraulic or electric power. After driving, their finished heads shall be of approximately hemispherical shape of uniform size throughout the work for the same size rivet, neatly finished and concentric with the holes. Rivets shall be finished and heated uniformly to a temperature not exceeding 1065^0C. They shall not be driven after their temperature has fallen below 528^0C. All shop driven rivets within a distance of 425 mm from a shop welded joint shall be driven after the welding is completed. Recouping a caulking of loose or defective rivets will not be permitted. While removing defective rivets, care shall be taken not to injure the adjacent metal and if necessary, they shall be drilled out.

8.4.15.Turned and Fitted Bolts

In cases, where bolts have to be used but strength of a riveted connection is required, this can be obtained by using special bolts in special holes to a driving fit. The bolts are specially made from black round bars and turned down to the exact diameter. The inside of the head and flat face of the nut should be machined. The hole must be accurately drilled or reamed with a clearance of not more than 0.25mm. The holes after assembly of the parts must be true throughout the thickness of all parts and perpendicular to axis of the member. Washers for turned and fitted bolts should be machined on both faces.

8.4.16.Drilling and Reaming

Holes shall be accurately located and drilled or reamed perpendicular to the face of the member and, if necessary, shall be drilled to a template. Counter-sinking, wherever required, shall be done carefully and to the full depth of head. Open holes in material of 18 mm or less in thickness, shall be sub-drilled or sub-purchased before assembly and reamed during assembly. Holes in structural steel of more than 18 mm in thickness shall be drilled 3 mm smaller than the normal diameter of the rivet or bolt, before assembly and reamed to the full size during assembly. All members shall be shop assembled before reaming or drilling holes for field connections.

8.4.17. Punching

For sub-punching, the diameter of the punch shall be 4.5 mm smaller than the nominal diameter of the rivet or bolt and holes shall be clean cut without torn or ragged edges.

8.4.18. Stress Relieving

Stress relieving of welded parts, where required, shall be carried out after all welding is completed but before that part is machined or assembled into structure. Localized stress relieving will not be permitted for shop welded parts. The stress relieving of parts shall be done as per IS: 2825, IS: 10801 and IS: 10234 latest edition). Provisions of IS: 4623 shall also be fulfilled for stress relieving of gate components.

8.5. HYDRAULIC HOIST FOR OPERATION OF VERTICAL/ RADIAL CREST GATES

8.5.1 General:-

The scope of work shall include the cylinders, the hydraulic power pack, both local and remote electrical control panels (compatible with the remote control / indication panel), pipes and fittings between the power pack and the cylinder, cabling, limit switches, position indicator, provision for manual operation etc., complete in all respect.

The scope of work shall also include arrangement for operation of gates using a standby power supply with the help of a DG set of adequate capacity. Provision for manual operation of gates in case of power failure or DG set failure shall also be made at the local control system.

The power and control system for gate shall be provided on an independent cabin house in the hoist chamber. The control systems shall comprise of motor-pump units, oil tank, hydraulic controls and values, control switches, push buttons, circuit breaker and contacts etc., for operation of gate.
The controls shall be so arranged that once initiated, the cycle for either closing or opening, shall be completed and the hoist shall stop automatically. It shall also be possible to stop the hoist in any

intermediate position during any cycle and restart or reverse as desired. Indicator lamps to indicate close, open and intermediate positions shall be provided on the control cabin.
In case of the Hydraulic Hoists for Crest Gates, all the hoist cylinders with piston and piston stem shall be identical and shall be interchangeable to any of the spill way gate vents.
The control system shall incorporate all the features necessary for opening or closing of the gate from local control system or from remote control system in specified speed. The operative system shall have provision for the 'open' 'close' and 'stop' signals. It shall also be possible to stop the gate in any position and if the gate is stopped at any intermediate position, it shall be possible to actuate the hoist either for further closing or opening cycle.
Due to leakage of oil, the gate may creep down from fully or partly open position. In case the gate creeps down by about 150 mm due to leakage of oil in hydraulic system, the control system shall actuate an automatic device for introducing oil under pressure below the piston so as to restore the gate to previous position. The device shall automatically cease to function when the gate is restored to its previous gate open position. The device shall not function when the gate is being closed purpose fully.
An alarm and associated lamp indication shall automatically be actuated both at the remote control system and at the local operating chamber, in case the piston creeps down to 175 mm, or more from fully or partly open position, due to failure to automatic device. The alarm and lamp indication system shall be separately provided for each gate hoist. The alarm and lamp shall have a reset provision.
The hoist shall be equipped with a damping device to slow down the downward motion of the gate with it is 300 mm above, from the fully closed position, in order to prevent banging/impact of the gate on the sill.
The operation of the hoists shall be by means of push buttons provided in the controls. There shall be separate push buttons for all operations like opening, closing (normal and emergency closing) and for stopping the gate in intermediate position. Controls for all operations of the hoist shall be provided both in the local control chamber adjacent to the hoist (i.e., hoist control chamber) and also in the remote control room / control room of the Power House.
The hoist shall normally be operated from the chamber adjacent to the hoist but it shall also be possible to operate the hoist form the controls provided in the control room of the Power House/ remote control room.
For closing the gate in emergency, an emergency push button shall be provided at the control boards located in the control room in the Power House / remote control room as well as in the hoist control chamber.
It shall also be possible to operate the control value manually for closing the gate in the event of failure of electric power.
Emergency closing of the gate shall be with 220V DC supply. The solenoids required for emergency closing shall be rated for 220Vots D.C.

8.5.2MATERIALS FOR THE COMPONENTS OF HYDRAULIC HOIST AS PER IS:10210-1993

S.No	Component Articles	Materials to be used	IS Specification
1	Supporting structure	Structural steel Cast Steel	IS: 2062-1992 IS: 1030 – 1989
2	Cylinder	Plate Steel / Boiler Guide Steel M10 420N Carbon steel forging Or High tensile tube st 52 corresponding to DIN 1692	IS: 2002 -1982 DIN designation: IS: 2041 – 1982 IS: 2004 – 1978
3	Cylinder heads	Cast steel Structural steel	IS: 1030 -1989 IS: 2002 – 1982 IS: 2062 – 1982 Standard DIN 17100
4	Piston stem	A) corrosion resistance steel b)Forged steel	IS: 1570(v)-1985 18% chromium IS:20041978 DIN 17440 Mat No:1.4057 or any other equivalent material
5.	Piston	Cast steel, forged steel Grey iron casting, carbon steel	IS: 1030 – 1989 IS: 2004 – 1978 IS: 210-1978 42 Cr Mo4 DIN:1.7225/EN 10083

6.	Piston ring	Bronze Grey iron casting	IS: 318 IS: 210
7	Clevis pin	Corrosion resistant steel	IS: 1570(v)-1985
8	Gland clevis bushing	Cast manganese bronze	IS: 6911 – 1982
9	Studs and bolts	High Strength Friction grip bots /studs	IS: 1367 – 1972

Note:- Latest editions/ revisions of all IS Codes mentioned in this technical specifications and / or on the specifications drawings shall be referred.

8.5.3. Hoist Capacity :

i.Hoist with a capacityas per CE, CDO approved designs/drawings shall be supplied.

8.5.4 Hoist Cylinder:-

The cylinders shall be made of seamless tubes of Plate Steel / Boiler Grade Steel / Carbon Steel forging, conforming to relevant IS Codes like IS: 2002-1982, IS: 2041-1982 and IS: 2004-1978 or High tensile tube of grade ST 52 corresponding to DIN 1692 or equivalent approved International codes.

The flanges shall be of either welded constructions out of plate steel as per IS: 2002-1982 and IS: 2041-1982 or carbon steel forging as per IS: 2004-1978. If the cylinder is in forged construction, the flanges may be forged as an integral part of cylinder otherwise the flanges of the cylinder shall be butt welded to the cylinder shell. In either case the cylinder shall be annealed and stress relived before machining which shall be carried out in accordance with relevant IS standards.

Cylinder heads: The cylinder heads shall be designed as thick plate, held down at the outer perimeter in accordance with IS: 2825.

Piston: The Piston shall be made of either cast steel or forged steel or grey iron casting as per IS: 1030, IS:2004 and IS: 210 respectively (latest editions shall be followed).

Piston shall be provided with grooves to accommodate the piston rings, oil rings and provisions for fixing the stuffing box having 'V' packing rings or other approved equivalents. To prevent leakage of oil.

Hanger stud for locking the piston with gate in fully raised position shall be provided for the hoist. It shall be possible to engage or dis-engage the hanger stud by means of a hand wheel provided in the centre of the upper cylinder head.

Piston rings & Packing: The pistons shall be fitted with hydraulic type piston rings and also with a stuffing box having 'V' packing rings, angled or overlapping stem cut type or other equivalent to eliminate leakages of oil past the piston and to permit holding of the piston in any position for, a longer period of time without flow of oil from below the piston is blocked.

The piston rings shall serve as a reserve seal in case of damage to the packing.

The piston rings shall be of single piece, made of either bronze, or grey iron castings conforming to IS: 318-1962 and IS: 210-1978 respectively.

Stems : The piston stem shall be of solid corrosion resistant steel or structural steel or forged steel, and shall be hard chrome plated to **at least 50Microns** thickness in uniform circular section. The piston stem shall be machined, ground and polished**. All the piston stems shall be seam less.**

The piston stem shall pass through in the lower cylinder head and shall be connected to the gate through the connecting link by means of a nut. The assembled piston and piston stem shall be concentric and the faces of piston shall be normal to the axis of the steam. The stem shall be checked for buckling.

i) Stem locking device (Hanger stud):

The gate shall be normally suspended by oil pressure. However arrangement shall be made in the hoist system for a hanger stud for holding the gate during erection and maintenance. The upper end shall be screwed into the cylinder upper head and locked with the hanger nut. The lower end shall be screwed with the piston. The arrangement shall be such that it is possible to engage or disengage the hanger stud with the piston by means of a hand wheel provided centrally on the upper cylinder head. The hanger stud in its minimum cross section shall have sufficient strength to hold the load of the piston, piston stem and the gate leaf. It shall also be designed to yield at its minimum cross section in case of an emergency when the lowering cycle is initiated without disengaging the hanger stud from the piston. Suitable wrench facings shall be provided near its minimum cross section to facilitate removal of broken piece screwed to the piston.

Couplings : The couplings for connecting the stems between the gate and hoist may be cleaves type, split collar type or hook & eye type depending upon suitability.

Wiper Scrapper :A wiper scraper, consisting of corrosion resistant steel scarper with a synthetic rubber wiping member assembled in tendon position and securely clamped and enclosed in a steel shell. Shallbe provided to remove foreign matters from stems exposed to water; to prevent damage to the packing while the stem enters the cylinders. The scraper shall have a ring fit on the piston stem and shall have sufficient play within the outer shell to permit alignment under normal working tolerance. It shall be installed in the lower cylinder head gland by a simple press fit for removing any

foreign matter stuck to the stem. It shall be effective only in the upward stroke of the piston and the wiping member shall remove any foreign particles that pass the scraper.

Gate position indicator: An indicator shall be installed to indicate the exact position of the gate at any time in its full travel. The indicator shall comprise of an indicator guide and indicator stem. The indicator head fixed at the end of the indicator stem shall move in the guides and shall carry the located in the operating chamber.

8.5.5 Hydraulic Equipment:

Oil tanks : Oil tanks made of robust steel construction and suitable for floor mounting shall be installed near power cabinet for serving the hoists .

The capacity of oil tanks shall be 3 to 4 times the pumping rate per minute plus.

a) Oil fully evacuated from the gate cylinder/ cylinders at a time.
b) Displacement of oil due to movement of piston stem of hoist cylinder/ cylinders.
c) 200 liters of spare oil or volume of one cylinder whichever is less
d) Free air space equivalent in volume to 200 liters of oil or volume of one cylinder, whichever is less.

Additional capacity should also be provided for the volumetric displacement of hoist stem and for temperature produced volume changes. The dimensions of the tank shall be fixed so as to accommodate it in the space available for the purpose.

Oil tanks shall be properly painted to ensure cleanliness and to avoid rusting. The tanks shall be provided with breather openings, provisions to drain water accumulation form the lower points in the oil tank, and hoist cylinder. The tanks shall also be provided with filler cap, strainer, drain valve, suction filter, top cover, necessary bolts & nuts, gaskets and also a transparent gauge to indicate the level of oil in the tank. The filter cap shall be a combination of air, vent, dust screen and air filter. The tank shall be provided with pedestal to keep it sufficiently above the floor of operation gallery.

The oil required for the operation of hoist shall be supplied along with necessary reserve capacity as required for, initially. The oil shall be of the type and quality as specified. The quoted rate shall be inclusive of the cost of oil, to be supplied initially.

Filters: The tanks shall be provided with screened filters, of not coarser than 150 microns, in the pump suction line of the tank. Oil filter shall be of the removable filter unit type. A pressure filter shall be provided in the return line to remove particles above 10 micron size. The top of filters shall be equipped with pipe plugs or suitable mean of venting air from the line. The pressure drop shall not be more than 0.1 Kg/Sq.m.

.Pumps : One set of motor driven oil pump for each hoist shall be provided for the operating system to ensure smooth and effective operation of gates. The pumps shall be of Plunge type gear pumps having a speed of preferably not more than 1000 rpm. Pumps shall be suitable to pump the hydraulic oil with rated discharge at the design pressure into the system.

Necessary valves, controls, safety valves etc., shall be provided so that the gate shall be opened/closed, when either of the two motor and pump units is in operation, although at a reduced rate.

The pumps shall be suitable either for foot mounting on the motor pump adopters. The pump shaft shall be provided with suitable bearings, shall be adequately packed or sealed to prevent leakages and shall be directly connected to the motor shaft through a flexible coupling.

One hand pump for each hoist in addition to the above electrically operated pumps shall be connected in parallel to the system as a standby arrangement.

Oil pressure gauge: The oil pressure gauge shall be of suitable type to operate rust proof and corrosion resistant moving elements. The pressure range of the gauge shall vary from zero to twice the pressure obtained in the control system, and shall be equipped with screw type device to reset the pointer. The dial shall have a diameter of approximately 150mm and shall have numerals at 20Kgs/Sq.cm. division points and primary divisions at 2 Kgs/Sq.cm. intervals. The gauge shall have flanged front suitable for flush mounting having pipe connection at the back.

.Pressure Switch: The oil pressure switch shall be of suitable rating to operate at least 5 amps at 240 volts A.C. supply. The switch shall have independent outside adjustments with locking devices for setting the cut in and cut out pressure and the pressure setting shall be indicated on a calibrated dial. The cage shall have suitable threaded entries at the back for pressure connection and electrical circuit connection and the switch shall have a capacity of at least, twice the maximum operating pressure obtained in the control system. The switch casing shall have an approximately diameter of 150 mm suitable

.Float Switch:A suitable float switch shall be provided to maintain the level of oil in tank. In case the oil level in the tank goes below a predetermined level due to leakage in the hydraulic system thereby causing the entry of air in the hydraulic circuit, the float switch shall give an indication for replenishment of oil in the tank.

Four way values: The Four way value for the control system for operating the gates shall be double solenoid controlled, spring centered, 3 position, having sufficient capacity and suitable for a working pressure of at least 220 Kg/Sq. cm. The valve shall be equipped with a mounting sub-plate suitably tapped to permit mounting or removal of the valve without disconnecting the piping. Electrical contacts as under shall be provided with each solenoid of each valve which shall operate during the period, the solenoid remains energized.

The valves shall also be equipped with push pins for manual operation in case of failure of electric power

Two contacts shall be normally closed and other two contacts open. The above electrical contacts of the four way valve shall be rated and 5 amps, 220vots, 50 cycles D.C supply.

The four way valve shall be a product of a reputed manufacturer, for the type of service. The operating voltage of the solenoids should be 220V DC.

Throttle valve: The throttle valve shall be the cylindrical spool spring loaded type. The value shall be rated for a working pressure of at least 220 Kg/ Sq. cm. and shall have ample capacity for the work to be performed by it. Throttle valves shall be rugged construction designed to perform the specified duties efficiently and without much noise.

.Back pressure relief valve: The back pressure relief valve shall be of balanced piston type, with internal drain, suitable for a working pressure of 220 Kg/ Sq. cm It shall have an adjustable pressure setting range and shall have sufficient rated capacity. The valve shall be a product of reputed manufacturer for this type of service.

System pressure relief valve: The system pressure relief valve shall be of balanced piston type with internal drain, having sufficient capacity and shall have an adjustable pressure range of approximately 20 Kg/ Sq. cm. to 220 kg/Sq. cm. The valve shall be a product of a reputed manufacture. The valve shall have steel bolts, socket weld, confined '0' ring type flanges.

Check valves: The check valves shall be of spring closed construction with threaded ends, and shall be rated for a working pressure of at lest 220Kg/sq.cm.

Gate valves: The gate valve shall be of screwed, non-rising stem wedge type and shall be suitable for use with hydraulic oil having characteristics specified in oil pumping unit and shall be rated for a working pressure of at least 220 Kg/sq. cm.

Hydraulic piping and pipe fittings:

Stainless steel hydraulic piping shall be provided from the cylinders to the hydraulic units. The connection between the fixed and moving parts shall be by non-ageing flexible hoses with stainless steel or other types of non-corroding integrated reinforcement.

The piping will partly be located on concrete face, partly in covered trench or through a protection pipe in the concrete.

Hydraulic pipe exposed to mechanical damage or trampling shall be protected by galvanized half – pipes, bolted to the concrete or steel structure.

All hydraulic piping shall be of heavy gauge seamless steel tubing. All pipe fittings shall be of high class malleable iron or forged steel. All inter connecting pipes, pipe fittings and valves including suitable clamps and fixtures for their mounting and gaskets, bolts and nuts and other jointing material for the hoist, oil tanks and Power and control cabinets shall be furnished by the contractor along with the control equipment. The pipe couplings for pipes above 65 mm diameter shall be of flanged type.

All pipes and pipe fittings shall be suitable for work at an oil pressure of 220 kg/ sq. cm. and shall be tested to a pressure equal to 150% of the above pressure. Fittings shall be proper and leak –proof.

All pipes shall be thoroughly cleaned to remove all dirt and scales frm the inner surfaces. Care shall be taken to keep any foreign matter away from entering the system after fabrication is completed.

After assembly, all piping system shall be tested to a hydraulic pressure equal to 150% of the rated working pressure /design pressure.

i) Separation of Hydraulic and Electrical control equipment:

For the hydraulic and electrical control equipment, complete cleanliness and neatness including proper painting shall be ensured. The hydraulic system for the operation of hoists shall be so designed and arranged that there is proper co-ordination amongst various hydraulic and electrical systems, functions and components, while ensuring proper functioning of the system as a whole. Electrical control equipment such as motor starters. Relays and circuit breakers which are likely to be subjected to arcing must physically be separated in the control cabinets etc., from the hydraulic system so as to avoid fire hazards. Where complete separation of electrical equipment form the hydraulic equipment is not possible special care shall be taken to prevent fire hazards.

8.5.6 ELECTRICAL EQUIPMENT:-

Motor

The electric motor shall be directly coupled to the oil pump through a flexible coupling and shall be of sufficient capacity to carry continuously the maximum possible load likely to develop under

all conditions specified for operation of gates without exceeding the specified rating and shall have nominal speed to match the requirements of the oil pump.
The motor shall be drip proof squirrel cage induction type suitable for direct driven non-reversing service, across the full line voltage of 400/440 volts, 3 phase, 50 cycle, A.C. supply. The motor shall have normal starting torque and low starting current characteristics.
The electric motors shall be suitable for direct on line starting with the starting current kept as low as practicable consistent with good design.
All ferrous surfaces including the rotor shall be coated with a protective coating to prevent formation of rust and corrosion due to effects of moisture.
The electric insulation shall be moisture resistant for use with motors which may be either. Continuously running or may be idle for long periods under highly humid **atmosphere** conditions. The winding insulation shall be of class B. The entire coil system shall be completely void filled and encapsulated with an impervious epoxy, forming a completely solid integrated insulation structure. The entire insulation system shall be moisture tight, mechanically suitable, abrasion resistant and sufficiently resistant to the effects of the thermo cycling without developing defects throughout the life of the electric motor.
The maximum temperature rise of the winding when the electric motor is delivering rated output continuously at rated voltage and frequency, shall not exceed 10^0 Celsius above the ambient temperature. The temperature rise of other parts of the motor shall be in accordance with the Indian standards or their approved equivalent. S
All the motor bearings shall be self lubricating and shall be either ball or roller type. The bearings shall be properly sealed against loss of lubricant or entrance of dust. All bearings shall be insulated, whatever necessary to prevent harmful circulating currents from passing through the bearing surfaces.
The motors shall be totally enclosed and suitable for use in tropical climate and highly humid atmosphere. To prevent condensation, the electric motor shall be equipped with 240 volts single-phase heater, mounted in or on the frame. The leads of the electric motor and the anti-condensation heater shall be brought out in a terminal box on the motor having suitable cable entry lungs.
The leads of the electric motor and the anti-condensation heater shall be brought out in a terminal box on the motor having suitable cable entry lugs. The motor characteristics shall conform to IS: 325-1978.

Wiring

All wiring of power control cabinets shall be nearly installed, connected and securely anchored in plate in a workman like manner.
The conductors shall be of standard wire gauge and shall conform to relevant Indian standard specifications.
Electric connections shall be neat, mechanically tight and secure and shall be made at apparatus terminals and terminals blocks.
Terminals for field connection shall be accessible without disturbance to the manufacturer's wiring.
The insulation of the control wiring shall be of polyvinyl chloride of similar synthetic insulations of 1100 volts grade.
To prevent compensation of moisture, all wiring shall be whether proof and suitable for tropical climate and highly humid conditions.
Terminal blocks provided for control wiring shall be of stud type of Elmex make type CAT – M4 or equivalent. The control wiring shall be run in PVC trays having covers.
The control wiring shall be done using PVC insulated wires having multi-strand flexible copper conductor of cross sectional area not less than 1.5 Sqmm.

Hoist control and Motor starter Control panel:

A control cabinet shall be provided with each hydraulic hoist which shall be mounted in the operation chamber of the gate.
The cabinets shall preferably be floor mounting type and shall be of sufficient size so as to neatly and methodically accommodate all the hydraulic power and control equipment. Equipment such as control switch for raising and lowering push buttons and indicating lamps shall be installed flush mounted, on the door of the cabinet so as to give clear view of all the indicating lights and that the gate can be fully operated with the cabinet door closed. The balance of the equipment shall be installed inside the cabinet, being accessible when the door is opened.
The cabinet shall b of not less than 3mm thick steel sheet, suitably reinforced if required. The assembled cabinet shall have a neat appearance and all exterior corners, welds and surface irregularities shall be ground smooth. The door shall swing freely on hinges and shall close without sticking. Suitable arrangement so as to give a clear view of all indicating lights and gauges even when cabinets are locked shall be provided.
The cabinets shall be completely assembled, wired and tested in the shop. The wiring shall be weatherproof and suitable for tropical climate having PVC. Insulation of 1100 volts grade. Electric connections shall be mechanically tight electrically secure and shall be made only at apparatus

terminals and terminal blocks. All the wires terminated on the terminal blocks shall be terminated using crimping type of lugs of suitable size. No splices or laps shall be permitted between terminal connections. Terminal for field connections shall be accessible without disturbances to internal wiring. Wiring within the panel shall be carried out in PVC trays with corners. To prevent condensation of moisture, the cabinets in the gate chamber shall be provided with a 240 volts cartridge heater.
For each oil pump motor, one magnetic motor starter of suitable capacity rated for 415 volt 3 phase 50 cycles A.C. supply and direct on line starting service shall be provided. The starter shall be suitable for working in conjunction with the control relay for thermal overload and single phasing protection and shall have a no-volt release coil. The starter shall consist of all automation & interlocking circuits and relays for local & remote operations. Provision for spare contacts. (Potential free) shall be made available for feed back of the gates position on the remote panel.

Circuit Breaker:

One air insulted triple pole MCCB shall be provided for protection of the power supply I of each motor. It shall be suitable for use as a back up protection against short circuit currents and conform to latest edition of IS: 2515 or its approved equivalent. It shall be provided with thermal overload release and short circuit protection. The breaker interrupting capacity shall not be less than 50 KA. Provision shall exist on the breaker for adjustment of trip setting to suit the requirements of electric motor. Provision shall also be made for single phase protection, separately.
For the control and protection of the control circuit air insulated triple pole breakers similar to the above, but having a trip setting of 15 amps shall be provided and shall be adjustable from 5 to 15 Amp.

Remote Control Operation of Spillway Verticak/Radial Gates

In addition to the local control, the crest gates have also to be operated form a remote control building which is proposed to be located about 100 m away and is on the banks. All the necessary piping controls, indicators etc., are to be provided to facilitate remote control operation of the crest gates.

Remote Control Operation of River sluice Gates

Similarly, in addition to the local control, the River sluice service gates have also to be operated from a remote control to be located at the Power House control room. All the necessary piping, controls, indicators etc., are to be provided by the contractor to facilitate remote control operation of the River sluice service gates. All necessary terminations shall be made available in the local control panel.

Local/Remote selector Switch

A selector switches shall be provided for Local/Remote selection of normal opening/closing operations of the gate. One set of potential free contacts of the switch shall be provided for use in the control system.

Push Button

For stopping the gate at an intermediate position, spring-loaded push buttons shall be provided. The push button shall be heavy duty type, having silver plated contacts and suitable for flush mounting on the panel. Separate push buttons shall be provided for opening/closing and emergency closing operations of the gate.

Heater Switch: Single Pole disconnecting switch rated for 5 amps, 240 volts, 50 cycles AC supply shall be provided for the heater in each electric motor in the control cabinets. The switch shall be suitable for flush mounting on a panel.

Control Relay

For the overload and single phase protection of the motor, a 3 phase control shall be provided. The overload device shall be set or adjusted to trip the starter between 115% and 120% of the rated normal full load running current of the motor. The relays shall be reset manually.

b) A single phase time delay relay having a continuous rating 5 amps at 240 volts, AC supply shall be provided in the control circuit so that solenoids of 4 way valve are energized after oil pump builds up pressure. The relay shall have adjustable time delay form 0.60 seconds and shall be pre-set for a time delay during which the pump builds up the normal working pressure.

c) A separate voltage operated single phase preventer shall be provided to stop the motor in case of single phasing.

Limit Switches

The limit switches provided for various positions of the gate shall be suitable for service under conditions of extreme moisture and shall be designed so that it can be wired and serviced after being mounted in position. Two sets of limit switch shall have two sets of double break contacts as required to operate **at 240 volts single phase 50 cycle AC supply and 220 volt D.C. Supply.**

Suitable number of limit switches shall be for the following functions:

To stop the gate at fully closed position in normal closing.

To stop the gate at fully closed position in emergency closing.

To stop the gate at fully open position.

To stop the gate at crack opening.

To detect creeping of the gate by 150 mm for restart opening.

To detect creeping of the gate by 175 mm for signaling the danger portion.

Note: Suitable number of potential free contacts shall be provided for use in the control system of the unit.

Indicating Lamps : To indicate the extreme positions and other positions of the gate, Indicating Lamps (LED CLUSTER Type) shall be provided. The indicating lamps shall be water tight, heavy duty type and rated for 220 Volt DC/240Volts AC, suitable for flush mounting on the panel.
The following indicating lamps shall be provided on the local and on remote control cabinets.

a)	Gate in fully closed Position	Green Colour
b)	Gate in fully opened Position	Red Colour
c)	Gate in operation	Amber colour.

Each of these indicating lamps shall be located on the individual control cabinets (in the hoist chambers) as well as on remote cabinet in the remote control room.
While the gate starts opening or closing, the amber lamp shall glow and shall remain lighted so long as the gate is under movement. In addition, provision shall also be made for green lamp or red lamp (while gate closing or gate opening respectively) to flicker to indicate the direction of movement of the gate. Once the gate is moved to fully closed or fully opened position the green or red lights as the case may be, should becomes stable and stop flickering and amber light shall switch off automatically.
A 420 Am analogue signal shall be provided as a feed back of the gate position by means of a LVDT or by any other suitable device to the control system of the unit (SCADA) for continuous monitoring of the gate position.
The other indications which are required to be displayed on control panels shall be as below:

No.1	Pump 'ON'
No.2	Tank Level, Low & Very Low
N0.3	System Pressure: Low & High
N0.4	Hydraulic Health

Additional Requirement:
A gauge well to indicate the water level in the reservoir has been proposed on the u/s of the dam in which water level indicator is proposed to be installed. Arrangements shall be provided on the remote control panel for digital display of the water level in the reservoir, with the help of the gauge.

GASKETS
The sheet Gaskets used under the seal base plates shall be made of a vegetables fibre compound with the binder, compressed into a homogenous structure. The materials shall be treated with glycerol based compound and shall be suitable for use in water.

Conduits
All electrical conduits shall be of heavy gauge and shall be hot up dip galvanized in accordance with IS: 1653 (Latest)

Electrical wiring
All wires for electrical wiring shall have 1100 volt performance grade, PVC insulation and shall have standard moisture resistant covering. All conductors subject to abnormal heat shall be 1100 volts grade heat resistant installations.

INTERLOCKING & EARTHING
Off position interlocking, Earthing and other electrical shall be provided I terms of provisions contained in IS: 3043 (Latest)

8.5.7 HOIST SUPPORTING STRUCTURE

General

a)The hoist supporting structure shall be fabricated out of IS structural steel sections or built up sections (weldable) as per CE,CDO Drawings.

Support Frame: The cylinder supporting frame shall be manufactured as per CE,CDO Drawings.

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8.5.8 Measurement and payment

8.5.8.1 Vertical/Radial Gates, Stop Log Gates, Scour Sluice Gates & EM Parts and other components except Hoists.

The measurement shall be made as per the provisions in approved fabrication drawings and as per standard IS weights of materials The measurements for payment will be made as per actual for the finished item only without considering any wastage due to cutting, bending, or due to any other operations involved in fabrication.
The unit of payment for the above gates items will be **ONE-VENT** and measurement by weight.

8.5.8.2 **Rope drum hoist**
Measurement and payment for the rope drum hoist will be made on '**set'** basis. The entire rope drum hoist system consisting of supporting structure, worm reducers, breaks, motors, shafts, wire ropes, gates, couplings etc., put together will make one set or one number.

8.5.8.3 Gantry crane
Measurement and payment for the gantry crane will be made on '**set'** basis. The entire gantry crane, consisting of gantry (supporting) structure, hoisting and traversing mechanism such as motors, gears, ropes, rope drums, shafts, pulleys etc., and control mechanisms, electrical items such as cables etc. put together will make 'one set' or 'one number'.

Procurement, fabrication and supply of E.M parts, Radial gates, stop log gates, hoist bridge, rope drum hoist, gantry crane.	80%
Erection of E.M parts, Radial gates, stop log gates, hoist bridge, rope drum hoist, gantry crane.	10%
On satisfactory completion of testing, commissioning of Radial gates, stop log gates, etc., in dry condition.	5%.
On satisfactory completion of testing, commissioning of Radial gates, stop log gates, etc., in F.R.L condition.	5%

8.6 Surface Preparation & Painting

8.6.1 General

All paints, painting materials and accessories for painting shall be supplied by the contractor and shall be included in the price bid. The paints proposed by the contractor must be got approved by Engineer in charge well before application of the same. The analysis in respect of paint properties, paint composition and performance requirements of the paints shall be submitted by the contractor for examination and approval. The painting and surface preparation shall confirm to the relevant Indian Standard Specifications, IS: 14177 – Guidelines for Painting System for Hydraulic Gates and Hoists.
The paint shall be a product of reputable manufacturer and shall be delivered in the manufacture's sealed tins stored under cover and used within the storage time and in accordance with the method recommended by the manufacturer.
The Contractor shall prepare and submit the painting specifications for approval of the Engineer in charge "The painting specifications shall cover paint schedule, manufactures statement of the physical and performance characteristics for paint materials to be selected, and manufactures recommended procedures for the surface preparation, application, handling instructions, equipment, ambient conditions, mixing instructions safely and storage instructions etc. The procedures shall also include any special requirements for field repairs the Barrageaged coating and for the coating of field joints.
All parts which will ultimately be buried in concrete shall be cleaned and protected, before leaving the manufactures shop by a Portland cement wash or other approved method as per relevant BIS codes. Before being installed they shall be thoroughly cleaned from all rust and adherent matter.
The contractor shall take all the precautions for scaffolding and ladder as per BIS 3696.
While every effort will be made by the department for ensuring continuity of the painting work of the crest gates, the department reserves right to operate the crest gates during the contract period for the purpose of water regulation and the contractor shall have no claim to idle labour etc., during the period of interruption in painting.

8.6.2 PREPARATION OF SURFACES:

Surfaces preparation shall be in accordance with the following procedure:

i) Welds, plates or any other surface irregularity shall be removed by any suitable means before cleaning.
ii) All oils, grease, and dirt shall be removed from the surface by use of the cleaning solvent, which shall be Xylol and cleaning the entire area with dry cotton waste.
iii) Following the solvent cleaning the surface to be painted shall be clean of rust, mill scale and other adhering objectionable substances should be removed completely to uniform bright base metal by brushing or any other affective means before the surface is painted upto the satisfaction of the Engineer Incharge.

iv) In the event that dust forms on the surface becomes otherwise contaminated in the interval between cleaning and painting, re-clearing shall be required. Surfaces of Stainless steel, Nickel, Bronze and machine surfaces adjacent to metal work being cleaned or paint shall be protected by plastic sheet cover or other suitable means during the cleaning and painting operations.

v) The contractor shall procure the paints from one of the following reputed firms one of the following reputed firms only.
1. M/s. Berger India Limited.
2. M/s. Asian Paints.
3. M/s.Johnson & Nicholson.
4. M/s.Shalimar Paints.
5. M/s.Goodlas & Nerolac.
6. M/s.Hindustan Ciba-geigy Limited.

vi) Each batch of paint that is brought to the site should be accompanied by the Certificate of specified composition of the ingredients of that particular paint.

vii) The Engineer-in-charge has right to reject the container of paint which he feels not suitable for work without assigning any reasons. The decision of the Engineer-in-charge in rejecting the container of the particular paint is final land is binding on the contractor.

viii) A tolerance of + 5 microns per coat is allowed on the coat actually applied. However if the thickness of any.

ix) If the thickness of any coat of paint when applied is less than the specified thickness in Schedule 'A' item, it should be made good by applying one more coat and no extra payment will be made for the coat which is extra applied. However, no extra payment will also be made if to thickness of coat of paint is more than the specified in the schedule 'A'. Specified in Tender schedules.
The above tolerance is + 2.5Microns per coat.

x) The contractor should arrange at the site an 'Elcometer" to measure the dry film thickness in microns of the paint applied to the surface.

xi) Each paint shall be tested in accordance with relevant I.S. specifications and I.S.14177 (Part-2)-1971 and I.S.14177-1994 for the following qualities and necessary test certificates shall be furnished along with each consignment from a state/central Government approval laboratory.

(1) Chemical composition on firming to relevant I.S. specifications.
(2) Weight test (weight per 10 litre of paint thoroughly mixed)
(3) Drying time.
(4) Flexibility and Adhesion.
(5) Consistency.
(6) Dry thickness and rate of consumption.

All the painting materials mentioned in Schedule 'A' items shall be got approved by the Engineer-in-charge before their application. Representative samples from each consignment of paint shall be got tested by any National Testing Laboratories at the cost of the contractor. If the samples of paint tested, does not confirming to the BIS specifications, the whole lot of paint pertaining to that consignment shall be rejected. The contractor has also to furnish Batch Nos., and date of manufacture for each lot from the concerned paint manufacturer including date of expiry.

8.6.3 Painting Schedule For Vertical Gates, Hoist Bridge and Equipment

After though cleaning with Sand blasting, the surfaces to remove the rust confirming to APDSS specification Nos., 1203, 1204, the system of protective coats has to be applied.

All surfaces of the gates except mechanical surfaces of ferrous metal which are to be in rolling or sliding contact comprising area of each bay shall be painted as follows:

1) Inorganic Zinc silicate primer by airless spray gun
Zinc phosphate Pigmented epoxy resin
Primer paint –1 coat DFT 70 microns per coat DFT 70 Microns.

2) Solvent less Coal tar Epoxy Resin paint 3 coats DFT 100 microns per coat. DFT 300 Microns.
(Equivalent to Berger Epilux 64
Coal Tar epoxy super black paint) ----------

Total: DFT 370 Microns.

These coats shall be applied with in 24 hours drying time between each coat or as per the specifications in technical brochure supplied by the concerned paints manufacturer or as directed by the Engineer-in-Charge. The temperature for painting may range between 45^0 F and 100^0 F. The final film thickness of the paint should be DFT 370 Microns to be measured by special instrument supplied by the contractor. Each coat of paint shall be applied in specified weather conditions as specified in technical brochure or as directed by the Engineer-in-Charge.

When so applied the dried fill shall be free from pin holes and conspicuous brush marks and shall be not more than slightly seedy granular or fibrous in appearance.

Paints required for primer and finishing coats should be procured from the same firm for achieving better results.

Normally thinners are not permitted. If it is necessary to be added for workability they must be used as recommended by the manufacturer of the particular paint in their technical specifications, whenever necessary only in the presence of Engineer-in-Charge. The quantity of thinner should be decided after trail and only the required quantity added so that the specified dry thinners should be borne by the Contractor only.

Paints should be used within the prescribed shelflife from the date of manufacture. The quantity of paint procured should be such that it is fully utilized before the prescribed period from its use. If the contractor could not utilize the paints before expiry date due to natural calamities or any unforeseen reasons, the department shall not accept any responsibility.

Surface preparation shall not be done unless the approved paints of sufficient quantity (for both primary and finishing coat paints) are available in stock. The contractor has to procure the paints proportionately in accordance with the programme of painting, so as to avoid expiry of paints, for which, department does not held any responsibility.

Caution shall be exercised in the application of fast drying paint to prevent too rapid evaporation of the solvent and paint shall not be applied to metal exposed directly to the sun in hot weather.

Painting schedule for hoisting arrangement and supporting structure : After thorough cleaning with sand blasting of surfaces to remove the rust confirming to APDSS Specification Nos.1203 and 1204, the following system of protective coat has adopted conforming to I.S.14177(latest edition): -

1. Zinc phosphate primer with airless spray gun –2 coats
   DFT 40+5 Microns per each coat. DFT 80 + 10 Microns.
   High Building Zinc Phosphate primer paint.
2. Alkyed based micaceous Iron Oxide paint –1 coat
   DFT 65 + 5 Microns
3. Special Weather resistant, synthetic enamel
   Paint with airless spray gun – 2 coats
   DFT 25+5 Microns per each coat. DFT 50 + 10 Microns.
   The total dry film thickness of all the coats including primer coat shall not be less than 195 microns and shall be conforming to BIS 14177(latest edition).

All the conditions specified as above hold good for procurement and testing of paints etc. All paints and coating materials shall be in thoroughly mixed condition at the time of application and shall not be thinned. Any Warming of paint shall be performed by means of a hot water both the paint shall not be heated to a temperature higher than 100^0 F. Paint shall not be applied when the temperature of the metal or the surrounding air is les than 45^0 F. Surfaces shall be free from moisture at the time of painting. The first/primary coat shall be applied immediately after cleaning. When paint is applied by spraying suitable means shall be provided to prevent segregation during the painting operations.

Effective means shall be provided for removing all the oil and moisture Iron the air supply lines of all spraying equipment, if adopted. Each coat of paint shall be free from ally provided each coat shall be allowed to dry or harden before succeeding coat is applied.

8.6.4 Method Of Painting

All painting shall be applied by skilled worker in a workman like manner and each coat of paint shall be permitted to dry properly before the succeeding coat is applied. Paints shall not be applied during Bad weather or surfaces that are not entirely free from moisture. Thinning or heating of paint will not be permitted, except with specific approval of the department. Contents of paint should be mixed thoroughly before and during use. The paints may be applied using brush cooler/Airless spray, if necessary

The contractor shall supply only such paints, which are of best quality from Berger paints /Asian paints/ Shalimar/Johnson and Nicholson /Goodlas Nerolac/Hindustan Ciba-Geigy Ltd., paints only and which have got sufficient period before their prescribed date of expiry and any defective paint supplied by the contractor shall be immediately removed from the site as per the directions of the Department and replaced with good quality of paint. The contractor shall provide all the facilities

required to the department to ensure that the entire quantity of paints supplied are fully used on the work.

8.6.5 Measures during Painting

Any bare spots or holidays shall be recoated with additional application of primer. All runs, sags, floods, or drips shall be removed by scrapping and cleaning. The cleaned area should be retouched or all such defects shall be remedied by reblasting or repriming.

Special attention should be given to good coverage on rivets, welds and sharp edges and covers.

Suitable measures shall be taken to protect the applied primer from contact with rain, fog, mist, dust other foreign matter until completely hardened and next coat is applied.

The air temperature at the time of application must not be below 10^0 C and relative humidity must not be above 90%.

8.6.6 Application Procedure

Paints and coating materials shall be in a homogeneously mixed condition at the time of application and shall not be thinned except as hereinafter specifically provided. Warming of the paint shall be performed by means of hot water bath. All surfaces to which paint shall be applied immediately after cleaning, and except otherwise specifically provided, shall be applied by either washing or by airless spray. When paint is applied by spraying, a mechanical agitator type of paint pot shall be used. Means shall be provided for removing all free oil and moisture from the air supply line of all spraying equipment. Each coat of paint shall completely cover the surfaces and shall be free from runs, sags, pinholes, and holidays. Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied.

All paints shall be applied by skilled workers in a workmanlike manner. Paint shall not be applied during bad weather and on the surfaces which are not entirely free from moisture. Rust preventive compound shall be applied by any convenient method to ensure complete coverage of heavy coating. After the final application, the paint film shall be allowed to cure at least for 7 days.

The application of protective coating shall be carried out at the contractors shop and/or field shop whenever possible. Painting work at erection site shall be limited to tough-up coatings for Barrageaged areas and coatings for field welding portions.

All paint, when applied, shall provide a satisfactory film and a smooth and even surface. Paint shall be thoroughly stirred, strained, and kept at the uniform consistence during application. Paint shall not be applied when the temperature of the metal or surrounding air is below 10 degrees Celsius and that of the metal is above 50 degrees Celsius or when the humidity is above 90 percent or when it threatens to rain before the painted coat gets dry. Each coat shall be protected during the initial curing period against the possibility of moisture condensation or contamination with foreign matter. All painting works shall be performed by airless spraying.

When the coating materials is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment; each coat shall be uniform and free from runs, sage and other imperfections. The time between successive coats shall be not less than the minimum or more than the maximum re-coating time specified by the paint manufacturer.

The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications.

Surfaces not required to be coated, but adjacent to surfaces which are to be cleaned and coated shall be adequately protected during cleaning and coating.

Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications.

Because of the flammable and toxic nature of the coating materials, the contractor shall take precautions to eliminate any health or safety hazard that may arise during the applications of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress, Where steelworks is to be welded, only the primer shall continue over the weld area. Subsequent coats shall be kept back 150 mm from the weld and completed after welding. The primer shall be such that no toxic fumes are given off during welding alternatively approved temporary protection such as taping may be provided as an alternative to priming the weld areas. The edges of shop coats exposed on removal of the tape shall be treated in accordance with the manufacturer's instructions to ensure adhesion to coats applied at site.

Painting shall be stopped off 75 millimeters from the edges of interface areas for high strength friction-grip bolts. Painting over and around such bolts shall be completed as specified after assembly.

8.6.7. Shop Painting

The painting to the gates, hoists and other parts shall be done as per IS specifications no 14177-1994 guidelines for painting system for Hydraulic Gates and Hoists and its Adjuncts Viz., IS: 1477(Part 1)-1971 IS: 1477 (Part II)-1971, IS 2339-1963 and IS: 2932-1994.

8.6.7.1 Embedded parts and Vertical gates

a) Primer coat

After surface preparation the following primer coats shall be applied.

(i) Vertical Gates

Over the prepared surfaces one coat of inorganic zinc silicate (preferably airless spray) should be applied giving a dry film thickness 70+5 microns Alliteratively, two coats of zinc rich primer (containing not less than 85% Zinc on dry film) should be applied to give a total dry film thickness of 70+5 microns.

ii) Exposed embedded parts

Over the prepared surfaces two coats of zinc rich primer (containing not less than 85% zinc on dry film) should be applied to give a total dry film thickness of 75+5 microns.

b) Finishing coats

Over the prime coats, the following finishing coats shall apply.

(i)Vertical Gates

Finishing coats should consist of three coats of solvent less coal tar epoxy paint. These should be applied at an interval of 24 hours. Each coat should give a minimum dry film thickness of 100 microns. The total dry film thickness of all the coats including primer coating should not be less than 370 microns.

(ii)Exposed embedded parts

Finishing coat consist of two coats of solvent less coal tar epoxy paint. These should; be applied at an interval of about 24 hours. Each coat should give a dry film thickness of 150+5 microns. The total dry film thickness of al the coats including primer coating should not be less than 350 microns.

8.6.7.2 Hoists and Supporting Structure

a) Primer coat

(i)Structural component

Two coats of zinc phosphate primer should be applied. Dry film thickness of 40+5 microns per coat should be given.

(ii)Machinery

Expect machined surfaces, all surfaces of the machinery including gearing, housing, shafting bearing pedestals etc., should be given one coat of zinc phosphate priming paint to give a minimum thickness of 50+5 microns, Motors and other bought out items should also be painted if necessary.

Hydraulic hoist

All un-machined ferrous surfaces (hoist cylinder, cylinder heads, hydraulic piping pipe fittings, bonnet covers) exposed to water should be given one coat of inorganic zinc silicate (preferably air less spray) to given a dry film thickness of 70+5 macrons and surfaces unexposed to water should be given two coats of zinc phosphate primer paint giving a dry film thickness of 40+5 microns per coat. Oil tank control cabinets, hoist beams and pipe support should be given one coat of zinc phosphate priming giving a minimum film thickness of 50+5 microns.

(iii) Un-machined surfaces

All un-machined surfaces should be given one primer coat of chlorinated rubber based zinc phosphate primer to give a dry film thickness of 50+5 micros

b) Finishing coats

(i)Structural component

The finish paint should consist of one coat of alkyl based micaceous iron oxide paint at dry film thickness of 65+5 microns followed by two coats of synthetic enamel paint conforming to IS: 2932-1974 to give dry film thickness of 25+5 microns per coat or synthetic enamel paint. The interval between coats should be 24 hours. Total dry film thickness of all the coats including primer coat should not be less than 175 microns.

(ii)Machinery

The finish paint should consist of three coats of aluminum paint conforming to IS 2339-1963 or synthetic enamel conforming IS: 2932-1974 to give dry film thickness of 25+5 microns per coat.

Hydraulic hoist

All un-machined ferrous surfaced (hoist cylinder, cylinder head, hydraulic piping, pipe fittings, bonnet cover) exposed to water should be given two coats of solventless coal tar epoxy paint. Each coat should give a dry film thickness of 150+5 microns. Total dry film thickness of all the coats including primer coat should not be less than 350 microns. Surfaces unexposed to water should be given one coat of alkyl based micaceous iron oxide paint to give dry film thickness of 65+5 microns followed by

two coats of synthetic enamel paint; conforming to IS:2932 –1974 to give dry film thickness of 25+5 microns per coat. The interval between coats should be 24 hours. The total dry film thickness should not be less than 175+5 microns oil tank, control cabinet, hoist beams pipe supports and clamps ladders, etc., should be given these coats of aluminum paint conforming to IS 2339-1963 or synthetic enamel conforming to is 2932-1974 to give a dry film thickness of 25+5 microns per coat. The total dry film thickness of all the coats including primer coat should not be less than 125+5 microns.

(iii)Un-machined surfaces

The un-machined surfaces of the position and the unfinished surfaces of cylinder heads should be cleaned and given three coats of very resin/chlorinated rubber to give a dry film thickness of 30+5 microns per coat, to obtain a minimum thickness of 125+5 microns including primer coat.

Machine surface

All machined surfaces of ferrous; metal including screw threads which will be exposed during shipment or while awaiting installation should be cleaned by suitable solvent and give a heavy uniform coating of gasoline soluble removable rust preventing compound or equivalent surface should be protected with adhesive tapes or other suitable means during the cleaning and painting operations of other components.

8.6.7.3 Painting of Embedded Parts in contact with Concrete

All surfaces of embedded parts which are to come in contract with concrete should be cleaned as given in IS: 14177-1994 to meet the requirements of class D and should be given a coating of cement latex to prevent rusting. Exposed machined surfaces of ferrous metal which are to be rolling and sliding contact should not be painted but should be coated with heavy gasoline soluble rust preventive compound. In all exposures where metal will be partially embedded in concrete, it is good practice to extend the protective coating on the non-embedded portion a short distance into the area later to be embedded, thus eliminating problem at the junction point.

8.6.8 Field Painting

The painted metal work shall be handled with care so as to preserve the shop coats. The area of the shop paint, which has been damaged during transport shall be cleaned to base metal and repainted. Paint applied to such areas shall be of the same type as used originally in shop painting.

8.6.9 Surfaces not to be painted

The following surfaces are not be painted unless or otherwise specified.

i) Machine finish or similar surfaces. However such surfaces should be protected with a corrosion preventive compound.
ii) The surface, which are in contact with concrete
iii) Stainless steel overlay surfaces
iv) Surfaces in sliding or rolling contact
v) Galvanized surfaces, brass and bronze surfaces.
vi) Aluminum alloy surfaces
vii) Bare electrical conductors and insulating materials
viii)Equipment name plates and instructions etc.,

8.6.10 Miscellaneous components.

Miscellaneous componentssuch as hand rails, gratings and frames, machinery's ladders, piping etc., shall be suitably painted with approved quality paint of appropriate colour as directed by the Engineer-in-charge.

8.6.11 Inspection

All painting works shall be inspected by the contractor himself in accordance with the approved test procedure prescribed subject to approval of the department

Following the visual inspection on surfaces that have been coated, the dry film thickness of coating shall be checked at as many spots of the coated area as possible to prove that the overall thickness to be to the specified minimum thickness by the Electromagnetic thickness meter, Further, for the purpose of measuring the continuity of coatings, areas shall be examined by the pin hole detector ("Holiday detector")

8.6.12 Measurement and payment

Payments will be made as per work done and recorded in accordance with Schedule A.

8.7 Catalogues and Operating/Maintenance Instructions

Six sets of catalogues indicating the complete lists of parts and operating instructions in the English language, which may be needed or useful in operation, maintenance, repair, dismantling or assembling and for the repair and identification of parts for ordering the replacement, shall be supplied by the contractor to the Engineer in charge. Such catalogues shall be in hard cover bound books and should have suitable jackets of thick polythene paper.

8.8 Instruction Plates

All gauges, meters and other instruments etc., shall have dials or scales calibrated in metric system. All name plates, instruction plates, warning signs etc., shall be in English as well as in Hindi. All markings to be used shall be submitted to the Engineer in charge for approval before the equipment is marked or labeled.

8.9 Shop Assembly and Test:

All gate frames and appurtenances shall be shop assembled so as to allow for adjustment of various dimensions to make them conform to the designed dimensions, fits, tolerances, surface finishers, clearances etc. in the event it is not possible to complete the gate leaf or any other equipment/component in the shop, they will be accurately assembled in the shop using temporary connections and various critical dimensions shall be verified. The embedded metalwork to be furnished under these specifications shall be shop assembled to the extent possible. Special care shall be taken in all phases of work affecting the strength and rigidity of anchorages and embedded anchorages since the correct operation and stability of gates are largely dependent upon the strength and accuracy of these parts. The yoke/trunnion girders shall be completely fabricated in the shop. The cost of carrying out the tests, not including the cost of inspection by the government personnel's shall be borne by the contractor and included in the lump sum price bid in the schedule. However, at the discretion of the Engineer-in-Charge, the above tests shall be carried out by the contractor on the shop assembled parts and bought out items to the extent possible and in accordance with the instructions of the Engineer-in-Charge. The yoke/trunnion girders shall be suitably stress relieved in an annealing furnace in accordance with standard practice. The fabricated parts and assembly of gates/gate frames and other equipment shall be inspected and tests observed by the Engineer in charge or his authorized representative.

8.10 Preparation of Dispatch

8.10.1 Unit marking, Match marking and Transportation Designation

Each part of the gates, embedded parts and hoists, which is to be transported as a separate piece, shall be marked to show the unit of which it is a part and match marked to show its relative position in the unit to facilitate assembly in the field. Unit marks and match marks shall be made with heavy steel stamps and paint. Each piece, sub-assembly or package transported separately shall be labeled or tagged with transport designation consisting of the specifications number and the marks number of such pieces, number of parts grouped in such sub-assemblies or contained in package. The contractor shall submit full information in triplicate, regarding markings along with illustrative large size drawings, photographs etc., of these parts before transportation.

8.10.2 Weights

Before dispatch, the contractor shall determine (by the most accurate means available), the net weight of each piece of assembly that is to be shipped as a unit exclusive of boxes, crates or kits. The particulars listing the net weight shall be painted on the respective pieces of assemblies or stated on the tags attached thereto.

8.10.3 Packing

All parts shall be prepared for dispatch so that slings for handling may be attached readily while parts are to be moved. Where it is unsafe to attach slings to the box, parts shall be packed with slings attached to the part and slings shall project through the box or crate so that attachment can be made easily. All parts shall be properly secured, packed to withstand handling during transportation. All packing shall allow for easy removal and checking at site. Special precautions shall be taken to prevent rusting of steel and iron parts during transit.

Suitable methods proposed to be adopted for protection against moisture shall be subject to the prior approval of the Engineer in charge. Each bale or package is to contain packing note quoting number and date of contractor's order and the name of office placing the order.

After delivery of material at site, all packing shall become property of the Engineer in charge. Notwithstanding anything stated in this clause, the contractor shall be entirely responsible for loss, Barrageage or depreciation to the stores due to faulty and insecure packing. The equipment shall be insured for loss or Barrageage during transit at the cost of the contractor.

8.11 ERECTION

8.11.1 General

The equipment covered by these specifications shall be furnished and erected by the contractor at the project site. The contractor shall be required to furnish all erection drawings. The contractor shall prepare a complete erection procedure, which shall describe the sequence of operations to be carried out, the method to be used, the measurements to be taken and the tolerances to be met, in the erection and alignment of the equipment. Such procedure shall have the approval of the Engineer in charge prior to the commencement of fabrication and when approved shall form a part of the specification furnished by the contractor.

8.11.2 Installation of 1st Stage Embedded Parts

The 1st stage embedded parts shall be provided as per the approved drawings of CE, CDO .

8.11.3 Installation of 2nd Stage Embedded Parts

Gate frames, anchor flat, guides and seal seats etc., shall be assembled and installed, brought to line grade and plumb within erection tolerances and secured in place by anchorages as shown on the drawings or otherwise according to the best method in practice and as may be necessary for successful functioning of these units. The erection tolerances for the frames and guides shall be as indicated on the drawings or as per latest relevant BIS Codes. Extreme care shall be taken to ensure that their surfaces be in a true plane within the tolerance throughout their entire length. The 2nd stage anchorages shall be strong enough to hold the embedded parts securely in position while concrete is being placed.

8.11.4 Installation of Gates, Hoists & Supporting structure.

All the components of gate & hoist shall be erected perfectly, giving due cognizance to the unit and match marks on the components. All components shall be designed and assembled to fit snugly and shall be water tight. It is desirable to avoid the flood period to perform erection of gate. Should it be necessary to do so, due precautions should be taken for measures against floods since the gate may be submerged in water sustaining Barrageages or the half erected gate may disturb the water flow causing Barrageages to the civil structure.

8.24.5 Placing of 2nd stage Concrete

2nd stage Concreting with M 25 grade shall be done by the contractor shall give a detailed programme of fixing and aligning the embedded parts for this purpose. Before placing the concrete in any one lift and between placement of successive lifts, alignment tolerances shall be checked and remedial action shall be taken by the contractor, if any displacement has occurred.

8.11.6 Tools & Tackles

The contractor shall provide all tools & tackles used in the above erection work and also for operation & maintenance purpose.

8.12 Inspection, Testing And Final Acceptance

8.12.1 General

All materials, supplied parts and assemblies there of being used in the works to be performed under this specification shall be tested for the quality and all works performed shall be subjected to inspections and no parts or supplies or articles or materials shall be dispatched until all the tests, analysis and shop inspection have been completed and certified copies of reports of results and analysis have been accepted.

Inspection and testing of the various types of Gates at different stages is to carried out as per the procedure laid down in BIS 7718(part-1), BIS 7718(part-2), 10096 : (part-1), 10096 : (part-2) and 10096 : (part-3) and other relevant BIS codes.

8.12.2 Place of Manufacture & Inspection

The contractor shall submit the place of manufacturer, testing and inspection of the various parts of the work. The Engineer in charge or his authorized representatives shall be present at the time of any or all tests, it is binding on the part of the contractor to provide all the necessary facilities at the place of manufacture and testing. The Engineer in charge or his authorized representative shall also be entitled to access any part of manufacture/material & testing of various parts of work.

The Engineer in charge or his authorized representative reserves the right to insist for tests in addition to the routine tests as per the relevant BIS codes/International codes.

8.12.3 Inspection

All materials required for the manufacturing of various parts of the work shall be tested as per the relevant BIS codes. All the materials shall not be dispatched until all tests, analysis and shop inspection have been completed to the satisfaction of Engineer-in-charge and certified copies of reports of test results have been accepted by the Engineer-in-charge. The test certificate in

quadruplicate shall be submitted to the Engineer-in-charge as soon as the tests are completed. In case the test certificates are not available for any of the materials, the same may be got tested in accordance with relevant BIS codes and any those materials which are in accordance with BIS standards/international standards shall only be used.

All supplies (which include without limitation raw materials, components, intermediate assemblies and end products) shall be subject to inspection and test by the Engineer in charge to the extent practicable at all time and places. Inspection shall be carried out in accordance with relevant Indian standards.

If any inspection or test is made by the Engineer in charge in the premises of the contractor or sub-contractor, the contractor without additional charge shall provide all reasonable facilities and assistance for the safety and convenience of Engineer-In-Chief or his authorizes representative in the performance of their duties. If on the request of the Engineer in charge, inspection or test is made at a point other than the premises of the contractor, it shall be at the expense of the contractor provided that in case of rejection, the Engineer in charge shall not be liable for any reduction in value of samples used in connection with such inspection and test. All inspection and tests by the Engineer in charge shall be performed in such a manner as not to unduly delay the work. The Engineer in charge reserves the right to charge the contractor any additional cost of inspection and test when supplies are not ready at the time of such inspection and test. The inspection and test by Engineer in charge of any supplies or lots thereof does not relieve the contractor of any responsibility regarding defects or other failure to meet the contract requirements which may be discovered prior to the acceptance.

Except as otherwise provided in the contract, acceptance shall be conclusive except as regards latent defects, fraud or such gross mistakes as amount to fraud. The contractor shall provide and maintain the inspection system acceptable to the Engineer in charge covering the supplies hereunder. Records of all such inspection work shall be kept complete by the contractor and made available to the Engineer in charge during the performance of the contract and for such longer period as may be specified elsewhere in the contract.

8.12.4 Operational Tests

8.124.1 Gates

The contractor shall carry out in the presence of the Engineer in charge or his authorized representative such tests on the gate equipment to determine that the gate will fulfill the functions for which it has been designed. Test shall be repeated, if necessary, until successfully carried out to the satisfaction of the department. Leakage tests and operational tests shall be carried out at the convenience of the project authorities after completion of other portions of the work. The project authorities shall have the right to carry out such tests also when the reservoir is at a level other than design level.

8.12.4.1.1 Dry Tests

Operational tests in dry shall be carried out as soon as possible after completion of erection. Tests shall include atleast who complete traverses from the maximum raised position to the fully closed position. All adjustments, clearances etc., shall be checked for proper operation.

8.12.4.1.2 Wet Tests

These tests should simulate the actual operating conditions as closely as possible. At least two complete traverses will be made from the fully closed position to the normal raised position of each gate as follows:

a. When gate is closed, raise gate to its normally open position in steps and observe the performance including vibration.
b. Lower the gate to the fully closed position in steps and observe the performance of the gate including vibration.
c. Check up the proper operation of limit switches.

8.12.4.1.3 Leakage Tests

Leakage tests shall be carried out with each gate lowered on to the sill. Before measuring the leakage, the gate shall be raised and lowered several times by a metre or so in order to dislodge any debris that may have lodged in the side seal seats. The leakage shall then be measured and recorded. The maximum permissible leakage shall not exceed 5 litres per min, per length of periphery of sealing surface.

8.12.4.2 Test for Rope Drum Hoist:

The hoist should be able to perform its function for which it has been designed. The gate shall be tested for self closing by its own weight. The movement of gate should be smooth. The hoist will be tested to stop the gate in intermediate positions with effective braking. The winding of rope over the drum should be uniform. Ensure that there is not any jerk in gate while starting and stopping.

8.12.5 Final Acceptance

Final acceptance of the work shall take place only after the completion of erection of all the gates and hoisting equipment and all other components

& successful completion of all required tests to this satisfaction of
Superintending Engineer, Kaleshwaram Project Circle No.1, Ramagundam.

The final acceptance of the equipment shall be based on the following.

a. Quality and workmanship of the equipment.
b. Satisfactory operation of the equipment after erection as required under these specifications.
c. Acceptance of various tests shall be as per relevant BIS codes. All the tests shall be carried out to the satisfaction of SE,. On successful completion of all tests, the equipment shall be accepted but all the responsibilities shall remain with the contractor within the guarantee period.

8.13. Guarantee

Within two years after completion of entire work, if any part of the gate, embedded parts and hoist is found defective because of workmanship or material or due to any reason, the contractor shall at his own expense, furnish and install new parts and materials as approved by the Engineer in charge.

8.13.1 Failure to Meet Guarantee

Should any part of the equipment fail to meet the guarantee/other requirements of the technical specifications within the time covered by the guarantee, the Engineer-In-Charge may direct the contractor to proceed at once to replace with new parts as may be necessary to meet the requirements. All expenses of replacing, delivering and installing new parts those are necessary by failure of the equipment to meet the guarantee and other requirements of the technical specifications shall be borne by the contractor. The contractor shall correct or replace at his own expenses any defect in the work/material within 10 days on intimation by the Engineer-In-Charge. If, after due notice, the contractor refuses to correct any failure of the equipment to meet the requirements of the technical specifications during the guarantee period, the Engineer-In-Charge may proceed at his own expense to correct such failure and to collect from the contractor an amount equal to actual expense so incurred, including overheads and all other incidental expenses.

8.13.2 Defective Equipment

In case any part of the equipment is found to be defective in material or workmanship or develops defects or does not otherwise meet the requirements of the specifications including errors or omissions on the part of the contractor the following shall apply:

a. Defects Disclosed Prior to Final Acceptance:
Any defect in materials or workmanship or other failure to meet the requirements of these specifications including errors or omission on the part of the contractor, which are disclosed prior to final payment or prior to final acceptances tests, whichever occurs at a later date, shall, if so directed by the Department, be corrected entirely at the expense of the contractor.

b. Defects Disclosed After Final Acceptance:
Any latent defect not disclosed before date of final acceptance shall be corrected promptly by the contractor entirely at his own expenses provided that the total period during which the contractor is liable for replacement due to latent defects shall not exceed two years after completion of entire work.

8.13.3 Operation of Unsatisfactory Equipment.

The Engineer in charge shall have the right to operate the equipment as soon as and as long as it is in operating condition, whether or not such equipment has been accepted. Such operation by the Engineer in charge shall not lessen or impair any express or implied warranties concerning such equipment. All repairs or alterations required shall be made at such times as directed by the Engineer in charge and in such a manner as will cause the minimum interruption in the use of the equipment by the Engineer in charge.

Operation of the equipment pursuant to this section shall not relieve the contractor of his responsibility to supply all equipment in complete accordance of technical specifications. While unsatisfactory articles can be taken out of service, for correction of latent defects, errors or omissions, the period of such operation of any use pending the correction of latent defects, errors or omissions shall not exceed two years without mutual consent of the contractor and the Engineer in charge.

8.14 Wastage of Steel:

The wastage of steel section, received from main producers, shall not be compensated to the contractor under price variation clause. The price variation will be reimbursed for the net weight of gates, hoists based on the sectional unit weight as per the table of standard sections (supplied by SAIL) and used in the gates. The weight of nuts, bolts, rivets, welding, etc, will not be considered in the net weight of gates. All the wastage of steel sections supplied by the

main producer will be at contractor's account and the contractor should consider this aspect while quoting the rates.
(Includes changing of seals of gate, wheels, bearing of gates etc.).

8.15Spare parts

8.15.1 Vertical Gates

1) Four side guide rollers assemblies for Verticalgates complete in flexible all Respects .
2) VerticalGate seats with fasteners and clamps --
3) Pumps and motors for Hydraulic Hoist --
4) Fixed and moving contract of each type of switch, contractor of relay –
5) Piston seals of Hydraulic Hoist --
6) Filters --
7) All types of valves --
8) Limit switch assembles –
9) All indicating lamps & fuses
10) Bearings --
11) Piping for Hydraulic system in all respects –.
12) Hydraulic cylinders –

8.15.2 Stop Log Gate

1) Flexible seals with fasteners and clamps for stop log units—
2) Bearing for Gantry Crane --
3) Motor for Gantry crane --.
4) Limit Switches –

8.15.3 Scour Sluices Gates

1) Flexible seals with fasteners & Clamps.
2) Motor for Rope Drum Hoist –.

All special tools and tackles which is required for maintenance and repairs –

All the above spare parts, special tools and tackles which is required for maintenance and repairs shall be supplied as per quantity mentioned in Schedule-A.

8.16Remote control of Gates

--Deleted --

SECTION – 9
Specification for stoplogs

9.1 Scope

The section shall covers various works necessary to install stop logs for General specifications "as appropriate.

Not less than ….sets of slide type stop log gates, each gate consisting of suitable no., of elements with appurtenant parts complete with necessary accessories shall be fabricated where required, finishing, paintings, insuring, shipping, and delivery at site and including installation of each element over the stop log groove and dogging beam designed suitable to hold one stop log elements for the purpose of storage as shall allow the stop log elements to side into groove when necessitated by operating lifting beam and gantry crane one set of stop logs (sufficient to cover the vent height) is to be provided for 10 no. of vents.

9.2 Details of stop logs

9.2.1 General

This stop logs are meant for inspection, maintenance and repair of the main gates while keeping river water level even if one of the main gates is raised for such purpose. The top element of the stop log shall be raised under unbalanced condition & other elements are operated under balanced condition.

The stop logs in general shall satisfy the following requirements.

Each stop log complete with seals, bearing plats and side rollers shall be assembled and erected in accordance with approved drawings and approved installation procedure, Joint shall be water tight. The rubber seals shall be so fixed on each stop log leaf and adjusted that the stop log, when set in guide slots have a tight and close feet on the sealing frames of the guide frames.

9.2.2 Details of stop logs

a) General

Each stop log shall consist of skin plate, main horizontal girders, and vertical members, bearing plates rollers, shoes, seals, upper sealing plate, lifting lugs and all other necessary components. The stop log shall be of the slide gate type and of welded constructions.

All stop log leaves shall be identical in construction and strength, and shall be interchangeable.

The details of construction of the stop log not specified herein shall be made by the contractor subject to review and approval of the Department.

b) Skin plate

The skin plate shall be at the down stream side of the stop log. The skin plate shall not be considered as a part of the strength members of main horizontal beams in the design of stop logs. The bottom of skin plate of the stop log shall be in true and straight plain to the embedded sill beam for complete water tight and uniform distribution of load along the sill beam.

c) Main Horizontal beams

The main horizontal beams shall be built up girder construction as per the drawings. Provision shall be made to drain off water from the horizontal member.

d) Bearing plates

The bearing plates shall be provided all along the side beams of stop logs to transmit the load acting on stop log to the embedded guide frames. The bearing plates shall be of corrosion – resisting steel.

e) Seals

The seals shall be the molded rubber shape clamped to the down stream face of the stop log by means of steel clamping plates and corrosion – resisting steel bolts, nuts, and washers. The side seals shall be of P shaped type or other approved shape which shall be activated by the up stream water pressure while the bottom seal shall be a plain bar rubber seal.

The sharp edges of clamping plates, base plates of rubber, bottom edge of skin plate etc., which contact with rubber seals shall be rounded to avoid a cut damage of rubber seals.

f) Side Rollers/Shoes

Two (2) side shoes shall be provided on each side of each stop log leaf to guide and position the stop log in the guide frame. The rollers/shoes shall be provided with corrosion – resisting steel pins, self – lubricating bushings with lubricating system and location. Washers or corrosion resisting plates.

The side rollers / shoes shall be designed for the inertia force acting on stop log leaf due to earthquake.

g) Upper sealing plate

The sealing plate shall be provided on the top of each stop log to receive the bottom rubber seal of the upper stop log, when the stop log is piled up each other in the slot. The sealing plate shall be straight and true plain within the specified tolerances to form complete continuous water tightness with the bottom rubber seal of the upper stop log and shall be of corrosion resisting steel.

h) Lifting Lugs

Each stop log leaf shall be fitted with suitable member of lifting lugs on the top of it. The lugs shall permit the sure catch and release operation by hand.

9**.2.3 Details of Guide Fames**

a) General

Each guide frame shall consist of the track – cum – side sealing frames, sill beam front frames with side rollers / shoe path and all other necessary components. The corrosion resisting steel plates shall be attached to all exposed surfaces of guide frames to avoid excessive wear thereof.

The details of the construction of the guide frames not specified herein shall be made by the contractor subject to review and approval of the Departments.

b) Sill Beams

The sill beam shall be straight and true flat for providing a close fit with the bottom of the stop log leaf. The sill beam shall consist of L shape beam and sealing plate made of corrosion – resistance steel T – shape beams shall not be applied to the sill beams.
The sealing surface of the sill beam shall be connected to the side sealing frames at the bottom corners to form a continuous seal with the seal rubbers of stop logs. The seal weld shall be made for the sealing plates at the corners and shall be ground finish.
The approved type water – tight expansion joints shall be used to connect the sill beam segments across the contraction joints of the foundation concrete. PVC water stops shall be connected to the bottom of sill beam at the contraction joints to keep complete water tight at the joints.

c) Track – cum – side sealing frames

The track frames incorporating the side sealing frames therein shall be provided at the down stream side of guide frames to transfer the load of the bearing plates of stop log to the concrete structures.
The track frames are provided with the bearing plates made of corrosion – resisting steel and its surfaces made to true flat.
The corner edges of the track frames shall be armored with the corrosion – resisting steel plates against the abrasion/wear due to sand, boulders etc. The seating surface shall be made to provide complete and smooth sliding seating with side seal rubber.

d) Side Roller / Shoe Paths

The side roller/shoe paths and frames shall have ample strength to resist the load from the side rollers/shoes of the stop logs. The assembled side roller/shoe paths shall be straight over their entire length and no offset shall exist at joints. The paths shall be made of corrosion – resisting steel.

Surface preparation & Painting for Stop logs:

Surface preparation: Surfaces requiring blast cleaning should be sand/grit/shot blasted after fabrication prior to painting.
Class B or class A type of blast cleaning for surface preparation should be adopted for stop logs.
Primer coat**:** After surface preparation over the prepared surfaces one was if inorganic zinc silicate (air less spray) should be applied giving a dry film thickness of 70 + 5 microns alternately, two coats of zinc rich primer, which should be applied to give a total dry film thickness of 70 + 5 microns.
Finishing coats: Over the prime coat, the finishers coat should consist of three coats of solvent less coal tar epoxy paints.
These should be applied at an Interval of 24 hours. Each coat should give a minimum dry film thickness of 100 +5 microns.

The total dry film thickness of all the coats including primer coating should not be less than 370 microns.

9.3. GANTRY CRANE: For lifting of stop log gates

9.3.2 GENERAL:

The Gantry crane with cantilever action shall be of class-II, out door traveling type with a rope drum hoist mounted on movable trolley as per IS. 807 "Code of practice for design, manufacture, erection and testing (Structural portion of Cranes and Hoists)". The operation of the crane shall be completely electrical with 415 Volts, 3 phases, 50 cycles/Sec. A. C. The Power Supply shall be made available from the plugs to be located at suitable intervals along the crane runway. The crane should be made to stop at the centre of each vent with the help of limit switches provided along the traverse. The voltages and frequency may vary + or – 10% and + or – 5% respectively.
An operator's cabin shall be provided in the crane. All controls required for electrical equipment on the crane shall be provided in the operating cabin. Indicating lights shall be provided wherever necessary for various operations.
The crane and the structural members shall be proportional in such a way that the actual calculated stresses for the combination of loading causing most adverse effect on the

members, arrived at by way of the accepted methods of calculation, shall not exceed the permissible stresses as specified in relevant Indian Standards.

The design of the component parts of the mechanism relating to the motion of Gantry Crane shall include due allowance for the effect of the duty which the mechanism will perform in service.

In all cases the mechanism shall be classified in accordance with the provisions laid under IS. 807 on the basis of the duty, and the design of component parts shall be in accordance with the provisions given in this section and as per relevant is specifications.

9.3.3 HOIST CAPACITY

The capacity of the hoist shall be based on the algebraic sum of the worst combination of the following forces during either lowering or raising cycle. The hoist capacity thus computed shall be increased by at least 20% as reserve.

a) All weights consisting of

i) Gate leaf elements along with all its components including ballast, if any.
ii) Self weight of hoist and its components.

b)Total water load on the gate elements including buoyancy.

c)All frictional forces comprising of
i)Wheel friction/sliding friction
ii)Guide friction
iii)Seal friction
iv)Friction of moving parts of the hoist.

d) Any Hydro-dynamic loads like hydraulic down pull/uplift.
e) Silt load.
f) Seating load as per the provisions of relevant IS codes.
g) Any other consideration.

9.3.4 MATERIALS FOR COMPONENTS OF GANTRY CRANE:

Sl No	**Component Parts**	**Materials**	**Specification**
1	Frame, cabin, ladders, walk ways, embedded parts for runway track etc	Structural steel	IS:2062-2006
2	Wheels	Carbon Cast steel / forged steel with min tread hardness 300BHN	IS:2707 IS:2004
3	Wheel axles, hooks	Forged steel or Carbon steel	IS:2004 IS:1570
4	Bearings	Standard make as per the approval of Engineer – in - charge	
5	Rope drum	Cast steel / structural steel	IS:1030 IS:2062-2006
6	Gears	Cast steel/ forged steel	IS:1030 IS:2004
7	Pinions	Forged steel	IS:2004
8	Shafts	Forged steel	IS:2004
9	Wire rope	6x37 or 6x 36 construction steel core	IS:2266
10	Rope sheaves	Cast steel	IS:1030
11	Runway rails	CR Rails	IS: 3443

9.3.5 LOADING:

All structural loads shall be computed as follows:

a) The load shall include the weights of the legs and horizontal members of the crane, crane drive mechanism, hoist mechanism tracks etc., The effect of the eccentricity of the location of the crane drive mechanism, hoisting mechanism shall be included in the design.

b) The live loads shall include the weight of the hooks blocks, and attachments. The live loads shall be multiplied by an impact factor.

c) The traction force on each wheel shall be considered as 5% of the resultant maximum wheel load considering the weight of the crane weight of the crane and a live load equal to the hoist capacity.

d) The normal wind load on the crane shall be taken as 50Kg/ m^2 for normal and 150kg/ m^2 for storm conditions and also in accordance with IS.875 Part-III and IS.807 (Part-I). The wind area of the crane shall be taken as the vertical projection of the structure, normal to the direction of wind.

9.3.6 Stability:

a) Considering load under the breakdown conditions of motor and a steady normal wind pressure of 50 Kg/m^2, the acceleration and retarding forces, the stability factor must be not less than 1.25.

b) Considering live load under service conditions with stable (normal) wind pressure of 50 Kg/m^2, and acceleration and retarding forces, the stability factor must be not less than 1.8.

c) In case of crane without load and not operating and considering storm wind pressure of 150 Kg/ m^2, the stability factor must be not less than 1.5.

9.3.7 Limiting length of members:

The 1/r ratio shall not exceed 180 for main compression members and 240 for bracing and subsidiary members. The ratio of the un supported length of the horizontal projection of any riveted tension members to the least radius of gyration shall not exceed 150. The ratio of l/b for any beam or girder shall not exceed the following limits.

Rivetted box plate girders - l/b - 65.
Welded box plate girders - l/b - 60.

Rolled sections:

All rolled sections used as beams shall have a depth of not less than one sixteenth of the span and where used in pairs shall have full depth separators spaced not more than 1.5m from center stiffeners shall be provided on the webs of the rolled steel beams at the ends and at points of the concentrated loads, if necessary to resist buckling.

Structure:

Care shall be taken in the design to produce a pleasing appearance of the crane. Stream lined appearance and general architectural treatment are considered as essential features of the design and are required to be incorporated in the design and construction.

9.3.8 Loads and Load combinations:-

Each mechanism/ component of the crane shall be designed to operate satisfactorily under most un-favourable combination of loads as indicated in the relevant sections of IS 3177 (Latest)

i) Frame:

The gantry shall be constructed of structural steel sections plates and shall be of either riveted or welded construction. The legs shall be of the box type with all angles on the inside of the leg. Field welding will not be acceptable. Diaphragms shall be provided to distribute the loads properly to the two sides of the legs and plane stiffeners shall be provided wherever necessary. All bearing surfaces of joints designed to transmit the stress by bearing shall be machine finished to provide full contact. Shop connections in the frame shall be riveted or welded so that the surface of the crane including the outside of the frame, case and hoist housing are viewed along the runaway, will be a plane surface except for the projection of rivet heads.

ii) Legs: The gantry legs shall be connected to the cross members by heavy gussets in a manner that will prevent and ensure rigidity and strength. Diaphragms shall be provided to distribute properly the loads from cross members to the sides of the legs. If the center lines of the legs are not directly over the center lines of the crane runway rails, the eccentricity shall be considered in determining the stresses.

iii) Machinery Housing: All weather housing, constructed of structural steel sections and plates shall be provided for housing the machinery.

9.3.9 Technical specifications – Mechanical Equipment:

The crane shall be designed in accordance with IS 3177-1999 class M5 Mechanism. All mechanical equipment shall be simple in design and capable of being easily erected, inspected, adjusted, painted and taken apart. The crane shall be of single motor, two drum

type, connected through gearing and shafting. The capacity of motor shall be such that the specific performance of hoist at rated load and at specified speed of hoisting will not demand more than full load torque. The shafts connecting the end gear trains shall be provided with a flexible coupling of the geared type, or any other approved arrangement which will permit each drum to be rotated with respect to the other drum and keeps the lifting beam always in a level position. All shaft loads shall be transmitted by suitable keys, sp-lines or pins. The transmission of loads by press fit only will not be permitted. A factor of safety of five over U.T.S. based on the rated capacity of the crane (exclusive of duty factor, impact factor, acceleration and retardation) shall be used in design of all mechanical parts provided that all parts of the equipment shall have sufficient strength to resist the forces produced by the rated break down torque of motor without exceeding 80% of the yield point strength of the material used. The hoist shall be so designed as to limit the maximum rope fleet angles not to be more than one in twelve, unless otherwise approved. The operation of the hoist shall be such as to allow the lifting beam to travel vertically. The hoist shall be provided with an electric brake.

9.3.10 Wheels & Axles:

The crane shall be carried on not less than 8 wheels. Four wheels in tandem, fully equalized, shall be provided for each crane travel base. All wheels shall be of heat treated steel (Carbon cast or forged) having the chemical composition and hardness in accordance with relevant IS specifications. Minimum tread hardness shall be maintained as 300BHN

The wheels shall be heat treated properly and certified copies of the test of the heat treatment furnished by the wheel manufacturer shall be submitted to Engineer-in-charge. The treated width shall have the proper clearance for the rail head and shall be of sufficient size to withstand satisfactorily the maximum standing and rolling loads. In no case, shall the diameter of crane wheels be less than that as given in IS: 3177.

The wheels shall be turned or ground to true and uniform diameter, concentric with the bore. The wheel axles shall be made of forged carbon or alloy steel and shall be accurately turned, ground and polished at journals. All axles shall be forced into the wheels at a pressure of not less than 3200 Kg. per Cm^2. of axle diameter and the driving wheels shall be keyed to the axles in addition to the forced fit. All wheels journal boxes shall be damp proof and shall be provided with self lubricating bronze bearings accurately machined and correctly bored for the axle fit, or may be provided with roller bearings with high pressure grease lubrication. All crane wheels assemblies shall be inter-changeable. The wheel assemblies shall be designed to facilitate removal of the wheels, bearings and journals from the frames. They shall be so arranged that wear may be compensated in order to maintain the drive gears in proper mesh. The size of the journals shall be ample to carry the load at the specified speed without excessive heating during continuous operation. Track sweeps at each end shall be provided and shall extend below the top of the rail on both sides.

9.3.11 Gantry Drive:

The gantry crane motion shall be affected by means of motors and shall be designed to move the crane at rated speed while supporting a maximum load for operating the gates. Not less than 50% of the wheels on each track shall be connected for driving. Each motor shall be mounted at one side of the gantry crane and shall be arranged to drive one truck on each side of the crane through gears. The drive shall be free from vibration and while moving, in no case, there shall be any tendency for gantry crane structure to get out of the line.

9.3.12 Brakes:

Following brakes shall be provided on the gantry crane.

a) **Hoist brake:** The hoist shall be provided with an automatic electromagnetic brake.The electromagnetic brake shall be mounted on the same base as the hoist motor and shall be electrically operated, spring set, solenoid release, shoe type brake and shall be equally effective in both directions of motor rotation. The brake shall have a capacity equal to one and a half times the rated full load torque of the motor. The brake shall be rated on the eight hour basis and shall be capable of with standing not less than four operations per minute. The brake shall be equipped with manual release, which must be hold by hand and cannot be left in the released position and should automatically apply at all times when the power is disconnected.

The terminals of the brake magnet shall be protected from accidental contact.

The connection and winding shall be effectively protected from mechanical damage. When necessary, magnet shall be provided with an efficient cushioning device.

If gear box is not self locking, In addition, a mechanical load brake is to be interposed between the winding drum and the source of power. It shall have a capacity to hold one and a half times the rated full load and shall be designed to prevent the load from moving downward unless the hoist motors are revolving under power in the lowering direction. The brakes shall preferably be of suitable multiple disc type and shall run in a bath of oil. The cases shall have

sufficient heat dissipating capacity to maintain the temperature of bath below 93^0 C when lowering the rated load with the electric brake in operation, and if required an external cooling device shall be provided to prevent this maximum. Temperature from being exceeded.

b) Gantry motion and parking brakes:

Electro magnetic brakes shall be provided for braking of crane, which shall apply automatically when the power supply to the mains is switched off. In addition parking brake (Manually operated) shall be provided on all 4 corners.

9.3.13 Rope Drums:

The rope drums shall be made of cast steel or welded plates and shall be reinforced to sustain the concentrated loads due to the rope loads. The drums shall be as indicated in Cl.8.4.6 of IS 3177 and shall be of sufficient length to accommodate the full length of ropes for the specified lift, plus two idle turns at each fastening and one extra groove. Right hand and left hand helical grooves shall be machined on the surface of the drums, to receive the hoisting ropes. The depth of the grooves shall be machined on the surface of the drums.

The depth of the grooves shall be not less than 0.3 times the diameter of the rope. The combined crushing and bending stresses should not exceed the permeable values as indicated in relevant IS specification. The total compressive stress due to the over winding of rope shall be taken as specified in IS: 3177. The drum flanges shall be to resist the horizontal forces caused by the over winding rope. The rope attachments to the drum shall be simple and secure so that adjustment and replacement of the rope may be accomplished without dismantling the parts. The crushing strength of the drum shall be calculated using the formula C=K.T/PT as indicated in IS: 3177.

Where C is compressive stress in drum in Kg. f/Cm^2
T is tension in one wire rope in Kgf.
P is scoring pitch in cm.
T is minimum drum thickness in cm.
K is co-efficient depending upon number of layers of wire rope on drum.

The drum also shall be checked on bending and combined stress shall be less than permissible stress of 0.2UTS

9.3.14 Sheaves:

All rope sheaves shall confirm to IS: 3177: 1999. All revolving sheaves shall be in true running balance. The sheaves in the lower block shall be mounted on self lubricated bronze brushing.

9.3.15 Shafting & Pins:

The distance between bearings on shafting subjected to no bending except its own weight, shall be such that the maximum lateral deflection of the shaft shall not exceed 0.8mm. per meter of length. Angular deflections of the shafts shall not exceed 0.25^0 per meter length. Proper provision shall be made to prevent longitudinal movement. The set collars shall not be used for this purpose. The allowable bearing pressure for sheaves and equalizer pins in steel frames shall not exceed 630 Kg/Cm^2 for the fixed portions and 400Kg/Cm^2 for the movable portions.

9.3.16 BEARINGS & LININGS:

All bearings shall be of the roller, ball or sleeve type with removable bronze linings, preferably flanged at both ends. The shaft bearing shall be placed as close as possible to the points of loading. Unless otherwise specified herein, bearings on revolving shaft shall be of divided type so that each shaft may be removed from the crane with its pinions and gear in position. In all cases, where divided bronze bearings are used, the bearing caps, unless dowelled shall be cased into the base and secured by turned bolts. Cap screws shall not be used for this purpose. This requirement will not apply in the case of roller or ball bearings. The design shall be such that any shaft may be removed without disturbing adjacent parts. Base castings for gear train bearings shall be made in one piece to ensure that accurate alignment and spacing will be maintained. They shall be hold securely in place by turned bolts. Provisions shall be made to hold effectively all bearings against rotation or changing position under load. All grease lubricated split bearings shall be provided with an adequate base in the center of the top half, drilled and tapped for lubrication. All bearings shall be weather proof, drip proof and shall be protected fully against the entry of rain, dust and any foreign matter. All bearings shall be designed so as to easily replaceable. Busing at ends of shafts shall be sealed by an approved method so as to be drip proof if oil lubrication is used. Open ends of brushings shall be sealed with approved grease retainers. Where bronze bearings are used, the bearing

pressure shall not exceed 0.04UTSon the projected area. The thickness of bronze linings shall not be less than 0.08d+3mm where'd' is diameter of shaft.

9.3.17 Hoisting ropes:

The hoisting rope shall confirm to IS: 2266 and the stress in ropes shall be taken at the maximum point and shall include the overall efficiency of the hoist tackle in the lines leading from the drum and the weight of the hooks and sheaves. In no case shall the working load be greater than $1/6^{th}$ of the nominal breaking strength of the rope. The rope shall have sufficient length to provide the specified total lift, plus two extra turns on the drums for each fastening in addition to adequate length for attaching to the drum. The hoisting rope shall be uncoated, extra flexible, high grade improved plough steel rope with fiber core and shall have 6/36 or 6/37 construction.

9.3.18 Hooks & Blocks:

The blocks shall be arranged to lift without twisting or sidewise pull of the load and dead-end ropes shall be avoided. The hook shall be made of forged, alloy or carbon steel or may be out from rolled stock by a method subject to the approval of the Engineer in charge. The bearings shall be totally enclosed dust proof and arranged to prevent leakage of grease. The hoist shall be provided with fixed type hook mounted on thrust bearing. The hook beams or cross beams shall be made of annealed, forged carbon or alloy steel. The sheave pins shall have such proportions as to provide ample sheave bearing area. The bottom blocks shall be constructed so as to guard the hoisting ropes fully and prevent them from leaving the sheaves under any operating condition. The guards shall be made of cast steel or plate steel, machined at the points, fitted close to the periphery of the sheaves, and arranged for proper drainage. Proper drain holes shall be provided in guard to prevent water storage.

9.3.19 Gears & Pinions:

Gears shall be of the spur, herrings bone or helical type. Spur gears may be used in the gantry drive. Horning bone gears shall be of the continuous standard in volute type. Spur gear shall be of the standard 'involutes' type with 14.5 degrees or 20 degrees pressure angle and of proportions as indicated by the Indian Standard Specifications. The width of face of spur gears shall not be less than twice the circular pitch. The gears shall be designed in accordance with the relevant Indian Standard Specifications taking due consideration of duty factor for the approximate class of mechanism. Overhung gears will not be permitted except on motor shafts. Pinions shall be forged in general with the shaft where practicable. Gears may be of cast steel, forge steel or welded constructions fabricated from steel billets and annealed.

9.3.20 Speed reducers:

Speed reducers shall be of helical, herring bone or worm gear type, entirely self contained in oil tight, steel or cast iron housing designed to maintain shafts and bearings in accurate alignment. Speed reducers shall be selected either on the basis of rated horse power output of the motor or on the basis of the rated full load motor torque, depending upon the motor speed, taking into account the friction losses in the machinery connecting the motor to the respective speed reducer.

9.3.21 Bolts & Nuts:

All bolts for mechanical equipment shall be finished and shall have hexagonal heads and nuts. Bolts, heads & nuts shall bear on a seat at right angles to the bolts. On castings, the seats shall be on finished brass or on spot faced surfaces. Nuts subject to vibration and frequent changes of load shall be secured by effective lock nuts. Double nuts shall be of standard thickness. Bolts & nuts used shall be as per IS: 1363.

9.3.22 Set Screws:

All set screws shall be provided with case hardened cup points and shall be of the safety type. Set screws shall not be used for transmitting torsion.

9.3.23 Lubrication:

Oil lubrication grouped type shall be provided for all gear trains, sleeve bearings on motors sheaves and bearings for track wheels of the master car builder's type. Lubrication for all other mechanical operating parts shall be by means of high pressure grease and industrial button type fittings shall be used. The lubrication fittings of bearings and journals shall be readily accessible and where necessary, shall be piped to convenient points with copper or brass pipe of ample size and adequately fastened. Grease grooves shall be provided in bearing linings for the satisfactory distribution of the lubrication. The edges of the grooves shall be rounded, and the grooves shall not come within 10mm from one end of the bearings.

9.3.24 Wrenches & Tools:

A suitable grease gun and a complete set of wrenches and tools in a pressure steel tool box shall be furnished for the crane and hoists. A sufficient quantity and variety of tools shall be furnished to cover all ordinary maintenance work in connection with the crane and hoist. Each

tools & wrench shall be stamped so as to be easily identified as to its use and size. Operating instructions in a suitable metal from covered with glass, shall be mounted in convenient locations in the operator's cage.

9.3.25 ELECTRICAL EQUIPMENT:

9.3.25.1 General: All electrical equipment and wiring shall meet all the requirements and shall be in accordance with IS: 3177 of out door duty and other relevant Indian Standards unless otherwise specifically stated in the specifications. Nuts, railings, screen and other accessories which are external to the apparatus, but which may be required to meet these orders for installed equipment, shall be furnished by the contractor. The power supply will be three phase AC 415 Volts, 50 c/s. All the electrical equipment shall be suitably designed and constructed for operation under tropical and out door. The ambient temperature considered shall be not less than 50^0 C.

9.3.25.2 Motors:

The crane shall be equipped with motors of ample capacity for the duties and speeds specified. The rated capacity of such motor shall be such that its full load torque shall not be exceeded in giving the specified performance of the crane. All motors shall be of squirrel cage 40% crane duty factor 150 starts per hour; foot mounted totally enclosed fan cooled operating on 400/440 V AC 50 cycles 3 phase (variable frequency drive)The pull out torque of the motors shall be not less than 225 percent of the full load torque with rated voltage and frequency applied. They shall be braced and insulated to withstand plugging service and the heavy shocks and vibrations transmitted to them by the driven machinery. The motors shall be provided with at least two brushes per slip ring. All the slip rings shall be insulated from the motor shaft. The brushes shall be provided with flexible copper shunts. The bearings shall have ample strength to withstand the heavy shocks and vibrations to which they will be subjected. They may be of the rollers or ball type and shall be sealed to prevent leakage of oil and entrance of dust. The insulation of the motor shall be of Class 'F'. Motors shall be rated in accordance with IS: 395-1961. The motors shall have a rated synchronous speed of not more than 100 RPM. but shall be capable of withstanding a maximum speed of 2 ½ times the rated speed or 200 RPM, whichever is less. Conduit terminal boxes, shall be attached to the frame of each motor. The motor loads shall be of proper length to afford means of connection within the terminal boxes. The motor shall be so located that the brush gear and terminals are accessible for inspection and maintenance and normal ventilation is not restricted. Full technical particulars of each motor including the values of the locked rotor current, pullout torque etc., shall be suitable for a minimum of 4 stop/starts per minute.

9.3.25.3 Master Control Equipment:

All motor controls shall be of full magnetic, reversing with definite time limit type with instantaneous over current, overload and low voltage protection. They shall be designed so that it will be possible to limit the vertical movement of the hook, with full rated load when staring from complete standstill to within 10mm. from the desired position. All hoist motor controllers shall have single speed control in each direction of operation, with inching facility. The control of the crane shall be by means of push buttons mounted on the pendent push button station supported by steel chain or steel rope from the top of the crane. The pendent control box shall be designed as per IS: 3177 for out door use to withstand rough handling. The contracts of protection relays of any motor shall be so wired that the operation of the relay will trip the motor primary contractors, thus making it necessary to return all controls to the 'off' position before the motor can be started again. The instantaneous relays shall be adjustable between 200 to 300 percent of the motor full load current. The power supply for the main contactors shall be protected by a 3 pole 415 volts. AC totally enclosed, air circuit breaker equipped with three Nos. time delay, direct acting, over load tripping elements, on shunt trip coil, and under voltage release for emergency tripping. A circuit breaker shall be provided to control and protect the control circuit for each motor and all control circuit shall be fused properly. An indicating lamp shall be provided to show that the control circuit is healthy. All switches, contactors and relays shall be enclosed in suitable cabinets and placed in accessible locations to facilitate inspection and maintenance. All resisters shall be non-breakable, corrosion resisting type and shall have a low temperature co-efficient. Where practicable controller handle should move in the direction of the resultant load movement. Each controller shall be marked in a permanent manner to show the motion controlled and wherever practicable of the direction of movement.

The resister shall be placed in accessible places outside the cages and in well ventilated non-combustible cabinets which will not omit flame. Each main supply circuit breaker shall have an interrupting capacity of not less than 10,000 amperes symmetrical of 415 volts. All switches, contractors, primary relays and preliminary circuits on controllers have a thermal capacity of 10000 amps for one second without injury. The resister shall be non breakable corrosion

resistant stainless steel type having low temperature co-efficient and preferably be continuous rated and their rating will be as per IS: 3177-1999. Allowable temperature rise during operation of the crane under service conditions shall not exceed the limit specified in relevant Indian Standards. Each contractor shall state in his tender, the make and type of all electrical equipment, which he proposes to furnish,. The equipment offer shall be of approved make. All switches, controllers, levers and other operating mechanism and electrical devices shall be subject to the approval of the Engineer in charge.

9.3.25.4 Cables & Cable Reel:

The rubber insulated cables or polyvinyl chloride insulated cables used for crane wiring should comply with the relevant Indian Standard specifications. The gantry crane shall be equipped with an automatic spring actuated to take up cable reel. Power will be obtained from plug receptacles placed at convenient intervals of the running. The cable and reel shall be provided with sufficient length of flexible cable and with limit switches arranged to cut off the power supply to the travel of the motors when all but 2 turns of the cable is un-reeled. The attachment plug for the receptacle and of the cable shall be furnished by the contractor. Size of the conductor of all power cables shall be calculated with a de-rating factor of not less than 0.70.

9.3.25.5 Wiring:

All wiring shall be run in hot-dip galvanized metal conduit. All conductors for primary power lighting and control circuits shall be insulated for not less than 1100 V. and shall have standard, moist, resisting double braid covering. All conductors between the secondaries of the motor contractor and resistors shall have a sufficient current carrying capacity in accordance with Indian standard and shall be insulated with 1100V. Class asbestos. The primary conductor to the motor shall be rated for continuous, current carrying capacity of not less than 100 percent of the rated full load, primary current of the motors. Cables having conductors smaller than 2.5 m^2 nominal equivalent copper area of cross section shall not be used for the power wiring for any of the motors. For control circuits and auxiliary wiring, cables having a sectional area smaller than 1.5m. nominal equivalent copper area shall not be used.

All cables shall be adequately protected against mechanical damage and metal trucking may be used if desired. Electrical conduits shall comply with the relevant ISS, applicable for out door cranes. Except where flexible un-armored cables are essential, cables shall be either armored or enclosed throughout their length in galvanized trucking or conduit, either flexible or rigid. A flexible metallic tube or duct may not form an effective earth connection and shall not be used for that purpose. Taped and braided varnished cambric insulated cable shall not be used for outdoor cranes.

Both control and power cables shall be terminated using tinned copper compressed type lugs with proper bronze shake proof washer or other approved device which will ensure good connections under hard and vibrating use.

All cables shall be terminated at both ends using double compression type nickel plated brass cable glands.

9.3.25.6 Conduits

All electrical conduits shall be of heavy gauge and shall be hot dip galvanized in accordance with IS: 1653-1972.

9.3.25.7 Limit Switches:

Limit switches shall be provided for the following operations:

i) To limit the travel of gantry crane at both ends of travel and to stop the crane at the center of each span.
ii) To limit the hoisting travel of the hook at both ends of the travel.
iii) One back up limit switch shall also be provided for hoisting.

The limit switches shall be of approved standard type and shall be suitable for service under extreme positions in either direction. It shall be so designed that it can be wired or serviced after mounting. The limit switches shall be completely enclosed in water proof coverings and shall be suitably designed and tested for normal lift and satisfactory operation in outdoor under the humid climatic conditions.

9.3.25.8 Isolating switches:

The manufacturer shall fit a main isolating switch in the cabin or adjacent to it capable of dis-connecting the supply for all power driven and associated equipment on the crane but not auxiliary circuits such as lighting and heating circuits. In the case of main isolating switch being cabined with the crane protective panel, it shall be mechanically inter-locked with the door giving across to the panel, and the terminals shall be screwed to prevent accidental contact when the door is open. When not so combined, a suitably worded red warning plate

shall be attached to the cover of the protective gear and all other panels and controllers, not fitted with inter-locked isolators. The main isolating switch and the additional isolating switches should be so situated that it will be possible to carry out any maintenance work of functional testing on them without danger.

9.3.25.9 Protective Equipment:

Iron clad electrical protective gear in accordance with IS: 3177 shall be provided except that in case of the aggregate power of the two largest motors (i.e.,) less than 30 KW and their aggregate current rating is less than 60 Amps. A manually operated equipment as per IS: 3177 may be used.

9.3.25.10 Emergency Push Button:

A push button emergency stop shall be so located as to be readily available for prompt use by the operator in case of emergency. This emergency push button shall be connected in the operating coil circuits in case of contractor and in the under voltage release circuit in the case of a circuit breaker.

9.3.25.11 Lighting & Convenient outlets:

The permanent 220V lighting system on the crane shall consist of four 500W high bay lighting units to illuminate the area under the crane. One 500W high bay lighting unit to illuminate the area over the pendent operating push button station. The system shall be supplied from 415 volts crane power system through a separate 415 volts circuit breaker. Each of the two 500 W high bay lights and another branch circuit shall be connected to give convenient outlets. The wiring shall be run through hot dip galvanized GI pipe and shall be done in accordance with the Indian Electricity Rules, 1937. The 400/440V. circuit breakers with an overload tripping element for each pole.

9.3.25.12 Inter-locking & Earthing:

The circuit breaker for the main power supply to the crane shall be inter-locked in such a way that it should be possible to close the circuit breaker only when the control system of all the motors are in OFF position.

The crane structure/ motor frames and metal cases of all electrical equipment shall be effectively grounded through 2 (Two) distinct paths in accordance with IS: 3043-1966.

9.3.25.13 OPERATION OF THE CRANE:

A pendent push button station shall be provided with all the push buttons, required for operation of crane viz., (a) crane travel (b) hoisting/lowering operation. Separate push buttons shall be provided for inching operation in either direction. Indicating lamps required to the healthiness of control supply, operation of the crane etc., shall be provided on the push button station.

A suitable weather proof box with locking arrangement shall be provide at a convenient height on one of the legs of crane for keeping the push button station when to in use.

The power supply/control supply switches shall be housed in a separate weather proof box with locking arrangement and the same shall be mounted on one of the legs of the crane.

9.3.26. Guarding, weather protection, inspection and testing for Gantry Crane.

Guarding, weather protection, inspection and testing for Gantry Crane shall be as per BIS 3177(latest edition) and got it approval from the Engineer in charge.

9.4.1 Table

List of referred Indian standards of BIS

Sl.	Code No.	Title
1.	IS: 4622-1978	Recommendations for structural design of fixed wheel gates.
2.	IS: 800-1962	Code of practice for use of structural steel in general building construction.
3.	IS: 2502-1963	Code of practice for bending and fixing of bars in Concrete reinforcement.
4.	IS: 1893-1966	Criteria for earthquake resistance design of structures.
5.	IS: 6938-1973	Code of practice for design of rope drum and chain hoist for hydraulic gates.
6.	IS: 2266-1970	Specification for steel wire ropes for general engineering purpose.
7.	IS: 3681-1966	General plan for spur and helical gears.
8.	IS: 325-1970	Specification for three phase induction Motors.

9. IS: 816-1969 Code of practice for use of metal arc welding for general construction.
10. IS: 7718-1975 Recommendations for inspection, testing and maintenance of fixed wheel and slide gate. (part-1)
Part-1:Inspection, testing and Assembly at the Manufacturing stage.
11. IS: 7718-1978 Recommendations for inspection, testing and maintenance of fixed wheel and slide gate. (Part-II)
Part-II: Inspection, Testing at the time of the erection.
12. IS: 7718(Part-III) Recommendations for inspection, testing and maintenance of fixed and slide gate.
(Part-III)Inspection, Testing and maintenance after erection.
13. IS: 1181-1967 Qualifying tests for metal arc welders (engaged in welding structure other than – Pipes) (first revision).
14. IS: 2825-1969 Code of practice for unfired pressure vessels.
15. IS: 2595-1978 Code of practice for radiographic testing.
16. IS: 823-1964 Code of procedure for manual metal arc welding of mild steel.
17. IS: 3658-1981 Code of practice for liquid penetrant flaw detection.
18. IS: 3664-1981 Code of practice for ultrasonic pulse echo testing by contact and immersion methods.
19. IS: 3703-1980 Code of practice for magnetic particle flaw detection.

9.4.2 Materials for parts of slide type gate components.

S.No	Component part	Recommended Material.	Reference to specification of BIS
1	Structural parts of stop logs i.e. skin plate, horizontal girders, vertical stiffeners. Seal bases, seal clamps, guide shoes etc.	Structural steel	BIS 8500 and BIS 2062
2	Track bases, sill beams bases, guides etc.,	Structural steel	BIS 2062
3	Seal seats, bearing plate and bottom seal seat	Corrosion resistant steel	BIS1570(part V)
4	i) Seals a) Side b) Bottom	Rubber Music Note type Rubber wedge type. Flat rubber seal	BIS 11855

9.5 Shop drawings and fabrication

The contractor shall carry out the fabrication of steel materials in accordance with the detailed design specifications and method approved by the Engineer in charge.

The gates and embedded parts shall be manufactured to such accuracy and tolerances as are required for safe and efficient operation of the gates.

The manufacturing tolerances in Table shown below shall be taken for general guidance in accordance with IS: 17718 (part-1) – 1975" recommendations for inspection, testing and maintenance of Fixed wheel and slide gate".

TABLE 9.5.1. MANUFACTURING TOLERANCES

Sl. No	Description	Tolerance
1.	**Embedded parts.**	
	i. Deviation of any point on the face of seal seats or wheel track from a2 meter machined straight edge held against it.	0.50 mm
	ii. Deviation from straightness of the guide track in 2 metre length.	2.00 mm
	iii. Variation in the distance between the face of the seal seat and the face of its respective wheel track.	1.00 mm

iv. There shall be no off-sets or gaps at any adjoining field joints between seal seats, wheel tracks and guide tracks.

2. Gates

i. These gates shall be so assembled that when a machined straight edge is held against all the wheels on either sides in zero position. It will not be possible to insert a feeler gauge thicker than 1.5 mm between any of the wheels and the straight edge.

ii. Distance between the side guide-block or guide roller 1.5 mm with on one side of the gate to the corresponding reference to guide block or guide roller on the other side. Dimension shown on the drawing.

9.6 Installation and Test at site

a) Guide frames

Guide frames shall be assembled in the block outs in accordance with the Approved Drawings and Approved installation procedures, brought to line and grade within the tolerances specified and firmly secured in place. Alignment bolts or other necessary devices shall be used to install the guide frames at corresponding accurate position. Connections between the guide frames and anchor plates/bars shall be adjustable for alignment and firmly tightened to hold the guide frames securely in position while concrete is being placed in the block outs. Additional braking shall be provided where necessary in the opinion of the department to ensure the required alignment without any additional cost and claim.

Extreme care shall be taken to ensure that the guiding, bearing and sealing surfaces lie in a true plane within the tolerances specified for their entire length. Placement of concrete in the block outs shall not proceed until the guide frames have been completely assembled and secured and passed the tests. After concrete placing, alignment and tolerances shall be checked and remedial action taken if readings indicate that displacement has occurred.

b) Stop logs

Each stop log leaf complete with seals, bearing plates and side rollers shall be assembled and erected in accordance with the Approved Drawing and Approved installation procedures. Joints shall be watertight where required for complete watertight. The rubber seals shall be so fixed on each stop log leaf and adjusted that the stop log, when set in the guide slots, have a tight and closes fit on the sealing frames of the guide frames.

c) Tests

Tests after completion of installations.

After completion of installation work at the site, the test shall be performed by the contractor in accordance with the Approved test procedures.

The tests shall include but not be limited to

a. Inspection by feeler gauge measurement for satisfactory sealing or all seals.
b. Inspection for satisfactory installation of all components.
c. Check of satisfactory operation under dry condition.

Any defect or improper operation discovered during the test shall be correct and the entire test shall be repeated to the satisfaction of the Engineer in charge.

i) Test on completion

After test at the site have been completed and approved by the Engineer in charge and relevant structures under other sections are fully installed, the following tests shall be performed by the contractor as tests on completion.

a. Check of satisfactory operation under an acceptable water level condition.
b. Check of water leakage from closed stop logs under an acceptable water level condition.

After the tests, stop logs shall be stored in the warehouse for them by the contractor.

Any defect or improper operation discovered shall be corrected at once and entire test shall be repeated to the satisfaction of the Engineer in charge within the tolerances as shall be defined by the contractor himself and subject to the Engineer in charge's approval.

9.7 Measurement and payment

Payments will be made for one set of stop logs as per work done and recorded in accordance with Schedule A.

10.0.OTHER ITEMS

10.1 .Gravel Backing Morum or Gravel backing to rough stone dry packing.

10.1.1. Gravel backing of specified thickness to the rough stone dry packing using the gravel of approved quality including cost and conveyance of gravel, sampling and testing of gravel, stacking of gravel, seigniorage charges, all water leads, preparation of base, mixing with

water, puddling, laying in position, with all leads, lifts, delifts, ramming, finishing and left to sky until it dries up, and does not show signs of yielding, all labour charges and all other operations necessary to complete the finished item of work to specifications as per drawings and as directed by Engineer –in-charge.

10.1.2 Preparation of Base:

The surface to receive the gravel backing shall be neatly trimmed to the required slope dimensions and free from all roots and vegetation and profusely wetted before morum is laid on.

10.1.3 Gravel Quality:

a) The gravel shall be composed of well graded, coarse siliceous grains, sharp and gritty touch and free from dirt and other deleterious matter. It shall not contain lumps larger than 20mm and the fines (passing through 75 Microns IS sieve) shall not exceed 10%.

b) The Liquid limit shall be – 20

c) Plasticity index – not more than 6.0

d) Morum stacking shall be as per standards.

10.1.4. Preparation and Laying:

a) Gravel shall be mixed with water on the previous day. Next day morning it shall be well mixed and worked with mamoties till it can be formed into stiff plastic walls.

b) Gravel so mixed shall be carried in baskets to where it is to be laid and deposited in a single layer to give 150mm thick of finished thickness and shall be well rammed in position with flat wooden rammers or any other method approved by the Engineer.

c) The finished surface of gravel shall be left untouched until it dries up and does not show signs of yielding.

d) If any thickness other than 150mm is specified the work shall be executed to this specification, ramming in layers not exceeding 150mm thickness.

10.1.5 Measurement and Payment:

A) Measurement:

a) All linear measurements shall be in meters, correct to 0.01 of a meter.

b) All volumes shall be computed correct to 0.01 of cubic meter.

c) The gravel shall be stacked and pre-measurements shall be taken before laying.

One cubic meter of finished item of work shall not be less than 1.16 cubic meter of s tack measurement.

B) Payment:

The Unit for payment shall be one cubic meter. The tender rate in schedule 'A' shall be for 1 cubic meter of finished work inclusive of cost of all material, sampling and testing, all leads, lifts, labour charges, conveyance charges and incidental charges for completing the work to the specifications and drawings.

10.2 ROUGH STONE DRY PACKING FOR APRONS AND SIDE REVETMENT:

10.2.1. General:

The specifications for construction of 600mm/ 450mm/ 300mm rough stone dry packing for aprons and revetments as specified in schedule 'A' and its materials.

10.2.2. Scope:

Rough stone dry packing of specified thickness in single layer upto 600mmthick, in two layer for 1000mm thick (400mm thick layer in the bottom and 600mm thick layer on top) and in three layers for 100mm thick using the stone of specified variety for bed pitching/ side revetment including cost and conveyance of stone, sampling and testing of stone, seigniorage charges, preparation of bed, stacking of stone to departmental gauge for pre-measurements, packing, all leads, lifts, de-lifts, seignior age charges, labour charges, and all operations necessary to complete the finished item of work to the specifications as per drawings and as directed by the Engineer-in-charge.

10.2.3. Material :- The provision of schedule 'D' shall apply

a) Stacking shall be done as detailed below at the locations specified or ordered by the Engineer.

i) Stacks shall be formed to regular shape and uniform cross sections.

ii) Materials shall be stacked on even ground. Stacking shall not be done in flood zones or in water logged areas.

iii) Rough stone shall be packed so closely as to give minimum quantity of voids possible without actual dressing of stone to fill interstices. In case of improper stacking done by the contractor, the Engineer shall have the right to either reject the stacks partly or completely.

iv) Unless otherwise specified templates shall be provided to the sizes and dimension of the stack as may be specified at the contractor's expense.

10.2.4. Preparation of Bed and Slopes:

A. **Bed:** The surface on which the rough stone is to be laid shall be excavated to the required level and leveled and prepared for the length and width as shown on the drawings. The base shall be compacted suitable with hand rammers or other means to have an even bedding. No packing shall be on un-compacted made up soil.

B. **Side Slopes:**

a) The sides of banks to receive rough stone revetment shall be trimmed to the required slope and profiles put up by means of line and pegs at intervals of 3 meters to ensure, regular, straight and an uniform slope throughout. Depressions shall be filled and thoroughly compacted.

10.2.5. Laying Apron (Bed Pitching) and Revetment (Pitching to Sides):

i) Apron (Bed Pitching)

a) Apron shall be provided to the dimensions and levels shown or drawings.

b) To ensure regular and orderly disposition of the full intended quantity of stone in the apron, template or cross walls in dry masonry shall be built about a meter thick and to the full height of the specified thickness of apron at intervals of 10metres or closer as directed y the Engineer, all along the length and width of the apron. In between the cross walls the stone shall be hand-packed.

c) The thickness of the apron shall be made with one stone only. Total thickness shall not be made up in two or more layers.

d) The stones shall be laid closely in position of the prepared bed and firmly set with their broadest ends downwards so that they may meet all round their bases and with the top of the stone level with finished surface of packing. The stones shall be laid breaking joints as far as possible in the direction of the flow of water. The stones shall be placed normal to the surface to be protected.

e) The interstices between adjacent stones shall be filled in with stones of the proper size, well driven in, with crow bars to ensure tight packing and complete filling of all interstices. Such filling shall be carried on simultaneously with the placing in position of the large stones and shall in no case be permitted to lag behind. The final wedging shall be done with the largest size chips or spalls practicable, each chip or spall being well driven hoe with a hammer so that no chip or spall is possible of being picked up or removed by hand to ensure tight packing. The sizes of spalls shall be minimum 25mm and shall be suitable to fill the voids in the pitching.

f) On completion, the surface presented by the apron revetment shall be even throughout, free from irregularities and the required length, breadth and slope as specified or as shown on the plans.

ii) Revetment (Pitching to sides):

a) Revetment shall be constructed to the required length , level, depth and slopes shown on the drawings.

b) Profiles or strings and pegs shall be put up to ensure that the pitching is done true, straight and to the proper slope throughout.

c) Revetment shall in all cases be built up from the foot of the bund to be reveted and built up in courses upwards. Care is necessary that a strong toe wall or other protection always given to the revetment. Which protective measure shall be shown on the plans.

d) Stones shall be placed to the required length by derrick or by hand. Stones shall be set normal to the slope and placed so that the largest dimension is perpendicular to the face, of the slope unless such dimension is greater than the specified thickness of pitching. The largest stones shall be placed in the bottom courses and for use as headers for subsequent, courses.

10.2.6 Measurement and Payment:

1) Measurement:

a) These protection works shall be measured as set forth below.

i) Unless otherwise specified for measurement, materials shall have to be stacked before laying and no extra cost will be paid to the Contractor for this stacking.

ii) All linear measurements for apron and revetment shall be in meters corrected to 0.01 meter. Volume shall be in cubic meters corrected to 0.01 cubic meter. The unit for payment shall be one cubic meter $1M^3$ revetment / Bed pitching shall not be less than 1.10 M^3 of stack measurements.

iii) Preparation of bed and trimming of the side slopes for laying apron and revetment to sides shall be deemed to have been included in the main item and shall not be measured separately unless otherwise specified.

iv) No extra payment for the construction of templates, cross walls in apron shall be made.

2. Payment:

a) The tender rate for one cubic meter in the schedule 'A' for finished work of apron shall include cost of preparing base, profiles, cost of all materials, conveyance, labour, tools and plants for laying completing the work according to the drawings and specifications.

b) The rate for one cubic meter of the stone pitching to side slopes in schedule 'A' shall include the cost preparing the base by trimming, putting the profiles, laying stone pitching of dry rubble to the specified thickness, lines, curves, slopes and levels and cost of all labour and materials including conveyance as well as tools and plants required for the work in completing the work as per drawings.

10.3. C.C. GROUTING TO THE APRONS AND REVETMENTS INCLUDING POINTING. (REPAIR GROUTING)

10.3.1. Scope: Repair grouting to aprons and revetments upto specified depth with cement concrete of specified proportion using 20mm MSA graded material and pointing with cement mortar specified proportion including cost and conveyance of cement and all other materials, seigniorage charges, sampling and testing, all water leads, mixing charges, all leads, lift, de-lifts and other labour charges and all other operations necessary to complete the finished item of work as per drawings and as directed by the Engineer-in-charge.

10.3.2. Materials :- The provision of schedule shall apply.

10.3.3.

i) The surface of the apron or revetments shall be thoroughly cleaned and joints raked out to 250mm depth or to any other depth as specified by the Engineer. The whole surface shall be swept clean.

ii) The joints shall then be filled in with cement concrete of specified mix and graded broken aggregate of maximum size 20mm. If the interstice are large, a larger size aggregate as specified by the Engineer may be used. The concrete shall be rammed with flat bars, trowels or flats ends of small thin crowbars to ensure effective consolidation.

iii) The surface shall then be neatly flush pointed with cement mortar of specified mix covering the joints of the newly laid concrete while the concrete filling is still green.

iv) The concrete and pointing shall be continuously kept wet for three weeks.

10.3.4. MEASUREMENT All linear measurement shall be in meters, correct to 0.01 of a meter. All areas shall be worked out correct to 0.01 of a square meter.

The unit rate in schedule 'A' shall be per ten square meters. The rate shall include all costs of cement concrete, surface, cleaning, filling joints with cement concrete, ramming pointing,

watering and tools and appliances required for completing the grouting operation. This shall also include the cost of bailing out of water where required unless otherwise specified.

10.4. ELASTOMERIC BEARINGS:

10.4.1. SCOPE OF WORK:

a) These section covers specifications for fully moulded Elastomeric Bearing pads.

10.4.2. Applicable Publications:

1) Ministry of shipping And transport. — Specification for Roads and Bridges works Section – 2000(Including all amendments)

10.4.3. Elastomer Bearings:

The term "bearing" in this case shall refer to an elastomeric bearing consisting of one or more elastomer slabs bonded to metal plates during manufacture so as to form a sand-which arrangement, while bearing pads shall denote single un-reinforced elastomer slabs.

10.4.4. Materials:

a) Elastomer:

a) The elastomer to be used for bearings shall be made from natural or synthetic rubber and shall satisfy the physical properties give n below. The test pieces required for the tests shall be selected from the central layer of the bearings making up the selection.

10.4.5. Properties of Elastomer:

Property	Unit	Test Method. IS specification Reference	Value of the Characterized Specified
1 Physical Properties			
1.1 Hardness	IRHD	IS:3400 (Part II)	60.+5
1.2 Minimum Tensile Strength	Mpa	IS:3400	17 (Part I)
1.3 Minimum Elongation at break	Percent (Part)	IS:3400	400
2. Maximum Compression Set	Percent	IS:3400 (Part X)	Duration (h) / Temperature (deg C)
			0 to 24.2 / 100±1
CR			35
3. Accelerate Ageing		IS:3400 (Part IV)	Duration (h) / Temperature (deg C)
CR			0+70 / 100±1
3.1 Max change in	IRHD +15		Hardness
3.2 Max change in	Percent -15	Tensile Strength	
3.3 Max change in	Elongation	Percent	-40

ii) Adhesive:

Adhesive used in bearing location or attachment to bridge decks shall be subject to the approval by the Engineer. It shall be of high viscosity resin, which are cold setting and free of solvent. Adhesive shall not be used o bond layers of cured elastomer.

ii) Reinforcement:

Mild steel used for plate reinforcement shall comply with the reinforcements of IS:226

10.4.6. Certification :

The contractor shall furnish to the Engineer in charge a certificate by the Manufacturer that the elastomer and fabric (if used) in the elostomeric bearing conform to all the above requirements. The certification shall be supported by an authenticated copy of the results of tests, performed by the Manufacturer upon samples of the elastomer and fabric to be used in the bearings.

10.4.7. General Requirements:

a) Thickness of a single layer bearing shall not exceed 20 percent of the least plan dimension. The total thickness of a laminated bearing shall not exceed 40 percent of the least plan dimension.

b) Thickness of any internal layer of elastomer shall not be less than 6 mm, nor greater than 12mm.

c) The thickness of outer plates shall not be less than 3 mm and that of inner plate not less than 1.5 mm. Metal plates in which dowels are located shall be in general, not less than 6mm thick. The edges of all plates shall be slightly rounded to approximately 15mm radii. The metal plates referred above should not be composed of thinner plates joined together.

d) Lamination bearing shall have side cover of elastomer of minimum thickness of 6mm to protect the ends of the steel plates and to give a reduced surface to that accruing at the edge of the bonded plates but shall not be considered in evolution of deformations. The cover of elastomer at the top and bottom surfaces neither be less than 3 mm nor more than half the thickness of internal layer. The outer cover at top and bottom surfaces, having thickness less than half of that of a single internal layer and not exceeding 3mm, may be considered as sample protection and need not therefore be considered in calculating deflections. Where the above elastomer covers are provided, there is no objection to keep the thickness of top most and bottom most plates same as that of inner plates.

e) Bearing shall be set back from the edge of a bearing surface at a distance not less than the thickness of the layer of Elastomer in contact with the bearing surface to allow for spreading of the elastomer under load.

f) Bearing may be located in position by means of dowel or studs or other devices, or bonded to the structure with approved adhesives which shall generally be of the high viscosity resin type, cold setting and free from solvent.

g) For spans on an inclined grade and without hinge bearings, the sole plates shall be provided and the same beveled so that the concrete surfaces and the bearing shall be kept horizontal.

h) The plan dimensions of the bearings to be finally adopted shall preferably be selected from series 'R'20 of IS:1076 –1967.

i) The arrangement of placing only one bearing under a girder shall be permitted. Further, bearing of different sizes shall not be placed next to each other to support a span.

j) The bearing shall be fully moulded when metal laminations are used. These laminated elastomeric bearings shall consist of one or more elastomer slabs bonded to metal plates so as to form a sandwich arrangement. Such fully moulded bearing shall be manufactured to required size.

k) The bond between elastomers and metal or fabric shall be such that, when sample is tested for separation, failure shall occur within the elastomers and not between the elastomer and metal or fabric.

10.4.8. Inspection and Testing:

a) The contractor shall, whenever required during the course of manufacture, arrange and offer all facilities for the purpose of inspection and test of all or any of the materials used- therein, by any officer directed by the Engineer-in-charge on the bearings. OR similar parts shall not be used in the superstructure except on the production of certificate of acceptance there of from the Directorate of Inspection whenever necessary. All the inspection charges shall be payable by the contractor.

b) The contractor shall get the bearings tested for physical properties and performance of bearings. The test pieces required for the test shall be selected, from the central layer of bearing. For the size of the test pieces, methods of tests etc., the relevant MOST standard shall be followed. All the necessary tests as may be required shall be followed.

All the necessary tests shall be carried out in laboratory approved by the Engineer-in-charge. Specimens or test as may be required shall be supplied by the contractor at his cost and testing charges shall also be fully borne by the contractor. Only those bearings which pass the tests satisfactorily will be accepted and will be permitted to be used. The Engineer-in-charge will not accept any responsibility for the cost of bearing rejected.

10.4.9. Protection against Corrosion:

Proper arrangement shall be made by the contractor to avoid corrosion of metal plates or deterioration of adhesive, by encasing the bearings totally in elastomer or by some other method approved by the Engineer-in-charge.

10.4.10. Fixing in Position:

a) When bearing assemblies on plates are shown on the drawing to be placed (not embedded) directly on concrete, the concrete bearing area shall be constructed slightly above grade and shall be finished by grinding.

b) It shall be ensured that bearings are set truly leveled and in exact position as indicated on the drawing so as to have full and even bearings on the seat. Thin mortar pads (not exceeding 12mm) may be made to meet with these requirements.

c) It shall be ensured that the bottoms of the girders to be received on the bearings are plane at the location these bearings and care shall be taken that the bearings are not displaced while placing the girders.

d) Before fixing the elastonueric bearings, the concrete surface on which the bearings are not to be placed shall be finished with wood float to a level plane which shall not carry more than 1.5 mm from a straight edge placed in any direction across the area.

e) The position of the bearing shall be accurately marked on the pier/ abutment cap and the area where the bearings are to be located leveled accurately.

f) The concrete surface shall be free from any loose material and cleaned of any grease, oil, paint etc., and it shall be dry at the time of fixing.

g) The surface of elastomer shall be free from any foreign material.

h) Once prepared, the concrete are elastomer shall not be touched with bare hand.

i) The bearings shall be covered with canvas or suitable covering material to protect them from direct sun light and weather until the concrete of superstructure is cast.

j) The bearing shall be fixed in position with epoxy resin adhesive of approved quality.

k) The concreting of super structure shall be taken up only after the ensuring that the adhesive for finding the bearings on pier / abutment cap has set.

10.4.11. Tolerances:

The tolerances given in table 2000-2 of MOST shall apply.

10.4.12. Measurement and Payment:

a) Measurement for payment of elastomeric bearing, shall be on the basis of cubic content measured in cubic centimeter of bearing pads actually fixed in position or each as specified in schedule 'A'.

b) The rate of each type of bearing shall include the cost of supplying including labour, material, equipment , cost of anti corrosive applications, cost of samples and their testing as directed by the Engineer-in-charge, the cost of adhesive for fixing them, fixing the bearing in position and also costs of all operations necessary to complete the work as per the drawings.

10.5 REINFORCED CEMENT CONCRETE PIPE:

10.5.1 Applicable Publications:

1.	IS : 458-1988 (Third Revision)	Specifications for concrete pipes (with and without reinforcement)
2.	IS:783-1985 (First Revision)	Code of practice for laying of concrete pipes.
3.	IS:9766-1981	Flexible PVC compounds

4.	IS:6066-1984 (First Revision)	Recommendations for pressure grouting of rock foundation in river valley projects.
5.	IS:1838-1983 (First Revision) Part - I	Specification for preformed fillers for expansion joints in concrete pavements and structures (non-extruding and resilient type) bitumen impregnated fibre.
6.	IS: 3597-1985 (First Revision)	Methods of test for concrete pipes
7.	IS:5382-1985 (First Revision)	Rubber sealing rings for gas mains water mains and sewers
8.	IS:5751-1969	Precast coping blocks

Other Publications:

Ministry of Shipping and Transport No. 7900. Specification for road and bridge works

In addition to the above I.S.codes, revisions and , latest amendments of the codes ,the specifications of A.P.S.S and manual for Quality Control and Inspection. shall also be compiled with.

10.5.2. Scope:

The scope for items include supply laying and joining reinforced cement concrete pipes including collars of the diameter and lengths required at the locations as shown on the drawings or as ordered by the Engineer-in-charge and in accordance with the requirements of these specifications.

10.5.3. Supply of Pipes:

a) Pipes shall be of specified diameter, NP class conforming to IS:458-1988 minimum length of the pipe shall not be less than 2.5 meters. The contractor shall order and supply the pipes for the work on the basis of the drawings.
The following information shall be clearly marked on each pipe for acceptance.

i. Class of pipe
ii. Date of manufacture
iii. Name of the manufacturer or his registered trade mark or both, and
iv. I.S.I. certification mark.

10.5.4. Handling and Laying of Pipes

a) Work shall be done as per IS:783-1985 or its latest editions.

b) Reasonable care shall be exercised, in loading, transporting and unloading of concrete pipes. Handling shall be such as to avoid impact .

c) All pipe sections and connections shall be inspected carefully before being laid. Broken or defective pipe shall not be used

d) Trench shall be of sufficient width to provide a free working space on each side of the pipe. The free working space shall be preferably, not more than $1/3^{rd}$ of the diameter of the pipe and not less than 15cm on either side.

e) Pipes shall be lowered in to the trenches carefully by mechanical appliances.

f) Pipes shall be laid true to line and grade as shown on drawings.

g) Laying of pipe shall always proceed upgrade of as slope. If the pipes have Spigot and Socket joints, the socket ends shall face upstream. In case of pipes, with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.

h) The sections of the pipes shall be joined together in such a manner that, there shall be as little unevenness as possible along the inside of the pipe.

i) In no case pipe shall be laid directly on rock or any such hard material.

j) No pipes shall be placed in position until the foundations have been approved by the Engineer-in-charge.

10.5.5. Jointing of Pipes:

Semi-flexible type joint as per IS:783-1985 and as shown on the drawing shall be provided. The rubber sealing rings used in the joint shall conform to type 1 A of IS:5382-1985. A rubber ring shall be placed on the SPIGOT which shall be forced into the socket of the pipe previously laid. This shall compress the rubber ring as it rolls into angular space formed between the two surfaces of the spigot and socket so as to form a flexible and water TIGHT joint. The recess at the end of the pipes shall be filled with the cement mortar (1:2). Every joint be kept wet for about 14 days.

10.5.6. Back Filling of Trenches:

a) Trenches shall be kept free from water until the material in the joints has hardened. Walking / working on the completed pipe shall not be permitted until the trench has been back filled to height of at least 45cm over the pipe except as may be necessary for back filling and compaction.

b) Trench shall be back filled after pipe has been laid subject to the condition that jointing material has hardened. Only selected material shall be used for back filling. Filling of the trench shall carried out simultaneously on both sides of pipe in such a manner that unequal pressure dies not occur.

c) The cement concrete for pipe bedding and around joints shall be provided as per drawings. The specifications of concrete mix shall be as per the relevant specification No. 4.0

10.5.7 Measurement and Payment

Measurement, for payment ,will be on running meter basis on the pipe line laid including joints. The rate per R.M. of pipe in schedule 'A' shall include the cost of pipes and collars including loading unloading, hauling, handling, storing, laying in position, cost of rubber rings jointing and curing including back filling and all other operations to complete the work as per the specifications.

Concrete for bedding shall be paid separately based on the quantity laid at relevant rate in schedule 'A' on cubic meter basis.

10.6 PUDDLE CLAY

10.6.1 Scope: puddle clay made from impervious soils and laid around pipe barrels to reduce seepage.

Requirements:

The material used for these purposes, shall be impermeable, free from excessive shrinkage and swelling, shall resist erosion and have adequate stability. As for as possible, G-C or S.C, materials shall be used .

Laying:

The ma0terial shall be mixed with water on the previous day .Next day morning it shall be well mixed and worked with mamoties till it can be formed into stiff plastic balls. Material so mixed shall be carried in baskets to where it is to be laid and deposited in layers of 150mm thick and shall be well rammed in position with wooden or iron rammers. The finished surface of morum shall be left untouched until it dries up and does not show signs of yielding.

Measurement: Dimensions shall be measured to the nearest 0.01 meter and volume worked out to the nearest 0.01cum.

Rate:

The rate shall be for a unit of 10cum and shall include all operations of quarrying, transporting, watering, mixing, puddling and laying in a position, ramming etc., complete. The rate shall include cost and conveyance of water and earth with all leads, lifts and delifts and all other operations necessary to complete the finished item of work as per drawings and as directed by the Engineer-in-charge.

10.7. PROVIDING AND FIXING IN POSITION 25MM EXPANSION JOINTS WITH 300MM WIDE PVC WATER STOPPERS AT JOINTS IN BARRELS AND WING WALLS ETC., INCLUDING APPROVED JOINT FILTER.

10.7.1 General :

a) Polyvinyl chloride (PVC) water stops shall normally have a center bulb of 12.4mm inside diameter and 25mm outside diameter. It shall be 300mm width and shall have minimum of 2 or 3 longitudinal ribs on each side of the bulb evenly distributed between the bulb

and the edge of the water stop. Each rib being 6.35mm high and the rib adjacent to the center bulb shall have web thickness 12.5 mm and the rib adjacent to the edge shall have a web thickness of 10mm and the contractor however, will be permitted to use water stops of any alternative manufacture, such as water stops with diamond shape and bulb provided, they conform to the specifications and the functional and constructional requirements. For this purpose, the contractor shall submit to the Engineer-in-charge for approval, four sets of drawings showing details of the water stops, including dimensions, shapes and details of intersections and splices between water stops of the same size and of different sizes. Fabrication and procurement of materials shall be made only of the approval of the drawing by the Engineer-in-charge. Any fabrication or procurement of material performed prior to approval of the drawings shall be at the contractor's risk. The Engineer-in-charge shall have the right to ask the contractor to make any changes in the drawings which may be necessary to make the finished installation conforming to the requirements and intent of these specifications without additional cost. Approval by the Engineer-in-charge to the contractor's drawings shall not relieve the contractor of his obligation to meet all the requirements of these specifications or of the responsibility for the correctness of the contractor's drawings.

b) One set of the above drawings will be returned to the contractor either approved , disapproved, or conditionally approved and these shall be resubmitted to approval, if so directed.

c) The water stops shall be dense, homogeneous and free from holes and other imperfections. The water stops shall meet the material and test requirements given hereinafter. The cross section of the water stops shall be uniform along its length and the thickness shall be symmetrically transverse. Tolerance for the dimensions given above shall be +5mm in width, +2mm in thickness and +1mm for other dimensions.

d) Certified copies of the laboratory test report on the physical properties of the PVC water stops and a certificate stating that PVC water stops as furnished, meeting with all other requirement of those specifications be obtained by the contractor from the manufacturer of the PVC water stops and shall be submitted to the Engineer-in-charge for approval. Three 1.5meter long samples of the PVC water stops shall be obtained by the contractor from the supplier and shall be submitted to the Engineer-in-charge. These samples shall be furnish at least 60 days prior to embedment of any water stops in the structures.

e) The contractor shall arrange to obtain the water stops from the suppliers in rolls securing packed, containing a single length is not less than twelve linear meters and having inside diameter of not less than 0.3mters.

10.7.2. Materials :

a) The PVC water stops shall be fabricated by an extrusion process from an elastomeric plastic compound, the basic resin of which shall be virgin polyvinyl chloride. No reclaimed polyvinyl chloride shall be used.

b) The compound shall contain any additional resins plastisizers, inhibitors or other materials, needed to ensure that the finished product will have the following physical characteristics.

i)	Tensile strength minimum	116Kg/sq.cm
ii)	Ultimate elongation minimum	300 %
iii)	Tear resistance minimum	49 kg/sq.cm
iv)	Stiffness in flexure minimum	24.6 kg/sq.cm
v)	Accelerated extraction	24.6 kg/sq.cm

vi) When tested in accordance with the effect of alkali test as described in the following paragraphs, the material shall not show an increase in weight of more than 0.25 percent or a loss in weight of more than 0.10 percent after 7 days, or more than o.40 percent increase in weight of more than 0.30 percent loss in weight after 28 days. After 28 days immersion the dimensions of the samples shall not differ from those of original sample by more than that 1.0 percent. After 7 days immersion, the Durometer hardness reading of the sample shall not differ by more than ± 5 from reading the original sample.

vii) When tested in accordance with the cold bend test described in the following paragraph, the material shall show no signs of cracking or hipping.

10.7.3. Inspection and Tests :

a) All water stops shall be subject to laboratory tests before transport. Samples of the finished water stops and material for test shall be furnished to the Engineer-in-charge. All tests shall be made by and at the expense of the contractor.

b) Samples for laboratory tests to determined physical properties of the compound shall be taken in accordance with the random process to obtain following number of test units from each lot received.

Size of Lot Received	**Number of Test Unit**
45 linear meters	1
45 to 90 linear meters	2
90 to 450 linear meters	4
450 to 900 linear meters	8
over 900 linear meters	15

c) Laboratory tests to determine physical properties of the water stops required to be furnished under these specifications shall be performed test specimen cut from test units taken from the finished products. The contractor shall furnish the specimens at his cost for tests at places as directed.

d) Tests shall be conducted in accordance with the following methods:

i. Tensile strength ASTM designation D 638
ii. Elogation – ASTM Designation D 638
iii. Durometer hardness – ASTM Designation D 2240 (Type A)
iv. Accelerated contraction test
v. Effect of alkali
vi. Cold bend test
vii. Impact resistance

10.7.4 Installation :

a) Location and embedment of the PVC water stops shall be shown on the drawings with approximately One-half of the width of the water stop embedded in the concrete on each side of the joint. In order to eliminate faulty installation that may result in leakage. Care shall be taken that the water stops are correctly position and secure during installation. All water stops shall be installed so has to form a continuous water tight diaphragm in the joint, unless otherwise shown. Adequate provision shall be made to completely protect the water stops during the progress of the work.

b) Additional vibration, over and above that used for adjacent concrete placement shall be carried out to assure complete embedment of the water stop in the concrete. Larger pieces of aggregate near the water stop shall be removed by hand during embedment to assure complete contact between the water stop and the surrounding concrete. Splices in the continuity or at the intersection of junctions of PVC water stops shall be performed by heat sealing the adjacent surface in accordance with the manufacturer's recommendations. A thermostatically controlled electric heat source shall be used to make all splices. The correct Temperature at which splices should be made will differ with the material compounds but should be sufficient to melt. All splices shall be neat with ends of the joined water stops in true alignment. A meter box guide and portable saw shall be provided and used to cut the ends to be joined to ensure good alignment and contact between joined surfaces. After splicing a remoulding Iron with ribs and corrugations to match the pattern of the water stop shall be used to reform the ribs at the splices. The continuity of the members of the cross sections of the water stops (ribs, tubular center axis, protrusions and the like) shall be maintained across the splices.

c) Where splices are required between water stops of different sizes, the splices shall be made as recommended by the manufacturer of the water stops and the drawings showing the details of the splices shall be submitted to the Engineer-in-charge for approval as required in paragraph 'General' above.

d) Prior to embedment, the edges of the water stops shall be secured to looped wire in the end bulbs to improve the concrete bond has shown on the drawings. The bars shall conform to the provisions of specification 4.20 'Reinforcement'. The manner in which the water stop is secured to the reinforcing bars shall be subject to approval.

10.7.5. Measurement and Payment:

Measurement for furnishing and placing PVC water stops shall be made along the center line of water stops payment shall be made at the applicable unit rate for one running meter rate in the schedule 'A', with no allowance for lap at splices and inter sections.

The unit rate shall include the cost of making splices and intersections and of furnishing all labour , equipment , and materials required for installing the water stops and protecting the water stops from damage during the progress of the work. The unit rate shall also include the cost of preparing and submitting the drawing, producing samples for approval of the Engineer-in-charge and cost of all incidental work needed to complete the work as per the specifications.

10.7.6 PROVIDING WEEP HOLES :

Providing Weep holes as shown on the drawings and providing filters and jali as per the drawings including cost of materials and labour charges complete.

10.8.1 General:

a) Rectangular Weep Holes:

Weep holes of size 75mm wide and 150mm high or of circular pipe size of 100mm diameter as shown on the drawings shall be provided and they shall extend through the full width of the masonry with a slope of about 1 vertical to 20 horizontal towards the draining face to drain moisture from the back filling. The spacing of holes shall be as per the drawings, in either direction staggered. The sides and bottom of weep holes in the interior shall be made up in the stones/ concrete having fairly plain surface and channel so formed slabbed over with stones/ concrete lintels not less than 150mm on each side.

In stone masonry, generally the height of weep holes shall be the same as the height of the course in which they are formed as directed by the Engineer-in-charge. Filters behind weep holes with jali shall be provided to the dimensions and grades as shown on the drawings.

b) In case of pipes, where the length of pipe falls short of the required length, it shall be joined with necessary collars in CM 1:3 or as directed by the Engineer-in-charge to form a continuous hole in the body of wall.

c) Defective work shall not be paid. The interior of the weep holes shall be free from all sand , mortar, stone pieces, dirt and other foreign matter. Care shall be taken to prevent entrance of any foreign matter into the weep holes during process of the work.

10.8.2 Measurement and Payment:

Measurement for payment of weep holes shall be on the basis of numbers actually formed. The payment will be made at the rate tender in schedule 'A' for each weep hole.The rates shall include cost of furnishing all materials, transporting, storing, testing, laying, fixing including jali pipes, filter as shown on the drawings and cost of all incidental operation charges for carrying out the work in accordance with the specifications.

10.9 PROVIDING AND LAYING 100 MM INTERNAL DIAMETER G.I. PIPE DRAINAGE SPOUTS INCLUDING NECESSARY CAST IRON GRATING AS PER DRAWINGS FOR ROAD BRIDGES.

10.9.1 Scope:

The waterspout shall be 100-mm internal dia G.I pipe. The pipe shall be of medium grade used for domestic water supply conforming to IS: 1239(Part.1)1979 and shall also bear the mark of certification issued by the Bureau of Indian Standards. The wall thickness shall be 4.5 mm. The spouts shall project at least 10 cm outside the concrete at the entry of the waterspout and shall be rigidly fixed. A cast iron grating shall be provided at the entry of the waterspout and shall be fixed in the recess so as to be flush with the road surface. The grating shall be painted with two coats of anticorrosive black bitumen paint. The quality and size of the grating shall be got approved from the Engineer-in-charge.

10.9.2 Measurement and Payment:

Measurement for payment shall be per number of water spouts fixed. Payment at the unit rate mentioned in schedule 'A' shall include cost of all materials, labour, tool, and incidental operations to complete the work as per the specifications.

10.10. PROVIDING ARCHITECTURAL COPING SLABS OF 150MM THICK WITH CEMENT CONCRETE OVER WING/RE TURN/ PARAPET WALLS WITH CEMENT MORTAR MM 7.5.

10.10.1. Scope :

a) The coping slabs shall be precast with M-10 grade concrete using not less than 220.00 kgs. of cement per cubic meter of concrete with machine crushed graded aggregate of 40mm maximum size.

b) The precast slabs shall be cured at least for 28days prior to transporting to site of fixing.

c) For fixing cement mortar of MM-7.5 grade shall be laid evenly to an average thickness of 15mm to the full width of top of the wall and the slabs be fixed. The joints shall be pointed with cement mortar MM-10 mix.

d) Measurement and Payment shall be on one cubic meter basis at tender rate in schedule 'A' which shall include cost of materials precasting, curing, storing, transporting, fixing including cost of cement mortar for fixing and pointing and all other incidental charges for completing the work as per specifications.

10.11.RAILINGS:

10.11.1 General:

Railings shall not be placed until the centering or false work for span has been released and the span is self-supporting.

The type of railing to be constructed shall be as shown on the drawing.

The railing shall be carefully erected true to line and grade. Posts shall be vertical within a tolerance not to exceed 6mm in 3 meters.

10.11.2 Metal Railing:

All pips used for railing shall be wrought iron, and all steel elements shall be galvanized.

All complete steel rail elements, terminal sections posts, bolts, nuts, hardware and other steel fittings shall be galvanized or painted with approved paint.

If galvanized, all elements of the railing shall be free from abrasions, rough, sharp edges and shall not be kinked or bent. If straightening is necessary it shall be done by methods approved by the Engineer-in-charge.

The railing shall be carefully adjusted prior to fixing in place to ensure proper matching at abutting joints and correct alignment and camber throughout their length. Holes for field connections shall be drilled with the railing in place in the structure at proper grade and alignment. Welding may be substituted for riveting in field connections, only with the approval of the Engineer-in-charge.

Unless otherwise specified on the drawings metal railing shall be given one shop coat of paint and three coats of paint after erection if sections are not galvanized.

10.11.3. Cast-in Situ Railing:

a) The portion of the railing or parapet which is to be cast in place shall be constructed in accordance with the requirements for cement concrete for structure in specification 4.0.

b) Forms shall either be of single width boards or shall be lined with suitable material duly approved by the Engineer-in-charge. Forms joints in plane surface will not be permitted.

c) All mouldings, panel work and level strips shall be constructed according to the details shown on the drawings. All corners in the finished work shall be true, sharp and clean-cut and shall be free from cracks, spalls or other defects.

10.11.4. Precast Railing:

a) Any precast member that becomes chipped marred, or cracked before or during Precast members of railing shall be reinforced cement concrete and shall conform to the specifications given in section 4. The precast members shall be removed from the moulds as soon as practicable and shall be kept damp for a period, of atleast 21 days. During this period they shall be protected from sun and windthe process of placing shall be rejected.

10.11.5 Measurement of Payment :

Railing shall be measured in running meters. The rate of railing in schedule 'A' shall include the cost of all labour , material, tools and plant required, for doing the work complete in all respects in accordance with above specifications and as shown on the drawing.

10.12.5 ELASTOMERIC SLAB SEAL EXPANSION JOINT :

1. Materials :

a) Steel inserts shall conform to IS:226. Use of any other materials like fiberglass or similar material shall not be permitted.

b) Elastomer for elastomeric slab unit (ESU) shall conform to clause 915.1 of IRC : 83 (Part II), compounded to give hardness IRHD 60±5, subject to the following additional stipulations :

i. Chloroprene (CR) only shall be used in the manufacture of elastomeric expansion joints. No reclaimed/ natural rubber or vulcanized wastes shall be used.

ii. The Chloroprene material used in the manufacture of elastomeric (expansion joints) shall be Neoprene WRT, Bayprene 110, Skyprenne B5 or Denka S-40V.

iii. Chloroprene content of the compound shall not be lower than 60 percent by weight. The ash content shall not exceed 5 percent (as per tests conducted in accordance with ASTM D-297 for (I) and (ii) above.

iv. EPDM and other similar candidate elastomers for expansion joints shall not be permitted.

c) Elastomeric plugs.

d) Spacer bars, marked with centre to centre distance of fixing holes.

e) Fixing bolts and nuts made of stainless steel.

f) Anchor bars comprising hooked anchor stiffeners welded with lower steel inserts and sinusoidal anchor bars welded with horizontal leg of the edge steel inserts. The elaborate anchoring arrangements of steel inserts shall be permanently welded / tied with the steel reinforcement.

2. Fabrication :

a) Steel inserts shall be grit blasted and provided with epoxy paint.

b) Edges of reinforcing steel sections shall be rounded.

c) Expansion joints shall be fully moulded to the required size in one single vulcanizing operation including the encasing layers as integral and homogeneous part.

d) Tolerances of fabrication shall be as follows :

i) Plan dimension - > ± 5 mm

ii) Total Height - > ± 5 mm

3. Supply and Handling :

i. The contractor shall supply all steel – reinforced elastomeric expansion joints including bolts, nuts, sealant, plugs and all other accessories for the effective installation of the joints including angled jointing sections for kerbs.

ii. Expansion joint material shall be handled with care and stored under cover by the Contractor to prevent damage, any damage occurring after delivery shall be made good at the expense of the Contractor to the satisfaction of the Engineer.

4. Installation :

4.1 Expansion joints shall be installed as per approved drawing, Steel inserts, spacer bars, concreting of pockets, fixing of elastomer slab unit and presetting, etc., shall be done as per the following:

a) Steel inserts

i. Deck casting shall be done leaving pockets or recess for steel inserts and anchors of the expansion joint as per drawing.

ii. Steel inserts shall be lowered at the appropriate location inside the pocket.

iii. The top of the insert shall be flush with the finished level of wearing course maintaining the camber.

iv. Spacer bars, duly set appropriate to the month of installation, shall be fitted under proper supervision.

v. Anchor rods shall be tied / welded with the existing deck main reinforcement, manufacturing level and alignment.

vi. Welding between anchor rods and deck reinforcement is preferable, if welding is not possible, strong steel tie wire shall be used for fastening, under proper supervision.

b) Spacer Bar

i. Spacer bars shall be used to ensure proper positioning of bolts and also leveling of the steel inserts during fixing of the same with the deck reinforcement and casting second stage concreting in the pocket thereafter.

ii. The 2^{nd} stage concreting operation shall preferably be started within 24 hours of fixing the steel inserts. In such cases, spacer bars should be removed just after concreting is finished. If there is a substantial time lag between fixing of inserts and concreting, then any one of the following methods shall be adopted, depending on the support condition:

a. For simply supported bridge resting on simple elastomeric bars, (with no dowel pins), insert shall be placed in position with spacer bars at every alternate joints. Such joints shall be called restrained joints hereafter. In other words, insert shall not be fixed simultaneously longer period at such restrained joints. Spacer bars shall be removed after concreting of such restrained joints and inserts placed in position with spacer bars at the other unrestrained joints thereafter.

b. For bridges resting on other than elastomeric bearings (including bearings with dowel pins at one end), after placing and aligning the inserts and securing the same, the spacer bars shall be removed. Concreting shall be done with great care so that inserts are not dislocated or distorted.

While removing the spacer bar after concreting, one must take care to see that the concrete is not damaged during withdrawal of spacer bar . If the spacer bar happens to be snugly fitted, it shall not be pulled by any means, it shall be gas cur in two pieces and then removed.

c) Concreting of Pockets :

i. Concreting of pocket shall be done with great care using proper mix conforming to grade similar to that of the deck casting besides ensuring efficient bonding between deck and steel insert. Also proper care shall be given for ensuring efficient bonding with the already cast concrete.

ii. Needle vibrators shall be used. Care shall be taken so that the position of steel insert is not disturbed during vibration.

iii. Spacer bar shall be removed within an appropriate time before the joint is required to permit movement.

d) Fixing of Elastomeric Slab Unit (ESU)

i. Special jig shall be used to preset the ESU during installation.

ii. ESU (mounted on the jig, if preset) shall be lowered to position

iii. The line and level on the ESU should be adjusted.

iv. ESU shall be removed and coated with special adhesive.

v. ESU shall be placed in position again, ensuring waterproof joining at required faces.

vi. ESU shall be tightened with stainless steel nuts and lock washers in position. Tightened nuts shall be locked with lock washers.

vii. Special sealent shall be poured inside the plug holes.

viii. The elastomeric plugs shall be pressed in position after applying adhesive on the appropriate surface.

ix. ESU shall be fitted in position after completion of wearing course. White completing this part of the wearing course, adhesive care shall be taken to ensure a waterproof jointing with the already existing wearing course.

e) Pre-Setting:

i. The main purpose of presetting of the steel inserts at the time of its installation is to ensure as closely as possible the condition that in the long run at the mean average annual temperature, the ESU remains at its nominal state.

ii. Major factors responsible for changing the longitudinal length of the bride superstructure are indicated below:

a) Temperature variation from annual mean.

b) Changes due to shrinkage of concrete.

c) Changes due to elastic shortening and creep of the prestressed bridge superstructure.

d) Deformation of superstructure and substructure, if any.

Resultant changes in expansion……. gap due to first factor ca occur in both directions from any pre-selected mean position whereas changes due to creep and shrinkage are un-directional such that the expansion gap continuously increase with passage of time.

The steel insert unit of expansion joint can be fixed in any month of the year. As stated earlier, the expansion gap between bridge superstructure may vary from time to time, hence the initial fixing distance between fixing points will obviously depend on the month of installation of steel insert. The c/c distance between stainless steel fixing of bolts as indicated in the drawing can be taken as only nominal. The same shall be modified by presetting depending on :

i. The difference between the mean temperature of the month of fixing steel insert and the annual average temperature.

ii. The elapsed period between the casting and/ pre-stressing and fixing of steel insert for calculating the remnant creep and shrinkage.

4.2 Special Requirements for Installation:

i. Prior to construction of bridge deck area adjacent to the joint, the supplier shall provide detailed working drawings showing the location of all bolts, recesses and holes necessary for the installation of the joint. Reinforcing bars in superstructure shall be amended as required to ensure that there will be no interference in the installation of the joint.

ii. All bearing surfaces and recesses which are in contact with the joint assembly shall be checked with a straight edge to ensure fitness of profile.

iii. No holes shall be drilled for fixing bolts within 7 days of concreting holes for the bolts shall be drilled to the site and depth shown on the drawings.

iv. Sections of the jointing making the completed join shall follow a straight line.

v. The fixing bolts shall not be placed in a position until at least 4 weeks alter

vi. stressing in completed in post-tensioned box or beam and slab structure. Prior to placing sections of jointing, contact surfaces shall be cleaned to remove all grease, tar, paint, oil, mud or any other foreign material that may affect adhesion of the sealant.

vii. Sealant shall only be applied to dry contact surface sufficient sealant shall be applied to the contract surfaces to cause extrusion of sealant when the jointing is fixed in position.

viii. Final scaling of the finished expansion joint shall be completed immediately after completion of installation. All exposed ends, joints between units and other areas of possible leakage shall be filled with sealant. All voids between the sides of the jointing and concrete or plates shall be filled with sealant.

ix. Bolt cavities shall be cleaned and plugged with Neoprene cavity pugs. Prior to placing the plugs sufficient sealant shall be placed in the cavities to cause extrusion of the sealant by the plugs.

x. All excess sealant shall b removed from the jointing and adjacent areas.

5. Acceptance Test:

5.1 As per clause 918.7 of IRC – 83 (Part II) necessary quality control certification by the manufacturer in regard to properties of Elastomer and steel will be furnished.

For severe environment, ozone resistance test as per clause 915.2.3 of IRC : 83 (Part II). Shall be carried out for elastomer. The properties of the elastomer shall conform to Table of clause 915.2 of IRC : 83 (Part II). The acceptance testing for elastomer material

shall conform to clause 918.4.1.2 of IRC : 83 (Part II) with additional criteria as started in S.S. 9.12.4.

5.2. The fabricated expansion joint shall be tested to the following acceptance tests :

i. Routine test. Each expansion joint shall be tested for at least 100 cycles for a test movement which shall be 10 percent more than the design expansion / contraction movement.

ii. In addition to routine test, one out of every 20 expansion joints shall be subjected to the test movement for 4000 cycles.

The lot shall be rejected if the elastomer material shows signs of fatigue or permanent set or distress in the test. The test piece shall not be used in the bridge.

iii. The type test for abrasion resistance shall be carried out for one joint out of every 20 nos. as per IS:3400 (Part 3) and the standard deviation shall be within ± 20 percent.

N.B. The manufacture shall preferably have in-house testing facility. Otherwise, the testing shall be got done by him at his expense at any testing establishment selected by the Engineer.

A manufacturer who cannot carry out the acceptance test shall not be entitled to supply elastomeric slab seal joint.

10.12.6. STRIP SEAL EXPANSION JOINT:

1. **COMPONENTS**

STRIP SEAL EXPANSION JOINT SHALL COMPRISE THE FOLLOWING ITEMS:

a) Edge beams – This special claw leg profiled member shall be of extruded rolled steel section combining good weldability with notch toughness.

b) Strip seal – this shall be of chloroprene with high tear strength, insensitive to oil, gasoline, and ozone, it shall have high resistance to aging. The component, provided to ensure water tightness, shall have bulbous shape of the part of the seal which is inserted into the groove, provided in the edge beam. The seal should be vulcanised in single operation for minimum full length of joint.

c) Rigid anchorage - this shall be welded to the edge beam at staggered distance.

d) Anchor loops - this shall be made of weldable steel connecting the anchorage with deck Reinforcement.

2. MATERIAL

a) Edge beams of this special section are at present being directly imported in India. The steel shall conform to steel grade Rst.37-2 of German standard or equivalent.

b) Chloroprene of strip seal shall conform to clause 915.1 of IRCc:83 (part II). The properties of chloroprene shall conform to Table.

c) Anchorage steel shall conform to IS : 2062

d) Anchor loop shall conform to IS : 2062

Table 1. STRIP SEAL ELEMENT SPECIFICATION

Sealing element is made of chloroprene and must be a extruded section. The working movement range of the sealing element shall be at least 80 mm with a maximum of 100mm at right to the joint and $\pm$ 40mm parallel to the joint.

PROPERTY	SPECIFIED VALUE
Hardness	63 $\pm$ 5 Shore A
Tensile Strength	Min 11 MPa
Elongation at fracture	Min 350 per cent
Tear Propagation Strength	
Longitudinal	Min 10 N/mm
Transverse	Min 10 N/mm
Shock Elasticity	Min 25 per cent

Abrasion	Min 220 mm^3
Residual Compressive Strain	
(22 h/70 deg C/30 per cent strain)	Max 28 per cent
Ageing in hot air	
(14 days/ 70 deg C)	
Change in hardness	Max +5 Shore A
Change in tensile strength	Max – 20 percent
Change in elongation at fracture	Max – 20 percent
Ageing in ozone	
(24 h/50 pphm/25 deg C/20 percent strain)	No cracks
Swelling behavior in Oil	
(116 h/25 per cent C) ASTM Oil no.	
Volume Change	Max 5 percent
Change in hardness	Max 10 Shore A
ASTM Oil no.3	
Volume Change	Max 25 per cent
Change in hardness	Max 20 Shore A
Cld Hardening Point	Min –35 deg C

3. Fabrication (Pre-installation)

a) Rolled steel profiles for edge beam shall be along enough to cater for a 2-lane carriageway. These shall be cut to size of actual requirements by means of a miter box saw. Alignment of the cut-to-size steel profiles shall then be made in accordance with the actual bridge cross-section on work tables. For this purpose, the contour of bridge cross-section shall be sketched onto these tables. After the steel profiles are aligned, they will be checked to the tables by means of screw clamps and tacked by are welding.

b) Anchor plates shall be cut to the required size by gas cutting. These shall be welded to the edge beams.

c) Anchor loops shall be bent to the required shape and welded to anchor plates.

d) The finally assembled joints shall then be clamped and transported to the work site.

4. **Handling and Storage.**

a) For transportation and storage, auxiliary brackets shall be provided to hold the joint assembly together.

b) The manufacturer shall supply either directly to the Engineer or to the Bridge Contractor all the materials of strip seal joins including sealants and all other accessories for the effective installation of the jointing.

c) Expansion joint material shall be handled with care. It shall be stored under cover on suitable lumber padding by the Contractor to prevent damage. Any damage occurring after delivery shall be made good at the Bridge Contractor's expense to the satisfaction of the Engineer.

5. Installation

5.1 The width of the gap to cater for movement due to thermal effect, prestress, shrinkage and creep, superstructure deformations (if any) and sub-structure deformations (if any) shall be determined and intimated to the manufacturer. Depending upon the temperature at which the joint is likely to be installed, the gap dimension shall be preset.

5.2 Taking the width of gap for movement of the joint into account, the dimensions of the recess in the decking shall be established in accordance with the drawings or design data of the manufacturer. The surface of the recess shall be thoroughly cleaned and all dirt and debris removed. The exposed reinforcement shall be suitably adjusted to permit unobstructed lowering of the joint into the recess.

5.3 The recess shall be shuttered in such a way that dimensions in the joint drawing are maintained. The formwork shall be tight.

5.4 Immediately prior to placing the joint, the presetting shall be inspected. Should the actual temperature of the structure be different from the temperature provided for presetting, correction of the presetting shall be done. After adjustment, the brackets shall be tightened again.

5.5 The joint shall be lowered in a pre-determined position. Following placement of the joint in the prepared recess, the joint shall be leveled and finally aligned and the anchor loops on one side of the joint welded to the exposed reinforcement bars of the structure. Upon completion, the same procedure shall be followed for the other side of the joint. With the expansion joint finally held at both sides. The auxiliary brackets shall be released, allowing the joint to take up the movement of the structure.

5.6 High quality concrete shall then be filled into the recess. The packing concrete must feature low shrinkage and have the same strength as that of the superstructure. but in any case not less than M 35 grade. Good compaction and careful curing of concrete is particularly important. After the concrete has cured. the movable installation brackets still in place shall be removed.

5.7 Rolled up neoprene strip seal shall be cut into the required length and inserted between the edge beams by using a crow bar pushing the bulb of the seal into the steel grooves of the edge beams. A landing to a bead shall be formed in the thickened end of the edges of the seal which would force the thickened end against the steel beam due to wedge effect when the strip seal is buttoned in place.

5.8 As soon as the concrete in the recess has become initially set, a sturdy ramp shall be placed over the joint to protect, the exposed steel beams and neoprene seals from site traffic. Expansion joint shall not be exposed to traffic loading before the carriageway surfacing is placed.

5.9 The carriageway surfacing shall be finished flush with the top of the steel sections. The actual junction of the surfacing/wearing coat with the steel edge section shall be formed by a wedge shaped joint with a sealing compound. The horizontal leg of the edge beam shall be cleaned beforehand. It is particularly important to ensure thorough and careful compaction of the surfacing in order to prevent any premature depression forming in it.

Acceptance Test

i) All steel elements shall be finished with corrosion protection system.

ii) For neoprene seal, the acceptance test shall conform to the requirements stipulated in Table 2600-I. It shall also be stretch tested. If a manufacturer is so supply this type of joint, they will have to produce a test certificate accordingly conducted in a recognized laboratory in India or abroad.

iii) In view of the importance of the built up edge beams, special investigation of fatigue strength of this section with anchorages to withstand 2×10^4 load change cycles without showing signs of damage, will be required. The supplier shall have to produce a test certificate in this regard. conducted in a recognized laboratory in India or abroad.

iv) The manufacturer shall produce test certificates indicating that anchorage system had been tested in a recognized laboratory to determine optimum configuration of anchorage assembly under dynamic loading.

v) The manufacturer shall satisfy the Engineer that water tightness test for the type of joint has been carried out in a recognised laboratory to check the water tightness under a water pressure of 4 bars.

vi) As strip seal type of joint is specialised in nature, generally of the proprietary type, the manufacturer shall be required to produce evidence of satisfactory performance of this type of joint.

10.12.7.TESTS AND STANDARDS OF ACCEPTANCE

The materials shall be tested in accordance with these specifications and shall meet the prescribed criteria.

The work shall conform to these specifications and shall meet the prescribed standards of acceptance.

10.12.8. MESUREMENTS FOR PAYMENT

The expansion joint shall be measured in running meters. For filled joints, the rate per running meter shall include the cost of sealant for the depth provided in this drawing.

10.12.9 RATE

The contract unit rate shall include the cost of all material, labour, equipment and other incidental charges for fixing the joints complete in all respects as per these specifications in the case of Bridge Contractor supplying the expansion joint. If the manufacturer supplies the expansion joint directly to the Engineer, the cost of installation, handling and fixing shall be borne by the Bridge Contractor.

SCHEDULE-D

MATERIALS AND WORKMANSHIP

1. General

1.1.1 a) No Material shall be used for construction in any work until notice has been given by the Executive Engineer that the test results are satisfactory. No oral instruction should be followed.

b) Recommendation of stacking and storage of construction materials at site shall be in accordance with IS:4082-1977.

c) To be of the best Quality:- All materials, and workmanship shall be the best of their respective kinds for the class of work described in the contract specifications and schedule. The word 'best' as used in the specifications shall mean, that in the opinion of the Executive Engineer their is no super quality of material are finished or articles on the market and that there is no better class of workmanship available for the nature of particular item described in the contract schedule. The contractor shall upon the request of the Executive-Engineer, furnish him with the vouchers to prove that materials are such as are specified.

1.1.2. The tenderer has to do his own testing of materials and satisfy himself that they conform to the specifications of respective I.S.I. codes, before tendering.

1.1.3. The contractor shall himself procure the required construction materials of approved quality including the earth for formation of embankment and water from quarries/sources of his choice. All such quarries/sources of materials required for the work shall be got approved by the Engineer-in-charge in writing well before their use on the work. The materials as per standards of relevant I.S.I. codes only will be accepted.

1.2 Samples

1.2.1 The representative samples of all materials should be procured by the contractor and arrange to send them to the Engineer-in-charge for conducting pre-construction tests and approval duly informing the source of materials from where he has collected the samples.

1.2.2 The raw and processed samples should be supplied at the contractor's expense to the Engineer-in-charge within 14 days after signing of the agreement. For testing of samples a maximum of 60 days time will be required. Each sample shall approximately consist of 100 kgs. of materials, or as directed by the Engineer-in-charge.

1.2.3 If the contractor desires to change the source of materials, he shall supply the raw and processed representative samples at his own expenses to the Engineer-in-charge at least 60 days before its use for pre-construction tests and approval.

1.2.4 In addition to pre-construction tests and approval of quarries, the Engineer-in-charge may test the aggregate for their suitability during their processing. The contractor shall provide such facilities as may be necessary for procuring at no extra cost representative samples at the aggregate processing plant and at the batching plant. Final acceptance of the materials will be based on the acceptable test results of samples taken from the construction site only.

1.2.5 The contractor has to bear the cost or raw and processed representative samples, laboratory tests and field tests. The contractor has to arrange the required men and material for collecting the samples and bear the cost thereon required for transporting them to the laboratory also. The contractor should quote his rates for finished item of work for the items of works of Schedule 'A' keeping in view the cost of pre and processed samples to

be submitted to the Engineer and also the rate of progress and the time required for conducting laboratory tests. No extension of time will be granted for any delay occurred in collecting the samples and conducting pre-construction tests in the laboratory and getting approval.

1.3 Procurement

1.3.1 The rates quoted for all items shall include cost and conveyance of all materials with all leads.

1.3.2 It will be the tenderers responsibility to satisfy himself that sufficient quantities of construction materials required for the works shall exist in the borrow areas or quarry sites. The Dept. does not accept any responsibility either in handing over the quarries or procuring the materials of any other facilities. The tenderer will not be entitled for any extra rate or claim for the misjudgment on his part for quantity and quality of materials available in the quarries.

1.3.3 Failure by the Tenderer to have done all the things, which in accordance with this condition, he is deemed to have done, shall not relieve the successful tenderer of the responsibility for satisfactory completing the works as-required at the rates quoted by him.

1.3.4 The contractor shall make his own Enquiries regarding the availability of other materials and make his own arrangements for procuring them.

1.3.5 The materials for embankment construction shall be obtained and got approved by the Engineer-in-charge. The responsibility for arranging and obtaining the land for borrowing or exploitation in any other way shall rest with the contractor, who shall ensure smooth and uninterrupted supply of materials for the quantity required in construction during the construction period. No separate cost will be paid.

1.3.6 Similarly, the supply of aggregates for constriction shall be of approved quality approved by the Executive Engineer. Responsibility for arranging uninterrupted supply of materials from the source shall be that of the contractor. No separate cost will be paid.

1.3.7 The contractor has to open and develop the quarry for the stone and aggregate required. All incidentals such as removal of over burden, stripping etc. in the quarry should be done by the contractor. The contractor shall make his arrangements for maintaining the approach roads to quarry for conveying the materials to site of work.

1.3.8 The contractors have to make their own arrangements for storage and conveyance of water and storage at work site for construction purpose. No extra payment will be made to the contractor over and above their tender rates for water lead for storage arrangements.

1.3.9 The tenderer should inspect the site and check-up the possible water source for carrying out the entire work throughout the year in monsoon and non-monsoon seasons Irrespective of the quantum of rainfall and quote their rates accordingly. No subsequent claims for extra water lead will be entertained under any circumstances.

1.3.10 The materials and labor utilized in the execution of work by the contractor shall not be less than that given in the A.P.P.W.D. standard data for the relevant item.

1.3.11 Lay-out of material stacks: The contractors shall deposit materials for the purpose of the work on such parts only of the ground as may be approved by the Engineer-in-charge. He shall submit, for the approval of the Executive Engineer, before starting work, adetailledsite survey clearly indicating positions and areas where materials shall be stacked and sheds built.

1.4 DEFECTIVE MATERIAL:

1.4.1 All materials which the Executive Engineer/his representative has determined as not conforming to the requirements of the contract will be rejected whether in place or not. They shall be removed immediately from the site a directed. Materials, which have been found defective, and which have been subsequently corrected shall notbe used in the work unless approval accorded in writing by the Engineer-in-charge Upon failure of the contractor to comply with any order of the Engineer-in-charge, given under this clause, the Engineer-in-charge shall have authority to cause the removal or rejected material and to deduct the removal cost thereof from any money due to the contractor.

1.4.2 The rejected rubble and spoils should be dumped far away from work spot as directed by the Engineer-in-charge. The muck, boulders etc. fallen on the approach roads, ramps, etc; below the place should be removed by the contractor immediately after blasting at the contractor's cost. In case the above materials are not cleared within 24 hours of issue of departmental instructions, the same will be removed by the Dept. and the cost thereof will be recovered from the contractor's bills.

1.4.3 The Dept. will not be liable for any compensation due to breakdown in machinery, water supply or electricity or delay in supply or materials and for damage due to rains and floods.

1.4.4 The Executive Engineer shall have power to reject at any stage, any work which he considers to be defective in duality of material or workmanship and he shall not be debarred from rejecting wrought materials by reason of his having previously passed them in an unworried condition. Any portion of the work or materials rejected or pronounced to be inferior or not in accordance with the drawings and specifications shall be taken down and removed from the work-site at the contractor's expense, within 24 hours after written instructions to that effect have been given by the Executive Engineer. Replacement shall at once be made in accordance with the specifications and drawings, at the contractor's expense.

1.4.5 In case of default on the part of the contractor to carryout such orders the Executive Engineer shall have power to employ and pay other persons to carry out the orders at the contractor's risk and all expenses consequent thereon and incidental thereto shall be borne by the contractor.

1.4.6 Executive Engineer's decision: To prevent dispute and litigation it shall be accepted as an inseparable part of the contract that in maters regarding materials, workmanship, removal of improper work, interpretation of the contract drawings and contract specifications, mode of procedure and the carrying out of the work, the decision of the Executive Engineer's decision shall be final and conclusive. In the case of any difference between Executive Engineer and contractor on matters regarding materials, workmanship removal of improper work, interpretation of contract drawings and contract specifications, mode of procedure and the carrying out of the work the contractor shall have a right of appeal to the next higher authority viz., the Superintending Engineer of the circle, and the decision of the latter shall be final and conclusive.

TEST INSPECTION AND REJECTION OF DEFECTIVE MATERIAL AND WORK:

1.5 Laboratory Setup:

1.5.1 For the works costing Rs.50.00 lakhs and above the contractor shall setup a laboratory and equip the same with adequate equipment and personnel in order to carry out all required tests and Quality Control work as per specifications or as directed by the Engineer-in-charge. The internal layout of the laboratory shall be as given in the drawing and list of equipment shall be got approved from Engineer-in-charge in advance..

1.5.2 "The cost of laboratory building including services, essential supplies like water, electricity, sanitary and their maintenance and cost of all equipment, tools, materials, labor and incidentals to perform tests and other operations of quality control according to the specifications requirement shall be deemed to be incidental to the work and no extra payment shall be made for the same".

1.6 Standard Tests and Quality

1.6.1 The day to day and periodical tests to be carried out on materials, finished or otherwise shall be specified by the Engineer-in-charge from time to time and the contractor shall allow facilities and co-operation towards collection of samples and cores etc., The contractor shall however make good at his cost, materials, mixes and cores with similar or other materials as may be directed and to the satisfaction of the Engineer-in-charge.

1.6.2 An authorized representative of contractor shall remain present at the time when the samples or cores etc., are taken, shall authenticate fact if so required. Should the contractor's agent fail to be present as aforesaid the samples or cores etc., taken by the Engineer-in-charge, or his representative shall be considered to be authentic. The contractor however will be informed of the details of such samples and cores etc., having been taken.

1.6.3 The material, mixes and cores etc., shall be tested day to day periodically at the laboratory available at the site or at other laboratory or place that the Executive Engineer may direct and the results given thereby shall be considered correct authentic by the contractor. It

shall then be the contractor's responsibility to execute the work to the standard, based on the laboratory designs and tests.

1.6.4 The contractor shall provide proper facilities at all times, for the testing of materials, and inspection of work by the Engineer-in-charge, and the Engineer-in-charge shall accordingly also have access at all times to the place of storage or manufacture where materials are being made for use under the contract to determine that manufacture is proceeding in according with the drawings and specifications.

1.6.5. The contractor shall, upon demand, also forward for the Executive Engineer's inspection, test certificates supplied by the vendors, when the is purchasing consignments of cement, steel and other materials in respect of which such certificates are usually available.

2.1. **EARTH FOR EMBANKMENT:**

2.1.1 The suitability of foundation for placing embankment materials thereon and all materials proposed for use in construction of embankment shall be determined by the Engineer well in advance on the basis of laboratory test results Chemical and physical tests of the materials proposed for construction of embankment shall be carried out to ensure that the soil does not, contain soluble lime content, Soluble lime salt content or cohesionless fines in quantities harmful to the embankments.

2.1.2 Materials for construction of embankment should be free from the organic material. Unless otherwise directed by the Engineer-in-charge all materials shall be deposited in embankment so that cobbles, gravel materials shall be deposited in embankments so that cobbles, gravel and boulders are well distributed through other material and not nested in any position within or under the embankment as per clause 6.4 of I.S.4701-1982

2.1.3 The soils Morum useful for construction of embankment shall be classified as impervious and semiprecious based on laboratory test results. They shall be utilized on the embankment work.

2.1.4 Soils for embankment: To ascertain the suitability of soils for embankment purposes, soils samples shall be taken in accordance to clause No.303.2.1.1 and 303.2.1.2 of A.P.S.S.

2.1.5 Testing and selection of suitable soils:

The soil samples collected as above shall be tested in accordance with the Indian standards for the following properties to assess their suitability for embankment.

(a) Grain size analysis
(b) Atternbeurg limits
(c) Shrinkage limit
(d) Optimum Moisture content
(e) Proctor's density.
(f) Shear strength at optimum Moisture content and 100% saturation
(g) Permeability at Proctor's density.

Note: Additional tests shall be conducted where require

2.1.6. Homogeneous section:

The soil for embankment construction of Homogeneous section shall generally be in accordance with the recommendations contained in I.S.8826-1978 (Para. "8")

2.1.7 Zonal Embankments:

CH and SC type of soils with high plastically index shall not be used in the casing zone.

2.1.8 The impervious zone shall be built of materials having sufficient percentage of clay so that it can be compacted at optimum moisture content by suitable compaction equipment to maximum dry density. Soils which are sufficiently impervious but have lower plasticity and higher density and shear strength shall be used in the heating zone. The dry density of the soil fraction in compacted embankment material shall not be less than 98% of the maximum dry density at optimum moisture content obtained in accordance with I.S.2720-(Part-VII) – 1980 or as specified.

2.2 CEMENT:

2.2.1 The contractor has to make his own arrangements for the procurement for the of cement required for the works subject to the following.

2.2.2 The contractor shall procure 43 grade ordinary Portland cement conforming to IS 8112-1989 or 53 grade and as per IS.12269-1990 in standard packing of 50 Kg/bag as fresh as possible from the authorized manufactures/dealers. Cement Procured from non b.I.S license firms will not be allowed. The contractor shall Make necessary arrangements at his own cost to the satisfaction of the executive Engineer for actual weighment of random samples from the available stock. Cement shall be got tested as directed by the executive engineer atleast 15days in advance before its actual use on work. Cement required for the testing shall be supplied by the contractor free of cost. All tests shall be conducted in accordance with I.S.4031 – 1988 and I.S. 4032 –1968 and I.S.3535 – 1986.

2.2.3 The contractor has to purchase the cement on the name of work and on the name of Contractor. The cement without mentioning the above two names will not be accepted. Vendor's test certificates and weightment most bills are to be furnished to the Executive engineer. Any quantity purchased without test certificates will not be accepted for use on the work.

2.2.4

a) The contractor should procure the cement required during the next 30 days, at least a fortnight in advance to facilitate conducting test on the quality of cement, so brought to site and shall be stored in accordance with clause no.112 of APSS. The contractor shall forth with remove from the work site any cement that the engineer-in-charge may disallow for use on account of its failure to meet with the required standards .

b) No cement procured by the contractor shall be used in any work until notice has been given by the executive engineer, that test results are satisfactory. Physical and chemical requirement shall conform to is:269-1989.

c) The contractor has to furnish the test certificates and samples for testing of each batch and each consignment to the executive engineer immediately after receipt of cement into the godown for verification and testing.

2.2.5 The contractor will have to construct sheds at approved locations having a capacity for storing cement required for not less than 30 days use. The Executive Engineer or his representative shall have free access to such stores at all times for verification of the stocks received, used on works and balance. A stock register should be kept in the store shed to facilitate such verification. If any difference is observed based on the carriage inwards, carriage outwards, theoretical requirement of cement for finished work, the contract will be cancelled and the contractor will be black listed.

2.2.6. The contractor shall further, at all times, satisfy the Executive Engineer on demand by production of records and books or by submission of returns and other proofs directed, that only the cement tested and approved by the Executive Engineer is being used . The contractor shall at all times keep his records upto date to enable the Executive Engineer to apply such checks as he may desire.

2.2.7 Cement more than 3 months shall invariably be tested to ascertain that it satisfies the acceptability requirements.

If any reduction in strength of cement is observed in the tests the contractor shall forth with remove the respective consignment from the stores. For such rejection/removal no claim will be entertained.

2.2.8 Usage of Cement on works, be it for concrete or for mortar or otherwise, should be done only by weight and not by volume.

2.29 Cement Storage:- Recommendations of stacking and storage of cement at site shall be as per IS:4082-1977.

a) Cement bags shall be stored in dry, weather proof godowns. Adequate precautions shall be taken to ensure stacking of cement bags in such as to keep them about 150mm to 200 mm clear above floor and 250mm to 300mm clear of walls.

b) The height of stack shall not ordinarily be more than 10 bags and is no case more than 15 bags (except for very short periods) to prevent possibility of lumping up under pressure. Cement bags shall be stacked in a manner to facilitate their removal and use in the order in which they are received.

c) Cement shall be stored at the work site in such a manner as to prevent deterioration due to moisture.

d) Cement which has become caked or other wise damaged by getting wet or for any other reason shall on no account be used on the work.

e) If cement is not properly stored as specified above, the contractor will not be allowed to use the cement for the work.

2.3 STEEL:

2.3.1 The various types for steel shall conform to relevant I.S. specifications as provided in A.P.S.S. No.126.

2.3.2. The Contractor has to make his own arrangements for procurement of tested steel required for the work. Steel for use in head works, major bridges, buildings, water supply schemes and major structures on main canals, branch canals, etc., shall invariably be procured from main manufacturers. Test certificates conforming to I.S.No.1786-1985 are to be furnished to the Executive Engineer before using the steel on works . The HYSD steel (I.S.1786 – 1985) bars should have TOR mark.

2.3.3 The contractor has to purchase the steel on the name of work and on the name of contractor and furnish the same to the Executive Engineer. The steel with out mentioning the above two names will not be accepted. Vendors test certificates and weighment bills are to be furnished to the Executive Engineer. Any quantity purchased without test certificates will not be accepted for use on the works.

2.3.4 If any difference is observed based on carriage inwards, carriage out wards theoretical requirement of steel for finished work, the contract will be cancelled and the contractor will be black listed.

2.3.5 The diameter and weight of steel should be as per I.S 1786-1985 or elevant I.S specifications with subsequent revisions from time to time.

Sl.No	Diameter of Rod	Sectional weight in Kilogram per Running Meter both for M.S and HYSD steel
1.	6 Millimeters	0.22
2.	8 Millimeters	0.39
3.	10 Millimeters	0.62
4.	12 Millimeters	0.89
5.	14 Millimeters	1.21
6.	16 Millimeters	1.58
7.	18 Millimeters	2.00
8.	20 Millimeters	2.47
9.	22 Millimeters	2.98
10.	25 Millimeters	3.85
11.	28 Millimeters	4.83
12.	32 Millimeters	6.31
13.	33 Millimeters	6.71
14.	36 Millimeters	7.99
15.	40 Millimeters	9.86
16.	42 Millimeters	10.88

NOTE: If any rods other than those specified above are used , the weights shall be as per standard steel tables.

2.3.6 Procurement

a) The contractor has to furnish the test certificates issued by the vendors and samples for testing for each batch and each consignment to the Executive Engineer immediately after receipt of steel in the stock yard at site of work for verification and for testing.

b) No steel procured by the contractor shall be used in any work until notice has been given by the Executive Engineer, that the test results are satisfactory.

Storage:

a) Reinforcement steel and binding wire shall be stored above ground surface upon platform, skids or other supports protected as far as practicable from surface detiorations by direct contact with undesirable elements or by exposure to conditions producing rust and corrosion. Bars shall be so supported as to avoid distortion and sagging of long lengths. All the reinforcement of same designation shall be stacked separately and distinctly marked.

b) Recommendation of stacking and storage of steel at site shall be in accordance with IS: 4082 – 1977.

2.4 BLASTING MATERIAL

2.4.1 The contractor shall make his own arrangements to procure blasting materials. It shall be the responsibility of the contractor to store the materials in accordance with the rules of the

Explosive Act or other rules framed by the Govt. of India. He should posses acquire proper licenses for transport, position and use of explosives and short firers licenses as per revised explosive Act 1983.The contractor has to purchase the blasting materials on the name of work and on the name of the contractor. The blasting material with out mentioning the above two names on the bills will not be accepted..

2.4.2 All the materials such as explosives, detonators, fuse coils, tamping materials etc.. that are proposed to be used in the blasting operations shall have the prior Approval of the Engineer-in-charge. Only explosives of required make and strength are to be used.

Black powder and safe explosives shall be used wherever possible .Explosives with nitroglycerine shall be used where the above explosives are not effective.

The use of fuse with only one protective coat is prohibited. The fuse shall be sufficiently water resistance as to be unaffected when immersed in water for thirty minutes. Rate of burning of the fuse shall be uniform and not less than 25 millimeters of length per 4 seconds with 10%(ten percent) tolerance on either side. The fuse known as instantaneous fuse shall not be used.

The fuse shall be inspected before use and the moist, damaged or broken ones discarded. The rate of burning of all new types of fuses shall be examined. When they have been in stock for a long time, they shall be treated before use. The detonators used shall be capable of producing effective blasting of the explosives.

2.4.3 **STORAGE OF EXPLOSIVES**

The contractor shall build a magazine or make suitable permanent arrangements at his cost for safe storage of the explosives. The contractor shall provide portable magazine for carrying the explosives to work-spot from the magazine at his cost. The site of the magazine , its capacity and design shall be subject to approval by the Engineer-in-charge and the Inspector of explosives before the construction is taken up. As a rule , the explosives should be stored in a clean ,dry, well ventilated, bullet proof and fire proof building , on an isolated site.

The Contractor shall provide armed guard security of required number for explosives magazine, or while transporting to work site, as per rules in force at his cost.

The explosives, detonators and fuse coils shall each be separately stored.

A careful and day to day account of the use of explosives shall be kept by the Contractor in a register in a manner prescribed by the Engineer-in-charge. The Engineer-in-charge may also pay surprise visits to the storage magazine. In case of any unaccounted storage of the explosives , or if the account is not found to have been maintained in a manner prescribed , by the Engineer-in-charge , the contractor shall be liable to be penalized, in which case , he shall not be entitled to any compensation for the losses etc.. The action taken under this clause shall be in addition to that which might be taken by the competent civil authorities in the Court of Law.

The magazine shall at all times be kept scrupulously clean.

No unauthorized person should at any time be admitted inside the magazine. A notice shall be hung near the storage prohibiting entrance of unauthorized persons.

The magazine on no account be opened during or on the approach of a thunder storm and no person shall remain in the vicinity of the magazine during such periods.

Magazine shoes without nails shall at all times be kept in the magazine and a wooden tub or cement trough about 300 millimeter high and 450 millimeter in diameter filled with water shall be fixed near the door of the magazine.

Persons entering the magazine , must put on the magazine shoes which shall be provided by the Contractor for the purpose and be careful.

i) Not to put their feet on the clear floor unless they have the magazine shoes on.

ii) Not to allow the magazine shoes to touch ground outside the clean floor.

iii) Not to allow any dirt or grit to fall on the clean floor.

Persons with bare foot shall, before entering the magazine, dip their feet in water and then step direct from tub over the barrier(if there be one) on the clean floor.

A brush or broom shall be kept in the lobby of the magazine, for cleaning the magazine on each occasion it is opened for the receipt , delivery or inspection of explosives. No matches or inflammable material shall be allowed in the magazine .Light shall be obtained from the electric storage battery lantern.

No person having articles of steel or iron on him shall be allowed to enter the magazine.

Oily cotton, rags, waste and articles liable to spontaneous ignition, shall not be allowed inside the magazine.

Workmen shall be examined before they enter the magazine to see that they have none of the prohibited articles on them.

No tools or implements other than those made of copper , brass gun metal or wood shall be allowed inside the magazine . all tools shall be used with extreme gentleness and care.

Boxes of explosives shall not be thrown down or dragged along the floor and shall be stacked on wooden trestles.

Where there are white ants, the legs of the trestles should rest in shallow copper lead or brass bowls containing water. Open boxes of Dynamite shall never be exposed to the direct rays of the sun. Empty boxes or loose packing materials shall not be kept inside the magazine. Magazines shall be inspected at least twice a year by an officer representing the Engineer.

He shall see that all the rules are strictly complied with. The magazine shall have lightning conductor which should be got tested at least once a year. The Contractor shall , comply with all the recommendations made by the officer testing the lightning conductor and also rectify the defects notified to him within 15 days, failing which the Engineer-in-charge, shall be entitled to comply with the same at the contractor's expenses which shall not be open to question. The Engineer-in-charge may take any action that he may consider fit at the cost of the Contractor.

The following shall be hung in the lobby of the magazine.

a) A copy of rules both in English and in the languages which the workers concerned are familiar with.

b) A statement showing the stock in the magazine on that day.

c) A certificate showing the last date of testing of the lightning conductor.

d) A notice that "Smoking is strictly prohibited"

2.5 STONE FOR MASONRY:

2.5.1 General

2.5.2 The following specifications shall govern the quality of material and general practices of construction of masonry for the dams and appurtenant structures like spill ways, non-over flow dams, retaining walls , regulators , bridges and other massive masonry structures with a view to ensure strength, durability, impermeability and uniformity. The masonry shall conform generally to I.S.8605-1977 and special specifications elaborated hereunder.

2.5.3 Materials

2.5.4 Stone

2.5.5 Quality:

All stones used shall be hard, dense, durable, tough sound and clean. They shall be free from decay, weathered faces, soft seams, coatings, holes, veins, flaws, cracks, stains and other defects. Stones not in uniform color texture and/or with stains may be permitted only after proper tests.

2.5.6 Strength:

The strength of stones shall be adequate to carry the load imposed allowing a suitable factor of safety. The crushing strength shall be determined in accordance with the I.S.1121(part-I) 1974, and shall be not less than what is detailed below.

Sl.No	Type of Stone	Minimum Crushing Strength
1.	Granite	1,000 Kg/Sq.Cm.
2.	Basalt	400 Kg/Sq.Cm
3.	Lime Stone	200 Kg/Sq.Cm

2.5.7 Water absorption:

The percentage of water absorption shall generally not to exceed 5 percent by weight as determined in accordance with I.S.1124-1974.

2.5.8 Stone for masonry:

The stone for masonry shall satisfy the requirement in respect of compressive strength, durability and water absorption and its general quality as indicated in 5.6 to 5.8 . The size of stone shall normally vary from 0.05 to 0.01 m3. The Stones shall be taken from quarries approved from Geological and Engineering considerations. No stone shall weigh less than 25 Kg. The stone used in the hearting shall be roughly cubical in shape. No stone weighing between 75 Kg and 150 kg shall be less than 225 mm in any direction and no stone weighing between 25 Kg and 75 Kg shall be less than 150mm in any direction.

2.5.9 Spalls with minimum dimensions of 200mm to 100mm shall be used to wedge into thick mortar spaces. They shall not normally exceed 10 percent of the volume of stone masonry.

2.5.10 Stone for coursed face work: The height of the stone for face work shall be uniform and is recommended to be 300m including mortar joint. The length and depth of the face stone shall not be less than the height of the stone. At least 50 percent of the stones shall have length more than twice the height of the stone. At least one third of the stones shall be bond stones projecting not less than 2 ½ times the height in to the masonry. The remaining shall be header stones with depth not less than 1 ½ times the height of the stone. The stones shall be hammer dressed on face and one line chiseled on bed, top and sides for a minimum depth of 75mm up to which the stones shall be true and rectangular. Beyond 75mm depth , the stones may be tapered but the tail end of the stones shall have at least half the area of the face.

Bushing on the faces of the stones shall not project more than 40mm.

2.5.11 Header Stones: The header stones shall not be less than 300mm in length , one and half times of the height in depth.

2.5.12 Stretcher Stones: The stretcher stones shall not be less than 600mm in length and not less than its height in depth.

2.5.13 Quoins: Quoin Stones shall be of the same height as the faces but shall be true and rectangular on two faces with the face dressing for 75mm depth in beds and sides. The stone shall be at least 300mm long on one face and 450mm on the other face.

2.5.14 Bond Stones: The Bond stones shall not be less than 300mm in length and two and half times its height in depth.

2.5.15 Stone for uncrossed face work: Stones for uncrossed face work shall be selected from stones meeting the requirement of stones for coursed face work (see 5.1.1) except that the stones shall be hammer dressed. The stones shall be early rectangular.

2.5.16 ROUGH STONE(For pitching & Revetment): Stone shall be used from the surplus useful excavated rubble or from the approved quarries if required, and shall be subject to thorough inspection and approved by the Engineer-in –charge.

The bed pitching material shall consist of the most durable rock fragments of approved quality selected for the purpose .The stone shall be sound ,hard, dense resistant to abrasion ,durable and free from segregation, seams, cracks , shall partings weathered portions, conglomerate bands and other structural defects or imperfections tending to affect their soundness and strength. Stone shall generally be freshly quarried with sharp edges and clean faces. They shall be free from rounded, worn or weathered surfaces or skin or coating. Stone subject to marked deterioration by water or weather shall not be used. The shape of the individual stones shall be angular stones when immersed in water for 24 hours shall not absorb water by more than 5% of their weight when tested as per IS:1125-1974 or its Latest edition.

2.5.17 SIZE OF STONE:

The size of the stone to be used for various thickness of revetments shall be as follows:

The size of stone shall be as large as possible in no case any fragment shall weigh less than 40KG. The specific gravity of stones shall be as high as possible and it shall not be less than 2.50.

Unless otherwise specified, for revetments up to 450mm thickness, the length of the stone shall be equal to the revetment thickness. For revetment over 450mm thick at least 50% of the stones shall be 450mm long. No stone shall have any dimension less than 150mm or less than 50% of the maximum dimension of the stone.

The minimum volume of the individual stones used for various thickness of revetments shall be as follows.

Thickness or revetment	Volume of stones
225mm	0.015 Cum
300mm	0.015 Cum
450mm	0.030 Cum
600mm	0.045 Cum

2.5.18 STACKING:

Stacking shall be done as detailed below at the locations specified or ordered by the Engineer-in-charge.

i) Stacks shall be formed to regular shape and uniform cross sections.

ii) Materials shall be stacked on even ground. Stacking shall not be done in flood zones or in water logged areas.

iii) Rough stone shall be packed so closely as to give minimum quantity of voids possible without actual dressing of stone to fill interstices. In case of improper stacking done by the Contractor , the Engineer-in-charge shall have the right to either reject the stacks partly or completely.

iv) Unless otherwise specified, templates shall be provided to the size and dimension of the stack as may be specified at the contractor's expense.

2.6 COARSE AGGREGATE:

2.6.1 General: For the purpose of these specifications, the term " Coarse Aggregate" designates clean well graded aggregate most of which is retained on 4.75 mm I.S Sieve and containing only so such finer material as permitted for various types described under clause 2.2 of I.S. 383-1970 coarse aggregate for concrete shall consist of uncrushed gravel or stone, crushed gravel or stone and partially crushed gravel or stone. Course aggregate shall generally have uniform and stable moisture content. In case of variations, clause 9.2.3 of I.S.456-1978 shall govern during batching.

2.6.2 Quality: The coarse aggregate shall consist of naturally occurring (crushed or uncrushed) stones and shall hard, strong, durable, clear and free from veins and adherent coating and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious materials. Coarse aggregate will be rejected if it fails to meet any of the following requirements.

2.6.3 Los-Angeles abrasion test: The abrasion value of aggregate when tested in accordance with the method specified in I.S.2386(part-IV) using Los-Angels machine shall not exceed 30% for aggregate to be used in concrete for wearing surface and 50% for Aggregates to be used in other concrete.

2.6.4 Aggregate crushing strength test: Aggregate crushing value, when determined in accordance with I.S.2386 (Part-IV) 1963 shall not exceed 45% for aggregate used for concrete other than wearing surface and 30% for wearing surfaces. As an alternative to the crushing strength test, aggregate impact value will be determined with the method specified in I.S.2386 (part-IV) 1963.The aggregate impact value shall not exceed 45% by weight for aggregates used for concrete for other than wearing surfaces, and 30% by weight for concrete for wearing surface such as roads and pavements.

2.6.5 Soundness test: The coarse aggregate to be used for all concrete works shall pass sodium or magnesium sulfate accelerated soundness test specified in I.S.2386 (Part-V) 1963 and the average loss of weight after 5cycles shall not exceed the limits specified in clause 3.6.67 of I.S. 383-1970.

2.6.6 Specific Gravity: 2.60 minimum.

2.6.7 Deleterious Materials: The maximum quantity of deleterious materials in coarse Aggregate shall not exceed the limits specified in Table-I of I.S.386-1970 when tested in accordance with I.S.2386-1963.

2.6.8 Grading:

a) Coarse aggregate shall be well graded to give a dense concrete of the specified strength and consistency that will work readily into position without segregation and without the use of an excessive water content.

b) Coarse aggregate shall be supplied in the nominal sizes given in Table-2 of IS383-1970. For any one of the nominal sizes, the proportion of other sizes as determined by the methods described in IS 2386(part –I) –1963 shall be in accordance with Table-2 reproduced below.

TABLE –2

Nominal sizes and corresponding grading for single size and graded aggregates.

IS Sieve Designation	Percentage passing by weight for single size aggregated Of nominal size					Percentage passing by weight for graded aggregated of nominal size				
	63mm	40mm	20mm	16mm	12.5mm	10mm	40mm	20mm	16mm	12.5mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
80mm	100	—	—	—	—	—	100	—	—	—
63mm	85-100	100	—	—	—	—	—	—	—	—
40mm	0-30	85-100	100	—	—	—	95-100	100	—	—
20mm	0-5	0-20	85-100	100	—	—	30-70	95-100	100	100
16mm	—	—	—	85-100	100	—	—	—	90-100	—
12.5mm	—	—	—	—	85-100	100	—	—	—	90-100
10mm	0-5	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75mm	—	—	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36mm	—	—	—	—	—	0-5	—	—	—	—

However, the exact gradation required to produce a dense concrete of specified strength and desired workability shall be decided by the Engineer-in-charge.

c) The material passing through the screen shall be in grade ranging from 40mm to 4.75mm each grade shall be stacked separately.

d) Specific gravity : 2.60 minimum.

iii) Storage:

a) Aggregate shall be stacked in such way as to prevent the admixture of foreign materials such as soil, vegetable matter etc.. Heaps of fine and coarse aggregates shall be kept separately.

2.7 FINE AGGREGATE:

2.7.1 General: The term sand is used to designate aggregate most of which passes 4.75mm I.S. Sieve and contains only so much coarser material as permitted in clause 4.3 of I.S 383-1970. Sand shall be predominantly natural sand which may be supplemented with crushed sand to make up deficiencies in the natural sand grading.

2.7.2 Sand shall have a uniform stable moisture content. Determination of moisture content shall be made as frequently as possible the frequency for a given job being determined by the Engineer-in-charge according to weather conditions(I.S.456-1978).

2.7.3 Quality: The sand shall consist of clean, dense, durable, un coated rock fragments as per I.S.383-1970.

2.7.4 Sand may be rejected if it fails to meet any of the following quality requirements.

2.7.5 Organic impurities in Sand: Color no darker than the specified standard in clause 6.22 of I.S.2386(part-II) 1963 (Indian standard method of test for aggregate for concrete part-II estimation of deleterious materials and organic impurities).

2.7.6 Sodium Sulphate Test for Soundness: The sand to be used shall pass a Sodium or Magnesium Sulphate accelerated test as specified in I.S.2386(part –V) 1963 for limiting loss of weight.

2.7.7 Specific gravity: 2.6 minimum.

2.7.8 Deleterious Substances.

2.7.9 The amounts of deleterious substances in sand shall not exceed the maximum permissible limits prescribed in table I clause 3.2.1 of I.S. 383-1970 (Indian Standard Specification for coarse and fine aggregates from natural source for concrete) when tested in accordance with I.S. 2386-1963.

2.7.10 Grading : - Sand mortar shall conform to the grading of sand given in Clause 4 of I.S. 2116-1980 as indicated below.

	Grading of Sand for use in Masonry Mortars
I.S. Sieve Designation	**Percentage by weight passing by mass**
4.75 mm	100
2.36 mm	90 to 100
1.18 mm	70 to 100
600 micron	40 to 100
300 micron	5 to 70
150 micron	0 to 15

2.7.11. Sand whose grading falls out-side: the specified limits due to excess or deficiency of coarse or fine particles may be processed to comply with the standard by screaming through a suitably sized sieve and or blending with required quantities of suitable size and particles. The sand for concrete as batched shall be well graded and when tested by means of standard selves shall conform to the limits given in table – 4 of I.S. 383-1970 and shall be described as Fine aggregates, grading zones – I, II, II and IV. Sand complying with the requirements of any of the four grading zones is suitable for concrete. But sand conforming to the requirements of grading zone – IV shall not be used for reinforced cement concrete work.

2.7.12. Fineness Modulus:

a) Sand shall have a fineness modulus between 2.4 to 3.0 subject to the gradation specified in the preceding paragraph.

b) The modulus shall be computed by adding cumulative percentage of sand retained on the standard screens 4.75mm, 2.36mm, 1.18mm, 600 micron, 300 micron, 150 micron. IS sieve and dividing the sum by 100. Gradation of sand shall be so controlled that the fineness modulus of atleast 9 out of 10 consecutive test samples of finished sand shall not vary by more than 0.10 from the average of 10 test samples. Sand having any deviation from the specified range

of gradation and fineness modulus shall not be permitted to be used in work without the written permission of the Engineer-in-charge.

Storage : All sand shall be stored on the site of work in such manner as to prevent intrusion of foreign matter.

2.8.SAND FOR FILTER MATERIAL :

2.8.1. The filter material shall consist of clean, sound and well graded sand and crushed rock. The materials shall be free from debris, organic matter and other deleterious matter. It shall be ensured that the surface over which the filter is to be laid has been well consolidated to not less than 95 percent of Proctor's density.

2.8.2. The filter materials in contact with earth or foundation soil shall be of any available clean, well graded sand having a maximum size of 6mm. This shall be over laid with well graded, hard durable coarse aggregate of size 10mm to 75 mm. In contact with rockfill, riprap shall be used.

2.9.METAL FOR FILTER:

2.9.1 the coarse aggregate as filter material unless otherwise specified shall consist of clean, sound, hard, dense, durable, sharp, angular pieces, broken to specified sizes, free from all dust, dirt, and vegetable matter. Flaky and weathered stones shall not be used. The aggregates shall not contain any harmful material such as iron pyrites, coal, mica, shale or similar laminated material, clay, alkali, soft fragments, organic impurities etc.,

2.9.2 The aggregate shall be well graded and size 10mm to 75mm broken rock obtained form rock excavation of canal or from approved quarries shall be approved by the engineer in charge, prior to being transported to the areas of depositing

2.9.3 The aggregate shall be well graded and of size 10mm to 75mm broken rock obtained from rock excavation of canal or from approved quarries shall be approved by the Engineer-in-charge, prior to being transported to the areas of depositing.

2.10.ROCK FILL FOR TOE OF EMBANKMENT (RockToe)

2.10.1 Rock Shall Consist Of Sound, durable and Well graded broken rock Obtained from approved excavation of work and/or from approved quarries and shall be approved prior to being transported to the areas of deposition.. the materials shall range in size from 75 to 450mm However, no load shall contain more than 15 percent by volume of rock fragments smaller than 75mm in size. All brush roots or other perishable material shall be removed from rockfill during the spreading.

2.11.WATER

2.11.1 The water used in making and curing of concrete, mortar and grout shall be free from objectionable quantities of silt, organic matter injurious amounts of oils, acids, salts and other impurities etc., as per I.S. specifications NO.456-1978 potable water is generally considered satisfactory for mixing and curing

2.11.2 The engineer-in-charge will determine whether or not such quantities of impurities are objectionable.

2.11.3 Such determination will usually be made by comparison of compressive strength, water required, time of set and other properties of concrete made with distilled or very clean water and concrete made with the water proposed for use.Permissible limits for solids when tasted in accordance with I.S.3025-1964 shall be as tabulated below.

Permissible limits for solids

1. Organic Maximum permissible limit 200 mg/litre
2 Inorganic 3000 mg/litre
3. Sulphates (as So4) 500 mg/litre
4. Chlorides (as Cl) 2000 'for plain concrete work and 1000mg/litre for R.C.C. work
5. Suspended matter 2000 mg/litre

If any water to be used in concrete mortar or grout is suspected by the Executive Engineer as exceeding the permissible limits for solids. Samples of water will be obtained and tested by the Engineer –in-charge in accordance with I.S. 3025-1964.

2.12 ADMIXTURES/AIR-ENTERTAINING AGENTS

2.12.1 An admixture/air entraining agent may be used in the concrete in such quantities as to produce a total workable concrete as may be permitted, upto 5% by volume of concrete. The admixture agent shall satisfy the relevant specifications for air-entraining agents (I.S.9103-1979) and the dosage shall be determined based on specific laboratory studies.

2.12.2 The department will specify and approve the admixture/Air-entraining agents required for the works. The use of such admixtures/Air entraining agents shall be made and the cost conveyance storage, batching, mixing of admixtures shall be borne by the contractor and shall be included by him in the quoted states for respective items of works involved in the use of cement.

2.13.Storage of materials

Storage of materials shall conform to the IS:458-1978 and IS:457-1957.

SEIGNIORAGE CHARGES

Seigniorage charges : The Seigniorage charges for the materials covered under this work shall be recovered from the contractor's bill at the following rates.

Sl.No.	Material	Seigniorage charges
1)	Sand	Rs. 40.00/Cum
2)	Metal	Rs. 75.00/Cum
3)	R.R.Stone for masonry	Rs. 75.00/Cum
4)	Revetment stone	Rs. 75.00/Cum
5)	C.R.S. Stone	Rs. 75.00/Cum
6)	Gravel/Morrum/Earth	Rs. 30.00/Cum

The rates are liable to be revised and amended from time to time by the Sate Govt. by notification in the "Telangana Gazette". If the revised seigniorage fee is more than the above mentioned, the recovery from the contractor's bills is as per revised rates.

Seigniorage charges for the Earth obtained from the distant quarries for the use of standard bank will be recovered at the rate of Rs.**30.00/Cum**. No Seigniorage charges will be recovered for the earth used for the standard bank obtained from the canal cutting.

DRAWINGS

1.0 DRAWINGS:

1.1 The plans enclosed with the tender are liable to be altered during execution of work as per necessity of site conditions. The percentage quoted by the contractor shall hold good for execution of work even with altered plans.

1.2 One set of drawings, on the basis of which actual execution of the work is to proceed shall be furnished free of cost to the contractor by the Superintending Engineer / Executive Engineer progressively according to the work program submitted by the contractor and accepted by the Superintending Engineer / Executive Engineer. Drawings for any particular activity shall be issued to the contractor in advance of the scheduled date of the start of the activity. However, no extra claims by the contractor towards any delay in issue of drawing or issue of any revision / change to the drawings issued earlier shall be admissible. If work gets affected due to delay to issue of drawings, for any particular stage of work the contractor shall be granted extension of time in terms of condition 14.7 of tender notice.

1.3 Signed drawings above shall not be deemed to be an order for work unless they entered in the agreement or schedule of drawings under proper alterations of the contractor and Executive Engineer or unless they have been sent to the contractor by the Executive Engineer with a covering letter confirming that the drawing issued with authority for the work in contract.

2.0 DISCREPANCIES:

2.1 In case of discrepancies between documents the following order of procedure shall apply:-

2.1.1 Between the written description of written dimensions in the drawings and the corresponding one in the specifications, the latter shall apply.

2.1.2 Figured dimensions shall supersede scaled dimensions. The drawings on a larger scale shall take precedence over those on a smaller scale.

2.1.3 Drawings issued as construction drawings from time to time shall supersede tender drawings and also the corresponding drawings previously issued.

Note: The contractor should not execute any component of work without obtaining the working drawings. Any work done without drawings shall be at the contractor's responsibility only.

3.0 SECRECY CLAUSE:

The drawings and specifications made available to the bidder shall exclusively be used on the work and they are restrained from passing on each plan to any unauthorized hand either in parts or in full under the provisions of Section-3 and 5 of the official secrets Act 1923. Any violation in this regard will entail suitable action under appropriate clause of official secret Act 1923.

BILL OF QUANTITIES
AND
PRICE BID.

PREAMBLE

1. The Bill of Quantities shall be read in conjunction with the instructions to Bidders, General and Special conditions of Contract Technical Specifications and Drawings.

2. The quantities given in the Bill of Quantities are estimated and provisional and are given to provide common basis for tendering. The quantities here given are those upon which the lumpsum tender cost of the work is based but they are subject to alterations, omissions, deductions or additions as provided for in the conditions of this contract and do not necessarily show the actual quantities of work to be done. The basis of payment will be actual quantities of work ordered and carried out as measured by the Engineer and valued at the scheduled rate plus or minus tender percentage quoted in the Bill of Quantities where applicable and otherwise at such rates and prices as the Engineer-in-Charge may fix within the terms of Contract.

3. The estimate rates in the Bill of Quantities shall, except in so-far as it is otherwise provided under the Contract include cost of all constructional material, labour, machinery, transportation, erection, maintenance, profit, taxes and duties together with all general risks, liabilities and obligations set out or implied in the Contract.

4. The plans enclosed with the tender are liable to be altered during execution of work as per necessity of site conditions. The Tender percentage quoted by the bidder shall hold good for execution of work even with altered plans.

5. The whole cost of complying with the provisions of the Contract shall be included in the estimated rates for items provided in the Bill of Quantities and where no items are provided in the Bill of Quantities, their cost shall be deemed to be distributed among the scheduled rates entered for the related items of work.

6. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering scheduled rate against each item in the Bill of Quantities.

7. The method of measurements of completed work for payment shall be in accordance with the relevant B.I.S. Codes & A. P. S. Specifications.

8. All items of work are to be executed as per the drawings / specifications supplied with the contract documents.

   a. If there is any contradiction between the drawings and the text of the specifications, the later shall prevail.

9. The Bidder should inspect and select the quarries of his choice before he quotes the tender percentage in the Schedule of Bill of Quantities and satisfy himself about the availability of required quantum of materials.

10. Diversion drains should be excavated before completion of the embankments and the useful soils should be used in the nearby embankments.

11. The actual proportion by weight to be adopted during execution will be got designed in the laboratories to suit the grade of concrete and mortar to be used. It will be the responsibility of the contractor to manufacture concrete and mortar of required strength.
12. The quantum of measurement for all items of earthwork involving conveyance manually or by machinery shall be as assessed by level measurement. The measurements for the embankment will be for the consolidated banks only.

13. Wherever bailing out of water is involved either for excavation or for foundations or for constructions, the rates quoted shall take into account the dewatering charges necessary. No separate payment will be made for dewatering.

14. Wherever embankment work is involved, useful soils approved by the Engineer-in-Charge from the cutting reaches and diversion drains shall be taken and used for forming nearby embankments soils used for constructions as directed in Schedule (A).

15. The quoted tender percentage shall also include the work of any kind necessary for the due and satisfactory construction, completion and maintenance of the works according to the drawings and the specifications and further drawings and orders that may be issued by the Engineer-in-Charge from time to time. The quoted tender percentage shall include compliance by the Contractor with all the general conditions of contract, whether specifically mentioned or not in the various clauses of these specifications, all materials, machinery, plant, equipment, tools, fuel, water, strutting, timbering, transport, offices, stores, workshop staff, labour and the provision of proper and sufficient protective works, diversions, temporary fencing and lighting. It shall also include safety of workers, first aid equipments suitable accommodation for the staff and workmen, with adequate sanitary arrangements, the effecting and maintenance of all insurances, the payment of all wages, salaries, fees, royalties / Taxes, duties or other charges arising out of the execution of works and the regular clearance of rubbish, reinstatement and clearing-up of the site as may be required on completion of works safety of the public and protection of the works and adjoining land. The work of quality control / assurance shall be deemed to be covered in the quoted percentage.

16. The Contractor shall ensure that, the quoted tender percentage shall cover all stages of work such as setting out, selection of materials, selection of construction methods, selection of equipment and plant, deployment of personnel and supervisory staff, quality control testing etc. The work quality assurance shall be deemed to be covered in the tender percentage.

17. A) The special attention of the bidder is drawn to the conditions in the tender notices wherein reference has been made to the APSS and the Standard preliminary specifications containing therein. These preliminary specifications shall apply to the agreement to be entered into between the contractor and the Government of Telangana and shall form an in-separable condition of the contract. All these documents taken together shall be deemed to form one contract and shall be complimentary to another.

    B) The bidder shall examine, closely the A.P.S.S. / MORD/ MORTH and also the standard preliminary specifications contained therein and sign the Superintending Engineer's office copy of the APSS / MORD/ MORTH and its addenda volume in token of such study before submitting his overall tender percentage which shall be for finished work in-situ. He shall also carefully study the drawings and additional specifications and all the documents, which form part of the agreement to be entered into by the successful bidder. The APSS / MORD/ MORTH and other documents connected with contract such as estimate plans, specifications, can be seen on all working days in the office of the Superintending Engineer [As specified in the NIT].

18. The bidders attention is directed to requirements for materials under the clause 'materials and workmanship' in the preliminary specifications of APSS. Materials conforming to the Bureau of Indian Standards specifications, APSS etc., shall be used on the work and the bidders shall quote his overall tender percentage accordingly.

19. The bidder has to do his own testing of materials and satisfy himself that they conform to the specifications of respective Codes before tendering.

20. The contractor shall himself procure the required construction materials of approved quality including the earth for formation of embankment and water from quarries / sources of his choice. All such quarries / sources of materials required for the work shall be got approved by the Engineer-in-Charge in writing well before their use of the work.

21. **Inspection of site and quarries by the bidder:** Every bidder is expected before quoting his overall tender percentage, to inspect the site of proposed work. He should also inspect the quarries and satisfy himself about the quality, and availability of materials. The best class of materials to be obtained from quarries, or other sources shall be used on the work. In every case the materials must comply with the relevant standard specifications. Samples of materials as called for in the standard specifications or in this tender notice, or as required by the Executive Engineer, in any case, shall be submitted for the Executive Engineer's approval before the supply to site of work is begun.

22. The bidder's particular attention is drawn to the sections and clauses in the A.P. standard specification dealing with
    a) Test, inspection and rejection of defective materials and work.
    b) Carriage
    c) Construction plant
    d) Water and lighting
    e) Cleaning up during the progress and for delivery.
    f) Accidents
    g) Delays
    h) Particulars of payments.

    The contractor should closely peruse all the specification clauses, which govern the overall tender percentage he is tendering.

23. The defect liability period of contract is Twenty four months for Civil works and Sixty Months for Electro-Mechanical works.

24. The estimate rates for items shown in the Schedule "A" include all construction materials. The bidder has to quote an overall tender percentage considering all the aspects of the tender to complete the finished item of work as per the APSS / MORD/ MORTH / B.I.S. specifications, the special specifications appended, Drawings etc.

25. If there is any contradiction between APSS / MORD/ MORTH and B.I.S. specifications, listed and detailed technical specifications, the latter shall prevail.

26. In case of a job for which specifications are not available with the Schedule or in APSS / MORD/ MORTH or B.I.S. code and are required to be prescribed, such work shall be carried out in accordance with the written instructions of the Engineer-in-Charge.

27. The contractor should use the excavated useful soils and stone for construction purpose. Soils used for construction either for homogeneous section in hearting or in casing zone based on the suitability as directed in Schedule (A) and the cost of stone used for construction purpose will be recovered from the contractor's bill.
    The contractor should quote his tender percentage keeping in view of the above aspects.

28. Additions and alternations by the Bidder in the Schedule of quantities will disqualify the tender.

29. In the case of discrepancies between the written description of the item in the Schedule "A" and the detailed description in the Technical Specification of the same item, the latter shall be adopted.
30. The Unit rates are those governing payment of extras or deductions for omissions according to the conditions or the contract as set-forth in the preliminary specifications of the A.P. standard specifications and other conditions of specification of this contract.

31. It is to be expressly understood that the measured work is to be taken according to the actual quantities in place and finished according to the drawings or as may be ordered from time to time by the Executive Engineer and the cost calculated by measurement or by weight at their respective rates without any additional charge for any necessary or contingent works, connected herewith. The Percentage Excess or less over ECV quoted, are for works in situ and complete in every respect.

32. For all items of work in excess of the quantities indicated the rates payable for such excess quantities will be tendered rates i.e., scheduled rates plus or minus tender percentage.

33. For all items of work, intermediate payment will be made provisionally as per relevant clause. Full-accepted agreement rates will be paid only after all the items of works are completed.

34. The contractor is bound to execute all supplemental works that are found essential incidental and inevitable during execution of main work.

35. The payment of rates for supplemental items of work will be regulated as under.

Purely new items which do not correspond to any item in the agreement.

The rate of all such items shall be derived considering SS Rates of sanctioned estimate plus or minus overall tender percentage.

36. ENTRUSTMENT OF ADDITIONAL ITEMS.

a) Wherever additional items not contingent on the main work and outside the scope of original agreement are to be entrusted to the original contractor dispensing with tenders and if the value of such items exceeds the limits upto which the officer is empowered to entrust works initially to contractor without calling for tenders approval of next higher authority shall be obtained. Entrustment of all such items on nomination shall be rates not exceeding the S.S rates.

b) Entrustment of supplemental items contingent on the main work will be authorized by the officers upto the monetary limits upto which they are competent to accept items in the original agreement so long as the total amounts upto which they are competent to accept in an original agreement rates for such items shall be worked in accordance with the procedure in vogue.

c) Entrustment of either the additional or supplemental items shall be further subject to the provisions under para 176(b) of APWD Code Viz., the items shall not be ordered by an officer on his own responsibility if the revised estimate or deviation statement providing for the same requires the sanction of higher authority.

BILL OF QUANTITIES

[Part-A]

Name of work :

Sl.No	Approximate Quantity In figures/ words	Description of work	Specification No. / APSS / BIS / MORD/ MORTH	Unit In figures / words	Estimate Rate In figures / words	Amount in Rs.
		Separately enclosed				

I / We are willing to execute the work at + / - / or at par on E.C.V.

CONTRACTOR

202 SUPERINTENDING ENGINEER
IRRIGATION CIRCLE NO.2, LMD COLONY.

BILL OF QUANTITIES

Part-B

Details of amount reimbursable to the Contractor.

a) Towards VAT/GST
ii) Towards Labour Cess
iii) Seigniorage charges
iv) NAC
v) Towards DMF(10%) and SMET(2%) on Seigniorage Charges

The bidders are eligible for reimbursement of amount towards VAT/GST, Labour Cess, Seigniorage charges and NAC.

The VAT/GST component shall be added in each bill of the contractors who opt for composition scheme and recovered. In respect of those contractors, who do not opt for composition scheme, the VAT/GST component shall not be released with the bills and VAT/GST however shall be recovered and for the recovery made, a deduction certificate will be issued based on which the contractor has to claim adjustment through their returns submitted to their respective assessing authorities.

FORMATS OF SECURITIES

PROFORMA

BANK GUARANTEE FOR EARNEST MONEY DEPOSIT

WHEREAS …….. (Name of the Contractor) (here in after called "the Bidder") has submitted his tender response to NIT No……. dated:…… for the work " ……..." (Name of work) (hereinafter called "the tender").

KNOWN ALL MEN by these present that we …… ……..…….. (Name and Address of Bank) …….. (hereinafter called "the Bank" are bound unto) …… / (name of the designated S.E) in the sum of * …….. for which payment will and truly to be made to the said Department, the Bank binds itself, his successors and assigns by these presents.

SEALED with the Common Seal of the Bank this …….. day of ……..20….

THE CONDITIONS of this obligation are:-

(1) If after Tender opening the bidder withdraws or modifies his Bid during the period of bid validity specified in the Form of Tender.

(2) If the Bidder having been notified of the acceptance of his bid by the Department during the period of validity.

(a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or

(b) fails or refuses to furnish the balance EMD and additional performance Security in accordance with the instructions of Bidders.

We undertake to pay to the Department up to the above amount upon receipt of his first written demand, without the Department having to substantiate his demand, provided that in his demand the Department will note the amount claimed by him is due to him owning to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date** …… after the dead line for submission of Tenders as such deadline is stated in the Instructions to Tenders or as it may be extended by the Department, 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.

DATE……. SIGNATURE OF THE BANK ……..

WITNESS…….. SEAL……..

(Signature, Name and Address)

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* The Bidder should insert the amount of the EMD in words and figures denominated in Indian Rupee. This figure should be the same as shown in the NIT.

** 6 months from the deadline date for submission of Tender [As specified in NIT].

CONTRACTOR 205 SUPERINTENDING ENGINEER
IRRIGATION CIRCLE NO.2, LMD COLONY.

PROFORMA

BANK GUARANTEE FOR BALANCE "E.M.D."

_____(name & address of Department)
_____

WHEREAS_____ _____
_____ _____ __
_____(name and address of Contractor) (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated: _____ to execute the work of _____ [name of work];

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Schedule bank for the sum specified therein as balance EMD / EMD for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of guarantee] _____ [in words], such sum being payable and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the contract documents which may be made between you and the Contractor 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 upto …….. i.e., until 28 days from the date of expiry of the Defects Liability period.

Signature & seal of the Guarantor_____
Name of Bank_____
Address_____

Date_____

PROFORMA

BANK GUARANTEE FOR ADDITIONAL FURTHER SECURITY

_____(name and address of Department)
_____

WHEREAS _____ (name and address of Contractor) (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated: _____ to execute _____ [name of Contract and brief description of works] (hereinafter called "the Contractor");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Schedule bank for the sum specified therein as Additional further security bank guarantee for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of *Rs.*_____ [amount of guarantee] _____ [in words], such sum being payable and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the contract documents which may be made between you and the Contractor 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 up to and until 28 days from the date completion.

Signature & seal of the Guarantor_____
Name of Bank_____
Address_____
Date_____

CONTRACTOR

207 SUPERINTENDING ENGINEER
IRRIGATION CIRCLE NO.2, LMD COLONY.

ANNEXURE I (B)

FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT FACILITIES

This is to certify that M/s./Sri _____ is a reputed company/individual with a good financial standing.

we shall be able to provide overdraft/credit facilities to the extent of Rs._____ lakhs to meet their working capital requirements

Date: Signature of senior Bank Manager_____

Place: Name of the Senior Bank Manager_____
Address of the Bank _____

ANNEXURE – I (A).
FORM OF SOLVENCY CERTIFICATE BY BANKS

I, _____ Managing Director / Manager / General Manager / Agent of _____ Bank Limited do hereby certify that a _____ _____ *[here the Names and addresses of the contractor]* to be solvent to the extent of Rs._____ [Rupees _____ _____] as disclosed by the information and record which are available with the aforesaid bank.

For the _____ Bank

Date:
Place:

Signature of Bank Manager
[Authorized to Sign]

A N N E X U R E

Clause 3.3 A (c)

For Barrages / Dams:

The Bidder shall have executed the similar works with not less than minimum mentioned parameters in respect of the following relevant components of the work.

a) Deleted.

b) Height of Dam / Reservoir/ Barrage: Shall be indicated as 25% of the height of proposed dam/Reservoir and 50% in case of barrages.
(The Height should be measured from the foundation level to the FRL of the Dam/Reservoir/Barrage).

c) Discharge: Construction of Barrages/ Dams/ Spillways/Hydro Power Projects across any river in India with maximum flood more than 1.00 Lakh Cusecs.

Clause 3.3 A (d)

"The bidder should have successfully executed and completed/ commissioned "Barrages/Dams/ Spillways " in India as a prime Contractor or as a Member of Joint Venture in any one project within the present Bid time period during last 10 Financial years and the executed value of such project in any **one financial year shall not be less than 10% of ECV of present BID (i.e. 10% of 264,24,29,950= Rs.26,42,42,995/-).** The present worth of above completed work /works by bidder shall be calculated based on weightage at 10% per annum to the current financial year".

Annexure 5

Photographs of site inspection of Manair River Front Project, Karimnagar



Figure 1 Construction of Barrage and Wire



Figure 2 Construction of barriage and wire



Figure 3 On cable bride with a background of pediments constructs at banks



Figure 4 Protect wall and pediments



Figure 5 River wall pediments constructed inside the river bank i.e. on the river bed



Figure 6 River pediments constructed on the river bed



Figure 7 River pediment with protection wall on river



Figure 8 Road also constructed to approch the river partially occupying the river bank



Figure 9 Approach road to river



Figure 10 On Manair Dam



Figure 11 On Manair Dam