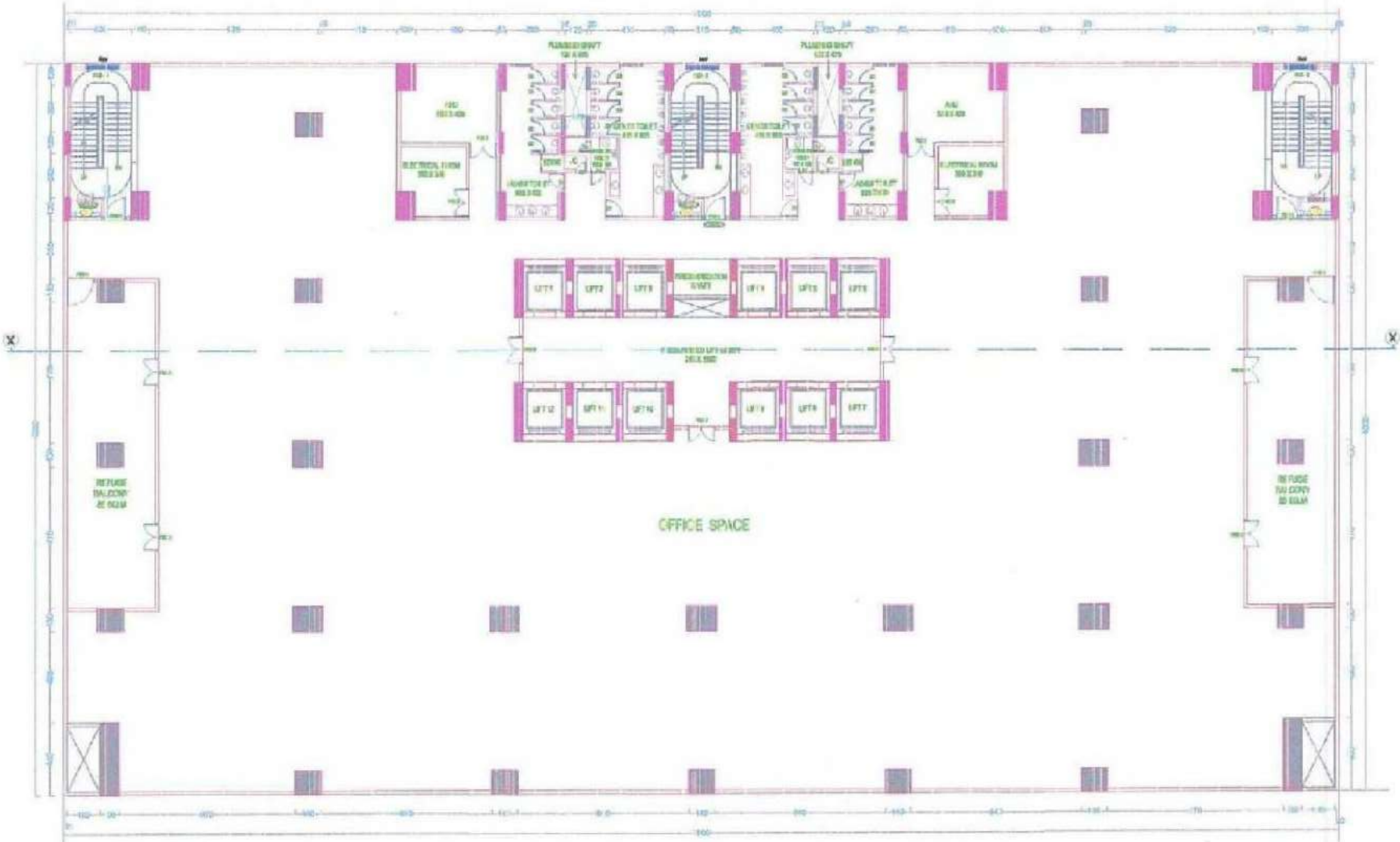
SHEET NO - 5/19



OFFICE BLOCK TYPICAL REFUGE FLOOR
5,9,12,15 &18

SCHEDULE OF JOINERY

NOTES
1. All dimensions are in cm.
2. Figured dimensions shall be followed.
3. Columns, beams, foundations, etc may be adopted as per structural design

STRUCTURAL ENGINEER:

ARCHITECT:

LEGEND
PROPOSED
ROAD
BOUNDARY

OFFICE BLOCK TYPICAL REFUGE FLO
5,9,12,15 ,18 & 21

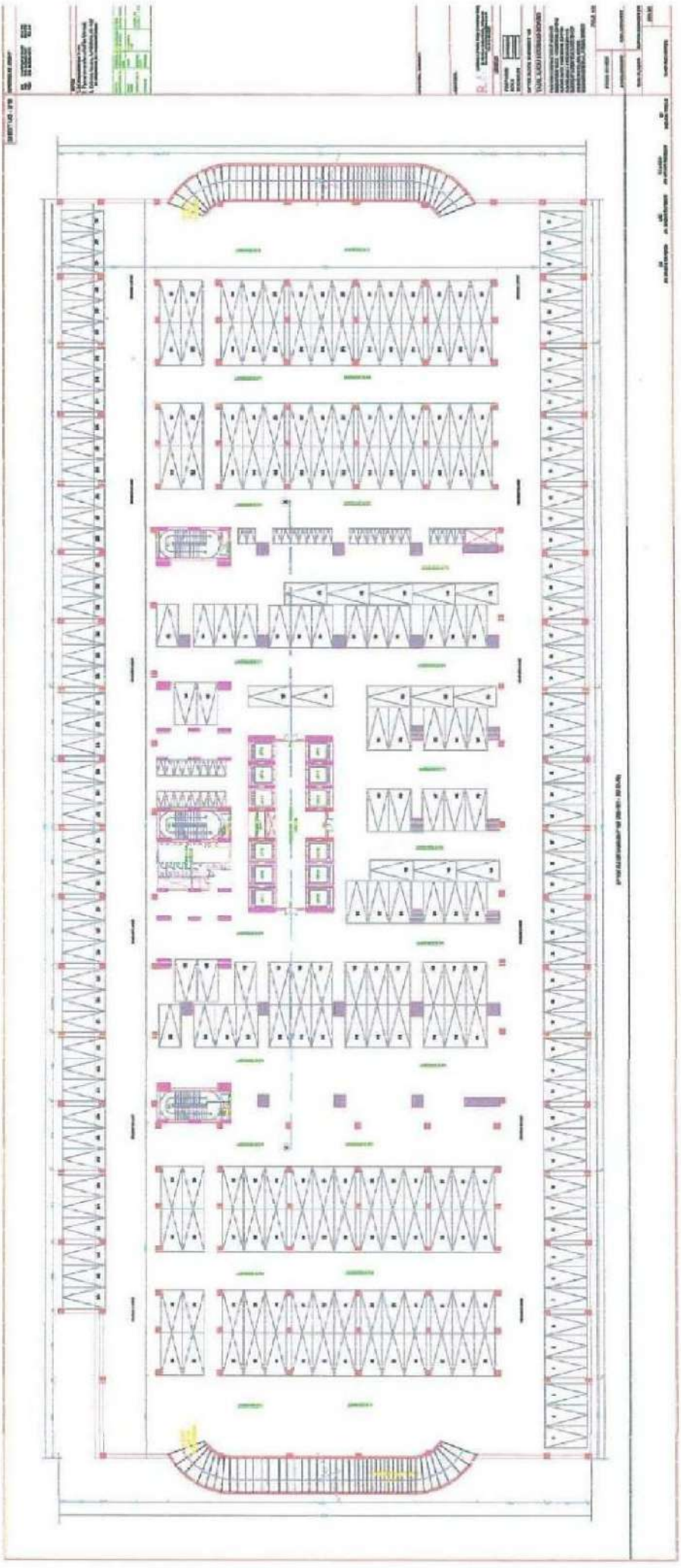
TAMIL NADU HOUSING BOARD

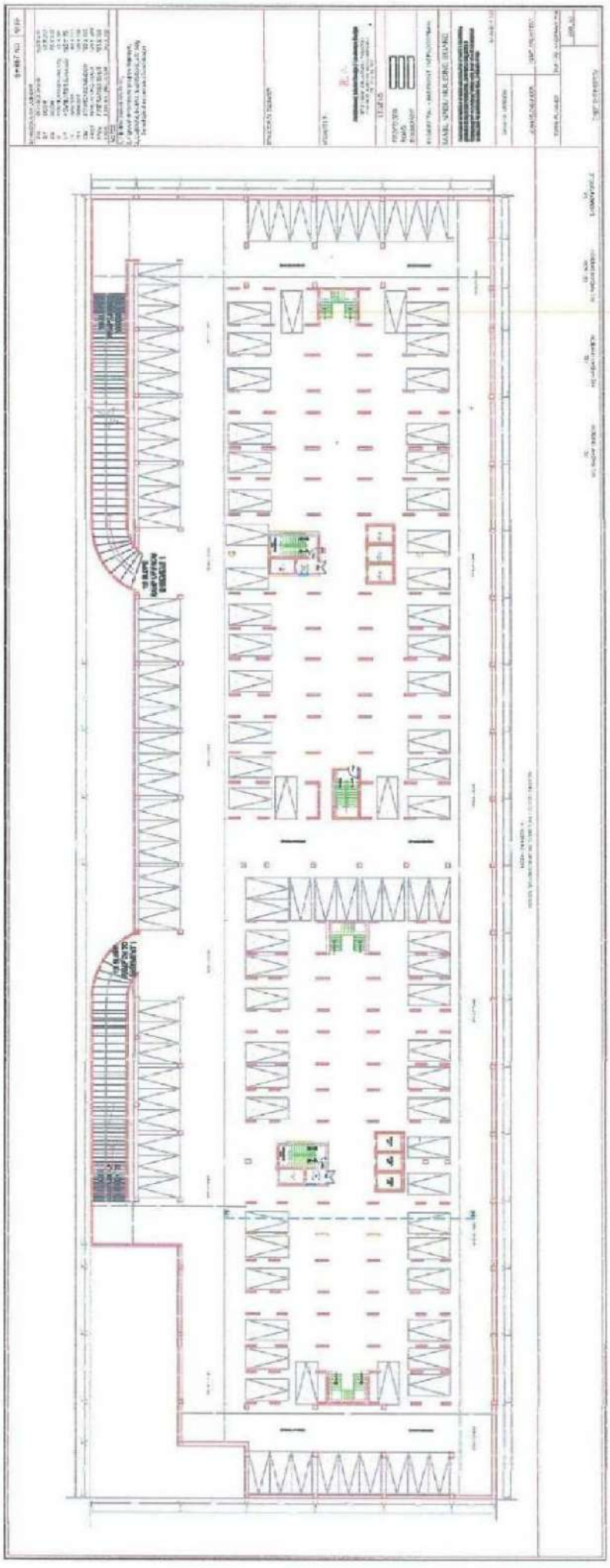
PROPOSED CONSTRUCTION OF MIXED USE DEVELOPMENT BLOCK 1 COMMERCIAL (2B+G+... FLOORS), BLOCK 2 RESIDENTIAL (2B+Ft+18 FLOORS), BLOCK 3 RESIDENTIAL(2B+P+18 FLOORS) AT SURVEY NO2, BLOCK NO... OF ... VILLAGE, EGMORE, NUNGAMBAKKAM TALUK, CHENNAI DISTRICT

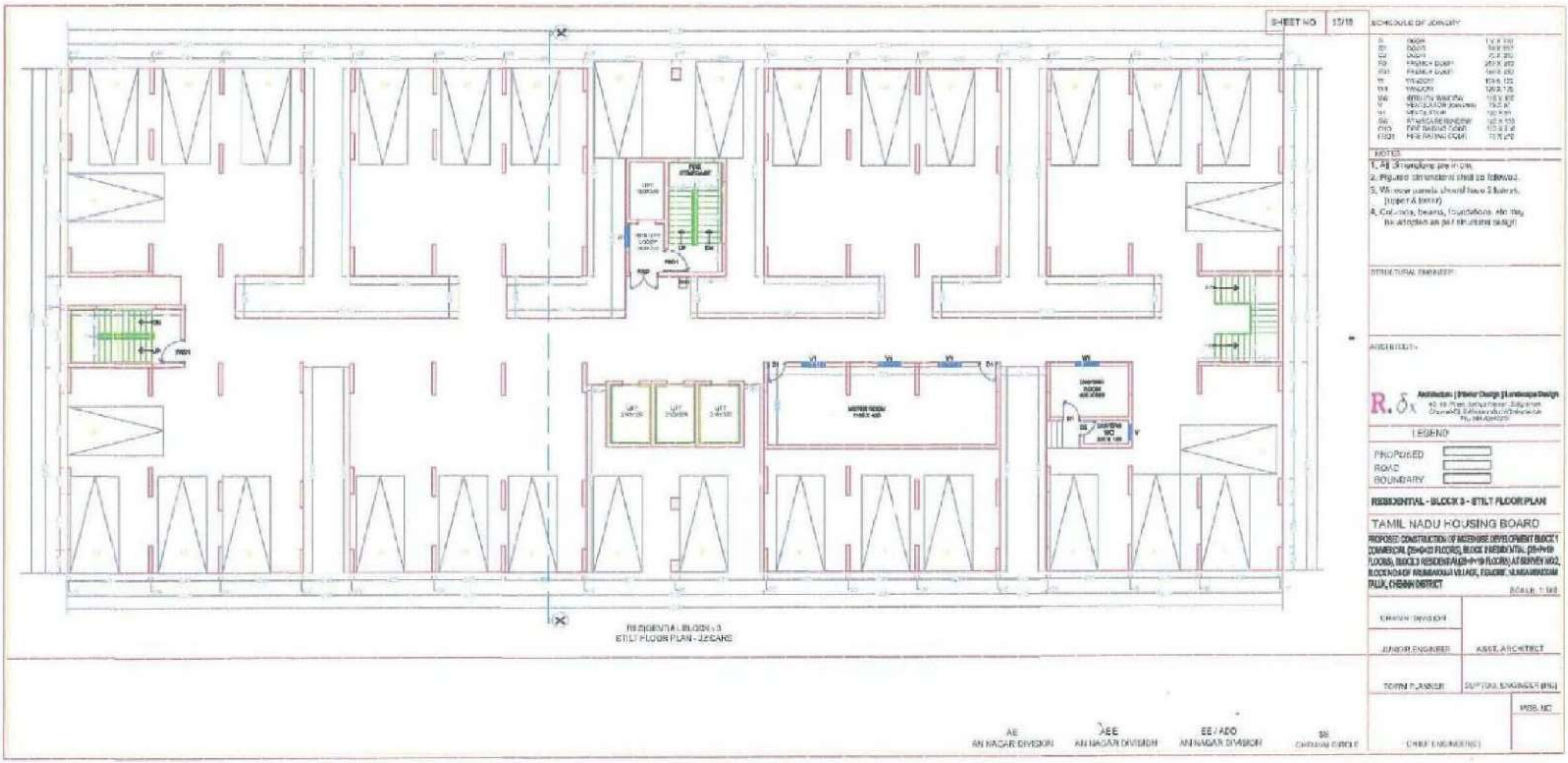
SCALE:

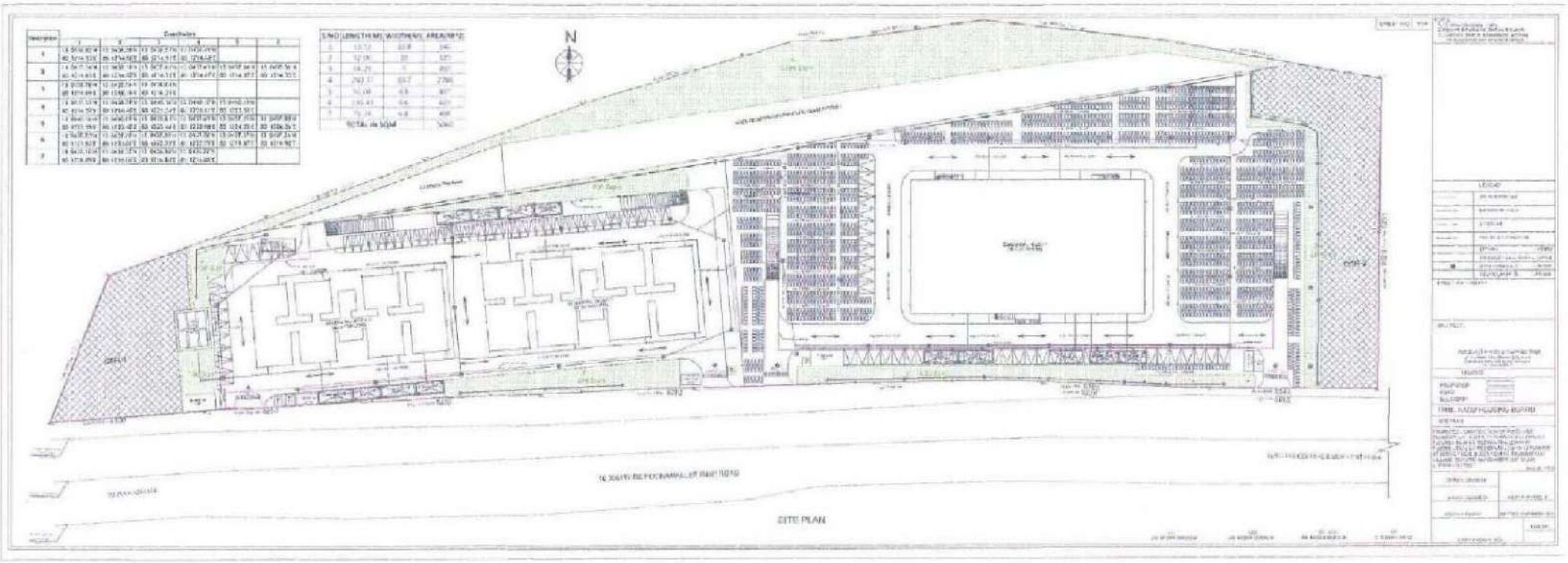
DRAWING DIVISION
JUNIOR ENGINEER | ASST. ARCHITECT
TOWN PLANNER | SUPTDG. ENGINEER
CHIEF ENGINEER

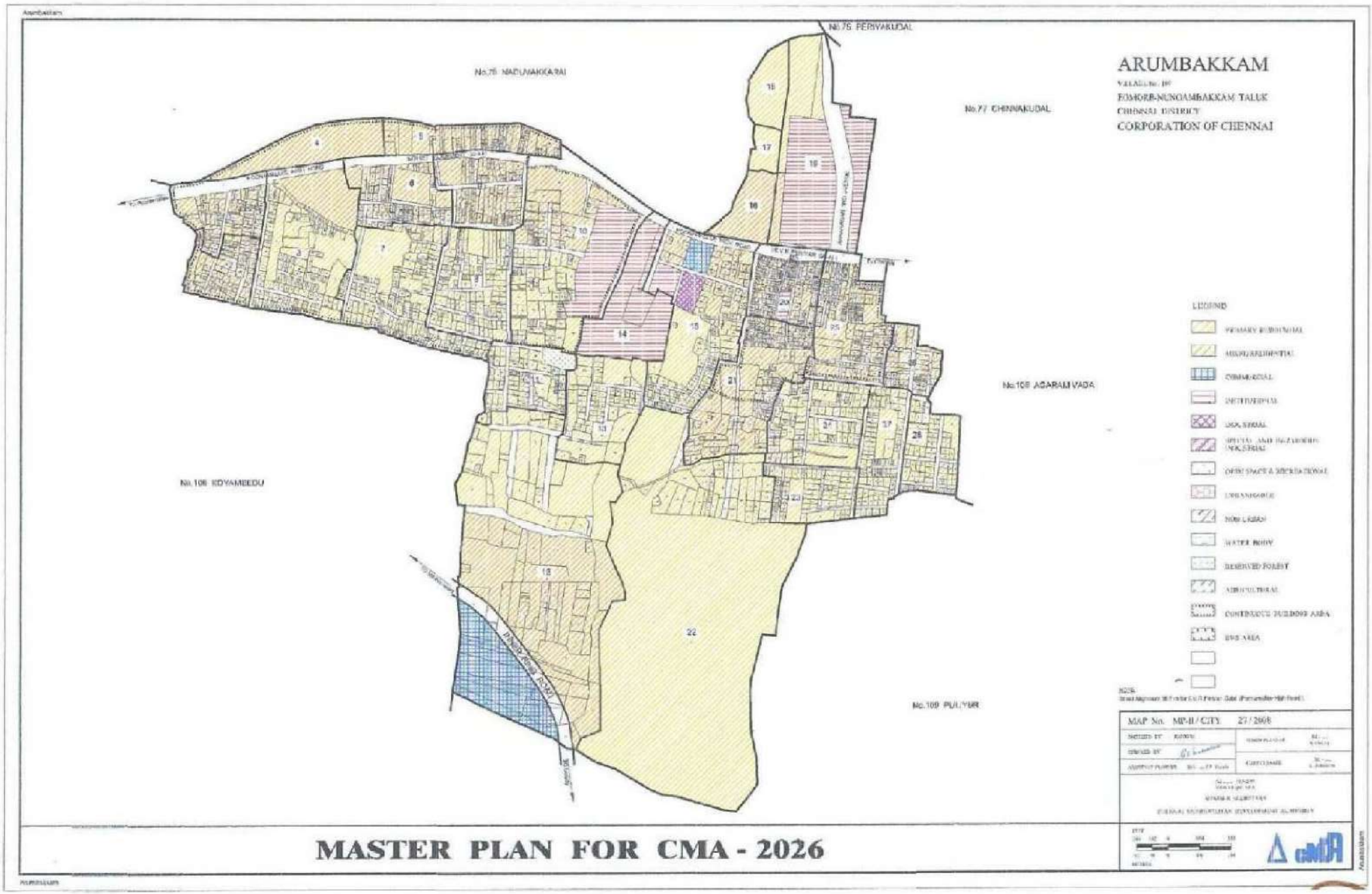
AE AN NAGAR DIVISION | AEE AN NAGAR DIVISION | EE / ADO AN NAGAR DIVISION | SE CHENNAI CIRCLE

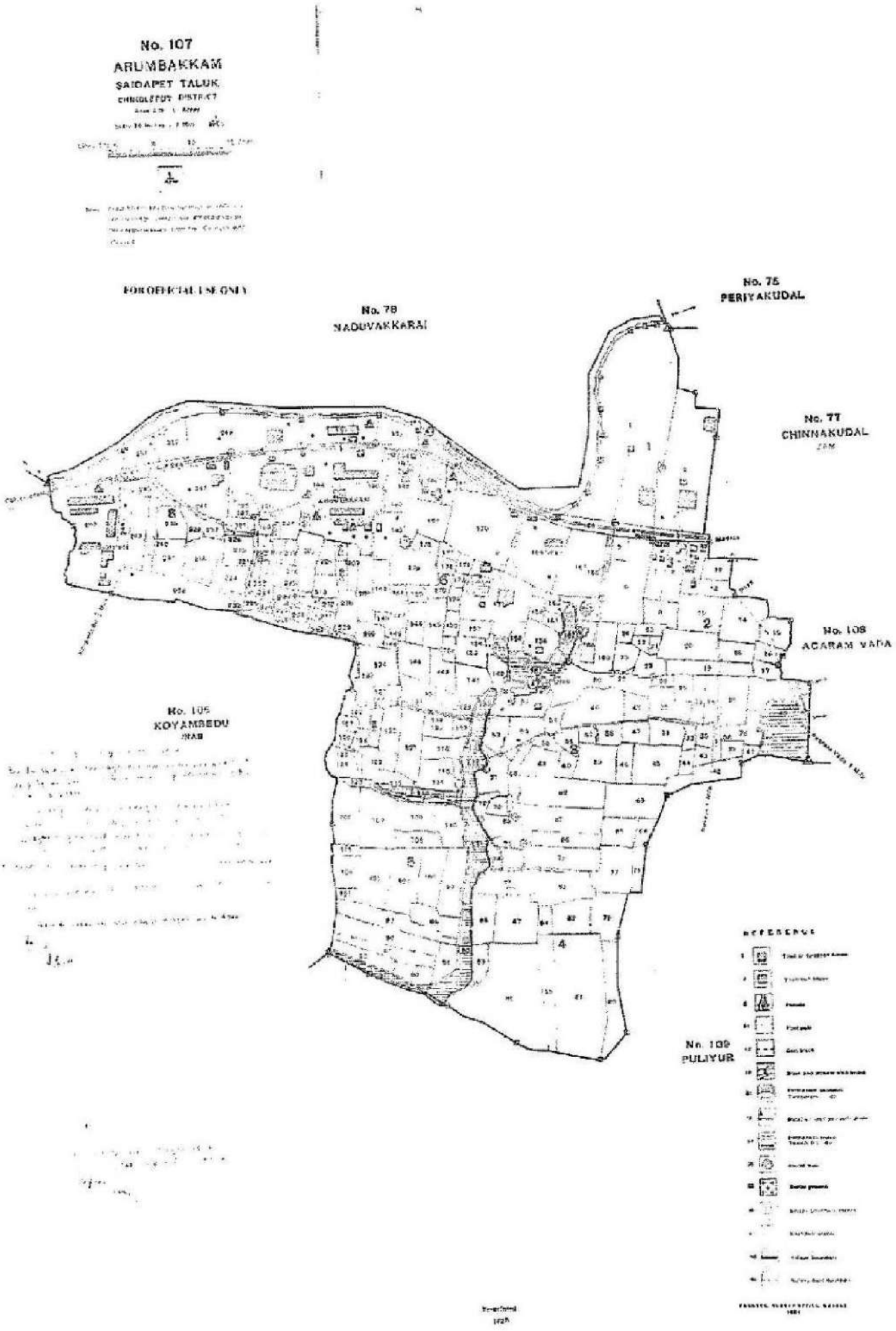





SHEET NO 15/18
SCHEDULE OF JOINERY
NOTES
1. All dimensions are in cm.
2. Figured dimensions shall be followed.
3. Window panels should have 2 leaves. (upper & lower)
4. Columns, beams, foundations, etc may be adopted as per structural design
STRUCTURAL ENGINEER
ARCHITECT
R. δx Architecture | Interior Design | Landscape Design
LEGEND
PROPOSED
ROAD
BOUNDARY
RESIDENTIAL - BLOCK 3 - STILT FLOOR PLAN
TAMIL NADU HOUSING BOARD
SCALE 1:100
JUNIOR ENGINEER
ASST. ARCHITECT
TOWN PLANNER
CHIEF ENGINEER
RESIDENTIAL BLOCK - 3
STILT FLOOR PLAN - 32 CARS
AE
AN NAGAR DIVISION
AEE
AN NAGAR DIVISION
EE / ADO
AN NAGAR DIVISION
SE
CHENNAI CIRCLE


N
SITE PLAN


No.76 PERIYAKUDAL
No.76 NADUVAKKARAI
No.77 CHINNAKUDAL
No.108 AGARAM VADA
No.108 KOYAMBEDU
No.109 PULIYUR
ARUMBAKKAM
VILLAGE No. 19
EGMORE-NUNGAMBAKKAM TALUK
CHENNAI DISTRICT
CORPORATION OF CHENNAI
LEGEND
MAP No. MP-II / CITY 27 / 2008
MASTER PLAN FOR CMA - 2026


No. 107
ARUMBAKKAM
SAIDAPET TALUK
No. 78
NADUVAKKARAI
No. 75
PERIYAKUDAL
No. 77
CHINNAKUDAL
No. 108
ACARAM VADA
No. 105
KOYAMBEDU
No. 109
PULIYUR

ANNEXURE II

GFA CERTIFICATE

From
K. Ravichandran, B.E.,
Executive Engineer and ADO,
Anna Nagar Division,
Tamil Nadu Housing Board,
Thirumangalam Shopping Complex,
Chennai - 600101

To
The Member Secretary,
State Environment Impact
Assessment Authority, Tamil Nadu,
3rd Floor, Panagal Maligai,
No.1, Jennis Road, Saidapet,
Chennai – 600 015

Letter. No. AND/ PLG/ 849/2016 Date: 26.06.2020

Sir,

Sub: Tamil Nadu Housing Board - Anna Nagar Division - Proposed Construction of mixed use development at S.No. 2, Block No. 4 of Arumbakkam village, Egmore - Nungambakkam Taluk, Chennai District - Gross Fixed Asset (GFA) - reg.

******

This is to certify that the value of the gross fixed assets of the said project by Tamil Nadu Housing Board is as follows.

S.No.	Description	Rs. In Lakhs
1.	Land	0.00
2.	Building	39,284.00
3.	Plant and Machinery	200.00
4.	ETP/STP/APC	300.00
5.	Other Assets	200.00
	TOTAL	**39,984.00**

The gross value of fixed assets stated above is true and fair to the best of our knowledge and belief.

26/6/2020
Executive Engineer & Ado
Anna Nagar Division

ANNEXURE III
LAND OWNERSHIP DOCUMENTS

CERTIFICATE
EXTRACT FROM THE TOWN SURVEY LAND REGISTER

District: Chennai Taluk: Aminjikarai Town: Arumbakkam Ward: 001

S.No	Block Code and Name Of Locality	Number		C.Sur No and Letter	Municipal Door No.	Govt. Mitta, Zamindari, Inam	Dry, Wet, Unassessed, Poramboke, House-site	Source Of Irrigation and Class	If Double Crop: Rate of Composition	Class and Sort of Soils	Taram	Acre / Hectare per Rate		Extent By Town Survey			Assessment		Municipal Register	Adangal	How the holding is utilized	Remarks
		Sur. Field	Sub Div.									Rs.	Paise	Hectare	Ares	Sq. Meter	Municipal	Govt.				
1	Block: 0004-.	2	0	249 / 1,2,3,5,250 / 1,2,3,4,5,6,251,252 / 2A -		Rayattuvari	Land	-	-	0-		0.00		3	30	0.0	-	76.25	-	State Housing Board	Kalittam	TR DT: 02-08-2016

Certified that the above is a true extract from the Town Survey Land Register maintained in Taluk.

E Signature / Digital Signature: 02-08-2016
Name / Name: Sekar S
Designation / Designation: Tahsildar
Location / Place: Sindagarai Circle / Aminjikarai, Chennai District / Chennai

Reference / Remarks:
1.This information was printed on 09-06-2020 at 03:41:11 PM.
The certificate was printed on 09-06-2020 at 03:41:11 PM.

2. If you wish to confirm the document details, please make sure you contact the Office of the Secretary of State
Further Certificate Confirmation and Details. You may approve Tahsildar concerns.

Note:

1. The above information / certificate duplicate details are from the e-register. Make sure they enter the reference number URB / 02/05/013/001/0004/2/0 on their website at http://eservices.tn.gov.in .
2. This information was printed on 09-06-2020 at 03:41:11 PM.
3. Read through the 2D barcode reader of the handset camera and check the website for 3G / GPRS route

Survey Manual Chap XIII Rule 84 & 187. நெற்குன்றம் TOWN SURVEY டவுன் சர்வே REGISTER. ரிஜிஸ்டர் பிளாக்கு எண்:4 Form No. Old. 51 / New. 41

Name of locality or Street (1)	Number: Survey field (2)	Number: Sub-division (3)	Old survey number and letter (4)	Municipal door number (5)	Government, Mitta, Zamindari, Inam (6)	Dry, Wet, Unassessed Poramboke, House-site (7)	Source of irrigation and class (8)	If double crop, rate of composition (9)	Class and sort of soil (10)	Taram (11)	Rate per Acre/Hectare: Rupees (12)	Rate per Acre/Hectare: Paise	Extent by Town Survey: Acres/Hectare	Extent by Town Survey: Square feet/Square Metre (13)	Assessment: Municipal (14)	Assessment: Government (15)	Number of patta or inam title-deed and name of the registered holder: Municipal register (16)	Adangal (17)	How the holding is utilised (18)	Remarks (19)
[illegible]	2	-	249/1		ப	[illegible]							3.30.00.0		-	76.25		State	மனை	—
			249/2															Housing	இடம்	
			249/3										(True Copy)					Board		
			249/5																	
			250/1,2,3,4,5																	
			250/6																	

Copied by: [illegible] TSL 4/3/2012

4/3/12

தலைமையிடத்து துணை வட்டாட்சியர்
அமைந்தகரை வட்ட அலுவலகம்
சென்னை-600 107.

ANNEXURE IV

ACKNOWLEDGMENT COPY OF CMDA PLANNING PERMIT

CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
Thalamuthu Natarajan Building, No.1, Gandhi Irwin Road, Egmore,
Chennai - 600 008
Phone : 28414855 Fax: 91-044-28548416
E-mail: mscmda@tn.gov.in
Web site: www.cmdachennai.gov.in

(Development Charges Letter)

File No. : CMDA/PP/HRB/N/0296/2020 Date : 09 October, 2020

To

The Executive Engineer,

Tamil Nadu Housing Board,

Anna Nagar Division, TNHB Complex Building,

Thirumangalam, Chennai – 40.

Sir,

Sub: CMDA – Area Plans Unit – MSB (North) Division – Planning Permission Application is for the construction of High Rise Commercial cum Residential Group Development viz., Block – 1 : Double Basement floor + Ground floor + 19 floors – Commercial Office Building; Combined Double Basement floor for Tower - 2 & 3; Tower – 2 : 1st floor to 19th floor – Residential Tower with 152 Dwelling units; Tower – 3 : 1st floor to 19th floor – Residential Tower with 152 Dwelling units (Totally 304 Dwelling units) at Old S.Nos. 249/1, 2, 3, 5, 250/1, 2, 3, 4, 5, 6, 251, 252/2A, T.S.No.2, Block No. 4 of Arumbakkam Village, Aminjikarai Taluk, Poonamallee High Road, Greater Chennai Corporation, Chennai applied by The Executive Engineer & ADO, Tamil Nadu Housing Board, Anna Nagar Division – Remittance of DC & Other Charges - Advice sent - Reg.

Ref: 1) Planning Permission Application received in SCB No. CMDA/PP/HRB/N/ 0296/2020 dt.03.06.2020.

2) Agenda and Minutes of 256th MSB Panel meeting held on 24.06.2020.

3) AAI NOC received in NOC ID: CHEN/SOUTH/B/061320/ 467308 dt.26.06.2020 valid upto 24.06.2028 (Requested Height: 96.95m).

4) This office letter even No. dt. 01.07.2020.

5) Applicant letter dt. 31.07.2020.

6) This office letter even No. dt.07.08.2020 addressed to the Government.

7) Government Letter (Ms) No. 124, H&UD Department dt.19.08.2020.

8) Applicant Letter No. AND/Plg/869/2018 dt.21.09.2020 & 26.09.2020 enclosing revised plans and other required particulars.

9) Deputy Director, District Survey Department Letter No. E1/2333/2020 dt.11.09.2020 enclosing FMB Sketch for T.S. No. 2, Block No. 4 of Arumbakkam village.

10) Minutes of Meeting taken by Chief Secretary to Government of Tamil Nadu on 08.09.2020.

The Planning Permission application received for the Building – proposed construction of 1Ground Floor + 2Floor Assembly 1Parking + 3Floor Residential building with 304 dwelling units at Door No:0,Plot No:0,Address:Poonamallee High Road,Locality:Arumbakkam,City/Town:Chennai in S.No. 249,250 TS.No.2,2 of Arumbakkam village within the limit of Greater Chennai Corporation Remittance of DC & Other charges – DC advice Sent - Reg is under process. To process the application you are requested to remit the following charges by separate Demand Drafts of a Nationalized Bank in Chennai City drawn in favour of Member-Secretary, CMDA, Chennai- 600 008, at Cash Counter (between 10.00 A.M and 4.00 P.M) in CMDA and produce the duplicate receipt to the Area Plans Unit, CMDA, Chennai-8 (or) Payment can also be made through online Gateway payment of Indusland Bank in A/c No.100034132198 (IFSC Code No. INDB0000328). was examined and layout plan has been prepared to satisfy the Development Regulation requirements and approved

Sl. No.	Charges	Charges/Deposits already paid	Amount to be remitted
I	Scrutiny Fees	Rs.2,85,931.00 R.t No CMDA/PP/Ch/3173/2020,dt 30 September, 2020	
II	IDC - CMWSSB (For sewered area only)		Rs.2,48,25,000.00
III	I & A Charge		Rs.5,65,00,000.00
IV	Shelter Charges		Rs.12,18,50,000.00
V	Flag Day Charge		Rs.500.00
VI	Balance Scrutiny Fees		Rs.15,000.00
VII	Development charges for land per Sq. m. Anc Development charges for building per Sq. m.		Rs.30,00,000.00

The security deposit is also acceptable in the form of Bank Guarantee from any Scheduled bank having branch in Chennai Metropolitan Area, in the prescribed format for the entire period of Planning Permission.

Security Deposit is refundable amounts without interest on claim, after issue of completion certificate by CMDA. If there is any deviation/violation/change of use of any part of /whole of the building/site to the approved plan security deposit will be forfeited. Further, if the security deposit paid is not claimed before the expiry of five years from the date of payment, the amount will stand forfeited.

Security Deposit for Display Board is refundable when the display board as prescribed with format is put up in the site under reference. In case of default Security Deposit will be forfeited and action will be taken to put up the display board.

a. No interest shall be collected on payment received within one month (30 days) from the date of issue of the advise for such payment.

b. Payment received after 30 days from the date of issue of this letter attracts interest at the rate of 12% per annum (i.e. 1% per month) for every completed month from the date of issue of this letter. This amount of interest shall be remitted along with the charges.

c. Infrastructure and Amenities Charges shall be paid by the applicant within 30 days from the date of receipt of this demand letter, failing which in addition to the Infrastructure and Amenities Charges due, an interest at the rate of 15% per annum for the amount due shall be paid for each day beyond the said 30 days upto a period of 90 days and beyond that period of 90 days, an interest at the rate of 18% per annum for the amount due shall be paid by the applicant.

d. Accounts Division shall work out the interest and collect the same along with the charges due.

e. No interest is collectable for security deposit.

f. No penal interest shall be collected on the interest amount levied for the belated payment of DC, OSR, Reg. Charges, Demolition Charges and Parking Charges within 15 days from the date of remittance of DC, OSR charges etc.

g. For payments of interest received after 15 days, penal interest shall be collected at the rate of 12% p.a

The papers would be returned unapproved, if the payment is not made within 60 days from the date of issue of this letter.

You are also requested to comply the following:

A. Furnish the letter of your acceptance for the following conditions stipulated by virtue of provisions available under TNCD&BR - 2019 :-

I. The construction shall be undertaken as per sanctioned plan only and no deviation from the plans should be made without prior sanction. Construction done in deviation is liable to be demolished.

II. In cases of High Rise Building, Registered Developers (RD), Registered Architects (RA), Registered Engineers (RE), Registered Structural Engineers (RSE), Registered Construction Engineers (RCE) and Registered Quality Auditor (RQA) shall be associated with the construction work till it is completed.

III. The Owner or Developer shall compulsorily appoint a Construction Engineer for over all constant supervision of construction work on site and such person appointed shall not be allowed to supervise more than one such site at a time.

IV. The Registered Architect or Registered Engineer and the structural engineer shall be responsible for adhering to the provisions of the relevant and prevailing Indian Standard Specifications including the National Building Code. However they will not be held responsible for the severe damage or collapse that may occur under any natural force going beyond their design courses provided in the above said Standards or National Building Code.

V. The Registered Architect or Engineer is solely responsible for obtaining the certificate required under this rule from the registered professionals.

VI. In the event of any deviations the Registered Architect or Engineer is the solely responsible to bring it to the notice of CMDA.

VII. The owner or developer shall submit an application to CMDA in the first stage after completion of work up to plinth level requesting for issue of order for continuance of work.

VIII. The owner or developer through the registered professional shall submit to the designated officer of CMDA a progress certificate in the given format at the stage of Plinth and last storey level along with structural inspection report as provided.

IX. If the services of the Registered Architect or Engineer on record are terminated he shall immediately inform CMDA about his termination and the stage of work at which his services have been terminated. The Registered Architect or Engineer appointed as replacement of the preceding Registered Architect or Engineer shall inform about his

appointment on the job and inform CMDA of any deviation that might have occurred on the site with reference to the approved plan and the stage at which he is taking over the charge.

X. The Registered Architect or Engineer appointed shall inform CMDA immediately on termination of the services of the registered structural engineer on record, registered construction engineer on record, or any change of owner or registered developer.

XI. If during the construction of the building the owner or registered developer (RD) or Registered Architect on Record (AR) , or Registered Engineer on record (ER) / Registered Structural Engineer on Record (SER) or Registered Geo Technical Engineer on record (GER) or Registered Construction Engineer on Record (CER) and Registered Quality Auditor (QA) is changed, he shall intimate to CMDA by a registered letter that he was no longer responsible for the project, and the construction shall have to be suspended until the new Owner or Registered Developer or Registered Architect on Record (AR) etc., undertakes the full responsibility for the project as prescribed in these rules and also in the forms.

XII. A new owner or registered developer (RD) or Registered Architect on Record (AR) or Registered Engineer on Record (ER) or Registered Structural Engineer on Record (SER) or Registered Geo Technical Engineer on record (GER) and Registered Construction Engineer on Record (CER) and Registered Quality Auditor (QA) shall inform the change to CMDA, and before taking responsibility as stated above,check as to whether the work already executed is in accordance with the Building Permit granted by the competent authority. He or She may go ahead with the remaining works only after obtaining permission with CMDA.

XIII. The owner or Power of Attorney holder or registered developer or any other person who has acquired interest shall submit application in complete shape for issue of completion certificate according to the norms prescribed in TNCDBR Annexure - XXIII.

XIV. The completion certificate shall not be issued unless the information is supplied by the owner, developer, the registered professionals concerned in the schedule as prescribed by the competent authority from time to time.

XV.

a) Temporary connection for water, electricity or sewer, permitted for the purpose of facilitating the construction, shall not be allowed to continue in the premises after completion of the building construction.

b) No connection to the water mains or sewer line or electricity distribution line with a building shall be made without the prior permission of the authority and without obtaining completion certificate.

c) In case, the use is changed or unauthorised construction is made, the authority is authorised to discontinue such services or cause discontinuance of such service.

XVI. On completion of the construction the applicant shall intimate CMDA and shall not occupy the building or permit it to be occupied until a completion certificate is obtained from CMDA .

XVII. While the applicant makes application for service connection such as Electricity, Water Supply, Sewerage he should enclose a copy of the completion certificate issued by CMDA along with his application to the concerned Department/Board/Agency.

XVIII. When the site under reference is transferred by way of sale/lease or any other means to any person before completion of the construction, the party shall inform CMDA of such transaction and also the name and address of the persons to whom the site is transferred immediately after such transaction and shall bind the purchaser to those conditions to the Planning Permission.

XIX. In the Open space within the site, trees should be planted and the existing trees preserved to the extent possible;

XX. If there is any false statement, suppression or any misrepresentations of acts in the applicant, planning permission will be liable for cancellation and the development made, if any will be treated as unauthorized.

XXI. The new building should have mosquito proof overhead tanks and wells.

XXII.The sanction will be revoked, if the conditions mentioned above are not complied with.

XXIII.Rainwater conservation measures notified by CMDA should be adhered to strictly.

a) An Undertaking to abide the terms and conditions put forth by Police (Traffic), DF&RS, AAI, IAF & PWD in Rs.20/- Stamp Paper duly notarized

b) Details of the proposed development duly filled in the format enclosed for display at the site in cases of High Rise Buildings.

The issue of Planning Permission depends on the compliance/fulfillment of the conditions/payments stated above. The acceptance by the Authority of the pre-payment of the Development charge and other charges etc. shall not entitle the person to the Planning Permission but only refund of the Development Charge and other charges (excluding Scrutiny Fee) in cases of refusal of the permission for non- compliance of the conditions stated above or any of the provisions of TNCB&DR - 2019, which has to be complied before getting the Planning permission or any other reason provided the construction is not commenced and claim for refund is made by the applicant.

You are also requested to furnish the following particulars:

- Boundary as per Site and as per FMB to be superimposed and the difference in area has to be distinguished with proper hatching.
- Genset in setback space is not permissible.
- Basement line to be clearly shown in the site plan and setback to be shown from the Basement line.
- Existing width of Poonamallee High Road to be mentioned in the site plan.
- Site levels are to be properly indicated and filling up details as per PWD to be mentioned clearly in the site plan, Section & Elevation.
- Clear height of Stilt floor to be mentioned in both section & elevation of High Rise Buildings.
- Car & TW parking are to be re-arranged with required aisle width.
- Car & TW parking reserved for Physically challenged are to be properly indicated.
- Both Car and TW parking are to be numbered properly.
- Fire Escape Staircase to be mentioned properly in all the High Rise Buildings.
- Unwanted Block images to be removed.
- Building dimensions to be mentioned in the site plan.
- Usages of OHT's in Terrace floor plan are to be mentioned properly.
- Section along Ramp to Basement floor to be shown for both Commercial & Residential Blocks.
- Section & Elevation requires correction with respect to individual floor plans.
- The term future development to be removed in the site plan.
- Area statement and Proposal title requires correction.
- Plans to be colored and signed by Structural Engineer.

- NOCs from Traffic Police, DF&RS, IAF, PWD from Inundation point of view are to be furnished for the revised plans.
- Environmental Clearance for the proposal to be furnished.
- OSR area 1 & 2 to be Gifted to CMDA through registered Gift Deed before issue of Planning Permission.
- As the height of the building exceeds 60.00m, Structural design report vetted by IIT(Madras)/Anna University to be furnished.
- Undertaking in Rs.20/- Stamp paper to avail Premium FSI to be furnished.
- Duly filled in Form – B and Form – C and notarized to be furnished.
- All plans duly signed by Architect & Structural Engineer to be furnished.
- The extended basement top slab below the external circulation at Ground level should be designed to withstand the fire fighting vehicular loads. An undertaking to this effect to be furnished by both Applicant and Structural Engineer.
- CCTV Camera to be installed at regular interval of 50.00m along the abutting road on the site boundary before issue of Completion Certificate. To this effect an undertaking to be furnished before issue of Planning Permission.

Yours faithfully,

Name :
Elangovan G
Designation :
Channel
Assistant
Planner
Date : 09-Oct-
2020 14:

Name: ELANGOVAN G

Designation: Assistant Planner

Date: 09 October, 2020

For

Member Secretary

CMDA

Copy to:

1. The Senior Accounts Officer,
   Accounts (Main), CMDA, Chennai-8.

2. The Commissioner
   Greater Chennai Corporation,
   Chennai- 600 003.

ANNEXURE V

REQUEST LETTER FOR WATER SUPPLY & SEWAGE DISPOSAL

From,
K. Ravichandran, B.E.,
Executive Engineer and ADO,
Anna Nagar Division,
Tamil Nadu Housing Board,
Thiruvangadam Shopping Complex,
Chennai - 600101

To
The Chief Engineer (O&M I),
Chennai Metropolitan Water Supply
& Sewerage Board,
No. 1, Pumping Station Road,
Chintadripet,
Chennai - 600002

Lr. No.AND/PLG/849/2016 Date: 26.06.2020

Sir,

Sub: Tamil Nadu Housing Board - Anna Nagar Division - Proposed Construction of Mixed use Residential Building at S No. 2, Block No. 4 of Arumbakkam Village, Egmore - Nungambakkam Taluk, Chennai District - Requisition of Water Supply Permission in the CMWSSB water supply scheme and permission to discharge excess treated sewage in CMWSSB sewer scheme - Reg.

Tamil Nadu Housing Board has proposed to construct mixed use development consisting of a Commercial block (2B+G+22 Floors), 2 Residential blocks (2B+P+19 Floors each) with each 152 residential dwelling units totalling of 304 units at S.No. 2, Block No. 4 of Arumbakkam Village, Egmore – Nungambakkam Taluk, Chennai District.

The residents are to be provided with safe water for drinking and domestic requirements. The total fresh water requirement is estimated to be 327 KLD and 270 KLD of treated sewage will be in excess after reuse for toilet flushing and greenbelt development.

It is requested you to supply the quantum of water 350 KLD through CMWSSB water supply scheme and permit to discharge 290 KLD of excess treated sewage in CMWSSB sewer network.

Hence it is requested to issue an in-principle approval letter indicating the supply of required quantity of water and permission to discharge the excess treated sewage in CMWSSB system at the earliest.

Executive Engineer & ADO
Anna Nagar Division

Encl: Calculation Sheet

Copy to:-

1. The Superintending Engineer (Central),
   Chennai Metropolitan Water Supply & Sewerage Board
   No. 1, Pumping Station Road, Chintadripet, Chennai - 600 002
2. Area Engineer VIII,
   Chennai Metropolitan Water Supply & Sewerage Board

1/7/2020

o/o. CE/O&M-I

From,
K. Ravichandran, B.E.,
Executive Engineer and ADO,
Anna Nagar Division,
Tamil Nadu Housing Board,
Thirumangalam Shopping Complex,
Chennai - 600101

To
THE COMMISSIONER,
Corporation of Chennai,
Rippon Building,
Chennai - 600 003

01 JUL 2020

Lr.No.AND/PLG/849/2016 Date: 26.06.2020

Sir,

Sub: Tamil Nadu Housing Board - Anna Nagar Division - Proposed Construction of mixed use development at S.No. 2, Block No. 4 of Arumbakkam Village, Egmore - Nungambakkam Taluk, Chennai District - Permission from Corporation of Chennai to utilize treated waste water for watering roadside trees and OSR development - Requested - reg.

Tamil Nadu Housing Board has proposed to construct mixed use development consisting of a Commercial block (2B+G+22 Floors), 2 Residential blocks (2B+P+19 Floors each) with each 152 residential dwelling units totaling of 304 units at the above-mentioned location for which we are applying for Environmental Clearance in State Environment Impact Assessment Authority, Tamil Nadu. The total quantity of treated waste water generated after reuse from the proposed project will be 270 KLD.

The SEIAA has emphasized to obtain permission for utilization of treated sewage for Avenue Plantation with details of land area earmarked. In this regard, we request you to grant permission to utilize the generated waste water for watering roadside trees and OSR development. We will be very thankful if you kindly issue the permission letter indicating the estimated quantity of 290 KLD at the earliest.

Executive Engineer & Ado
Anna Nagar Division

ANNEXURE VI

NOC - AAI, TRAFFIC, PWD INUNDATION, FLOOD & FIRE AND RESCUE SERVICES

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

M/s Tamil Nadu Housing Board represented by Shri. Ravichandran, Executive Engineer and Authorised Si

Date: 26-06-2020

The Executive Engineer and Ado, Anna Nagar Division, Tamil Nadu Housing Board, Nandanam, Chennai – 600035

Valid Upto: 24-06-2028

No Objection Certificate for Height Clearance

1. This NOC is issued by Airports Authority of India (AAI) in pursuance of responsibility conferred by and as per the provisions of Govt. of India (Ministry of Civil Aviation) order GSR751 (E) dated 30th Sep. 2015 for Safe and Regular Aircraft Operations.

2. This office has no objection to the construction of the proposed structure as per the following details:

NOC ID :	CHEN/SOUTH/B/061320/467308
Applicant Name*	Nachiappan K
Site Address*	Proposed Multistoried Mixed Use Building including Residential flats and Offices in TS.No.2, Block No.4 of Arumbakkam Village, Egmore Nungambakkam Taluk, Chennai District, Tamil Nadu,Egmore Nungambakkam Taluk/Arumbakkam Village/Arumb,Chennai,Tamil Nadu
Site Coordinates*	13 04 39.11N 80 12 18.35E, 13 04 37.32N 80 12 18.54E, 13 04 39.43N 80 12 20.66E, 13 04 38.14N 80 12 20.84E, 13 04 39.46N 80 12 21.22E, 13 04 37.92N 80 12 21.44E, 13 04 40.06N 80 12 25.57E, 13 04 38.51N 80 12 25.79E
Site Elevation in mtrs AMSL as submitted by Applicant*	11.34 M
Permissible Top Elevation in mtrs Above Mean Sea Level(AMSL)	107.29M

*As provided by applicant

3. This NOC is subject to the terms and conditions as given below:

a. Permissible Top elevation has been issued on the basis of Site coordinates and Site Elevation submitted by Applicant. AAI neither owns the responsibility nor authenticates the correctness of the site coordinates & site elevation provided by the applicant. If at any stage it is established that the actual data is different, this NOC will stand null and void and action will be taken as per law. The office in-charge of the concerned aerodrome may initiate action under the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994"

b. The Site coordinates as provided by the applicant in the NOC application has been plotted on the street view map and satellite map as shown in ANNEXURE. Applicant/Owner to ensure that the plotted coordinates corresponds to his/her site.In case of any discrepancy,Designated Officer shall be requested for cancellation of the NOC.

c. Airport operator or his designated representative may visit the site (with prior coordination with applicant or owner) to ensure that NOC terms & conditions are complied with.

d. The Structure height (including any superstructure) shall be calculated by subtracting the Site elevation in AMSL from the Permissible Top Elevation in AMSL i.e. Maximum Structure Height = Permissible Top Elevation minus (-) Site Elevation.

e. The issue of the 'NOC' is further subject to the provisions of Section 9-A of the Indian Aircraft Act, 1934 and any notifications issued there under from time to time including the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules,1994.

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

f. No radio/TV Antenna, lighting arresters, staircase, Mumtee, Overhead water tank and attachments of fixtures of any kind shall project above the Permissible Top Elevation of 107.29M (AMSL), as indicated in para 2.

g. Use of oil, electric or any other fuel which does not create smoke hazard for flight operations is obligatory, within 8 KM of the Aerodrome Reference Point.

h. The certificate is valid for a period of 8 years from the date of its issue.One time revalidation without assessment may be allowed, provided construction work has commenced,subject to the condition that such request shall be made within the validity period of the NOC and the delay is due to circumstances which are beyond the control of the developer.

i. No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground lights of the Airport shall be installed at the site at any time, during or after the construction of the building. No activity shall be allowed which may affect the safe operations of flights

j. The applicant will not complain/claim compensation against aircraft noise, vibrations, damages etc. caused by aircraft operations at or in the vicinity of the airport.

k. Day markings & night lighting with secondary power supply shall be provided as per the guidelines specified in chapter 6 and appendix 6 of Civil Aviation Requirement Series B Part I Section 4, available on DGCA India website: www.dgca.nic.in

l. The applicant is responsible to obtain all other statutory clearances from the concerned authorities including the approval of building plans. This NOC for height clearances is to ensure the safe and regular aircraft operations and shall not be used as document for any other purpose/claim whatsoever, including ownership of land etc.

m. This NOCID has been assessed w.r.t Chennai Airport(s). NOC has been issued w.r.t. the AAI aerodromes and other licensed civil aerodromes as listed in Schedule-III, Schedule-IV(Part-1), Schedule-IV(Part-2;RCS Airports Only) and Schedule-VII of GSR751(E).

n. Applicant needs to seek separate NOC from Defence, if the site lies within the jurisdiction of Defence Aerodromes as listed in Schedule-V of GSR751(E). As per Rule 13 of GSR751(E), applicants also need to seek NOC from the concerned State Govt. for sites which lies in the jurisdiction of unlicensed aerodromes as listed in Schedule-IV (Part-2;other than RCS airports) of GSR751(E) .

o. In case of any discrepancy/interpretation of NOC letter, English version shall be valid.

p. In case of any dispute w.r.t site elevation and/or AGL height, top elevation in AMSL shall prevail.

Chairman NOC Committee

Region Name: SOUTH

Address: General Manager Airports Authority of India, Regional Headquarter, Southern Region, Chennai Airport, Chennai-600027 (Tamil Nadu)

Email ID: vomm.noc@aai.aero

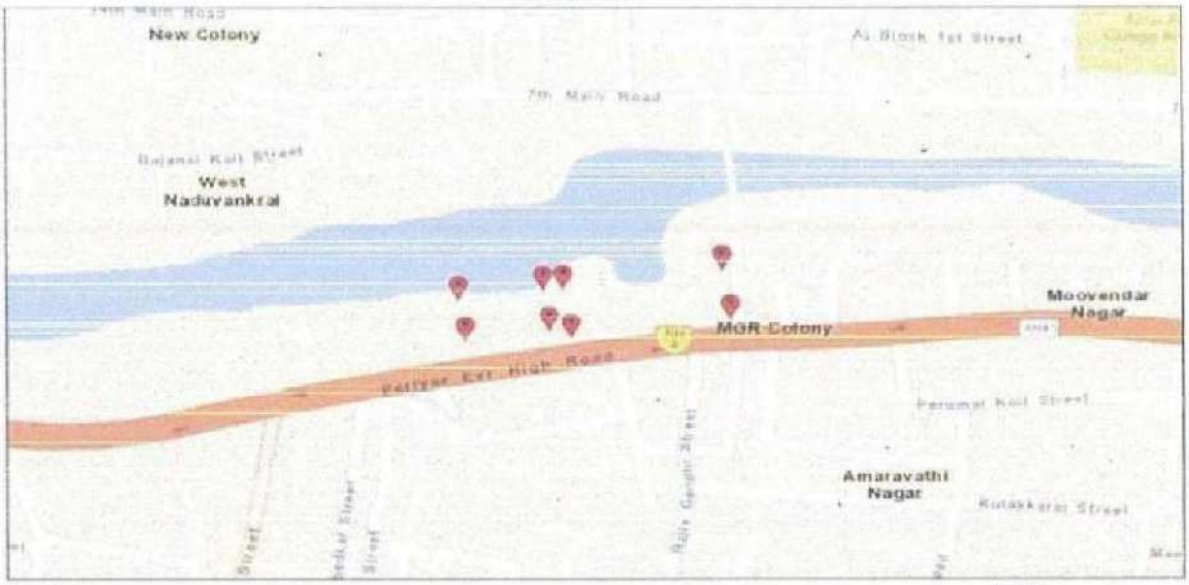
Contact No: 044-22560046

Name / Designation / Sign with Date	
Prepared By :	
Verified By :	

Distance From Nearest Airport And Bearing

Airport Name	Distance (Meters) from Nearest ARP	Bearing (Degree) from Nearest ARP
Chennai	9700.17	20.83
NOCID	CHEN/SOUTH/B/061320/467308	

Street View



Satellite View

Public Works Department
Water Resources Department

From
Er.K. Asokan M.Tech.,
Chief Engineer, WRD.,
Chennai Region, PWD.,
Chepauk, Chennai - 5.

To
The Member Secretary,
Chennai Metropolitan Development Authority
No.1, Gandhi Irwin Road,
Egmore, Chennai – 600 008

Letter.No.DB / T5(3) / F- NOC – Arumbakkam / 2020 / dated.03.10.2020

Sir,

Sub: CMDA – Area Plan Unit – MSB (N) Division – Planning permission for the construction of high rise commercial cum residential building group development viz Block – 1: Double basement floor + ground floor + 22 floors – commercial office building; combined double basement floor for tower – 2 & 3 + combined stilt floor cum ground floor for tower – 2 & 3; Tower – 2 : 1st floor to 19th floor – residential tower with 152 dwelling units; Tower – 3 : 1st floor to 19th floor – residential tower with 152 dwelling units (Totally 304 dwelling units) by availing premium FSI at old S.No.249/1, 3, 4 & 5, 250/1, 2, 3, 4, 5 & 6, 251, 252/2A and T.S.No.2 Block No.4 of Arumbakkam village, Poonamallee High Road, GCC – Demarcation the TNHB land and PWD Cooum river boundary – Remarks along with NOC on inundation point of view – Issued – regarding.

Ref:
1.The Member Secretary, Chennai Metropolitan Development Authority, Chennai-8's letter No.CMDA / PP / MSB / N / 0296 / 2020 / 01.07.2020.
2.The Superintending Engineer, PWD., WRD., Palar Basin Circle, Chepauk, Chennai Letter No.DB / JDO – 1 / F – 2301 (NOC) /.2020 / 04.09.2020.
3.The Assistant Director of Survey, Chennai letter No.2333 / 2020 / 11.09.2020.
4. The Executive Engineer & ADO, TNHB, Thirumangalam, Chennai – 600 101 letter No.AND / Plg / 869 / 2018 / 11.09.2020.
5. The Deputy Secretary to Government, Highways & Minor Ports (HW1) / Department, Chennai – 600 009 letter No.1726 / HW1 / 2012 – 74 / 14.09.2020.
6. The Deputy Secretary to Government, Highways & Minor Ports (HW1) / Department, Chennai – 600 009 letter No.1726 / HW1 / 2012 – 75 / 16.09.2020.
7. This office letter No.DB / T5 (3) / F - NOC- Arumbakkam / 2020 / 16.09.2020.
8. The Chief Engineer (City), TNHB, 493, Anna Salai, Nandanam, Chennai – 600 035 letter No.CE / PC / 3 / 20-21 / 23.09.2020.

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In the reference cited above the Member Secretary, CMDA, Chennai informed that the TNHB has applied for the "Planning permission for the construction of high rise commercial cum residential building group development viz Block – 1: Double basement floor + ground floor + 22 floors – commercial office building, combined

double basement floor for tower – 2 & 3 + combined stilt floor cum ground floor for tower – 2 & 3; Tower – 2 :1st floor to 19th floor – residential tower with 152 dwelling units; Tower – 3 : 1st floor to 19th floor – residential tower with 152 dwelling units (Totally 304 dwelling units) by availing premium FSI at old S.No.249/1, 3, 4 & 5, 250/1, 2, 3, 4, 5 & 6, 251, 252/2A and T.S.No.2 Block No.4 of Arumbakkam village, Poonamallee High Road, GCC" and directed the TNHB to furnish the sketch showing the width of the abutting road at all crucial points along with earmarking site dimension to confirm encroachments in Cooum river if any and details of alignment of proposed elevated corridor to confirm whether the site is affected by the project with PWD/WRD NOC on inundation point of view, which have not been furnished by the TNHB so far.

The site under reference is located in the co-ordinates of 13°04'38"N 80°12'20"E. The applicant furnished only Patta, Block Map & combined FMB sketch latest which is modified from the original Revenue records i.e.1906 records, except patta land ownership documents other documents have not been furnished by the applicant. The Revenue records namely village plan of Arumbakkam and Naduvankarai village, A.Register, FMB sketch of the year 1906 are very much required to ascertain the classification and ownership of the said lands. As per A.Register the S.F.No.249, 250, 251 & 252 are classified as Red soil dry Land. The slum dwellers have already encroached of about 18m in Arumbakkam village and 40m encroached in Naduvankarai village of Cooum river boundary. The same was evicted for the purpose of Elevated Corridor by NHAI as well as for the Restoration of Cooum river by CRRT to protect the water body boundaries as per old Revenue record measurements. While scrutinizing and comparing the available latest Revenue records furnished by the applicant with old Revenue records of year 1906 the present site is found to be varying in measurements and not coinciding with 1906 map matching and contradictory to the available records with PWD/WRD. And it is found that TNHB and also TNSCB encroached in S.F.No.127, 128 & 129 and in S.F.No.117 of Naduvankarai village respectively on Northern side i.e.left side bank of Cooum river i.e.opposite to the proposed site.

The site was jointly inspected with the TNHB officials and found that the site is located abutting the river boundary on the right bank along the downstream of Inner Ring Road Bridge at LS.14200m. On physical observation it is found that the site has a sloping terrain towards the river bed from the existing Poonamalle Road on the

Southern side of the river in S.F.No.248. Cooum river flows partly in S.F.No.253 and partly in S.F.No.97 on Northern side of Poonamallee high road. The field levels were transferred from the Temporary Bench Mark as Inner Ring Road Bridge road top level (+)12.370m MSL and bridge soffit level as (+).10.570m on Southern side. At present the applicant fixing their Northern boundary with available latest documents as FMB, Block Map & Patta which lies along the middle portion of the existing Cooum river where the Baby canal is in existence which is recently formed during the restoration works by CRRT which seems to be an encroachment in S.F.No.253 of Arumbakkam and S.F.No.97 of Naduvankarai village. Originally the Baby canal width formed for about 14m along the middle portion of Cooum river reduced to 4m wide at this stretch due to dumping of earth by TNHB without concurrence and prior permission from PWD/WRD. In case of any legal proceedings in respect of the developmental activities in the said water course poromboke, since it is violation against prevailing Government orders, Circulars, Hon'ble Supreme Court & High Court, NGT judgments, Tank Protection Act 2007 and G.O.Ms.No.78 / H&UD (UD4(3) D / 04.05.2017 etc. This was already brought to the notice of TNHB officials during marking of alignment. Hence, the PWD/WRD will not held responsible if any litigation arises. The above proposal is to be deferred due to the above said reasons. Also if there is any discrepancy in the Revenue records produced by the applicant, and the applicant will be held responsible. Hence, the applicant should immediately restore the Cooum river with baby canal to its original standards as per G.O.Ms.No.78 / H&UD (UD4(3) D / 04.05.2017 or otherwise upper reaches will out flank and leads to inundation and affect public and property and this could create flood surge and afflux during heavy flood and inundate the adjoining areas. It should be restored before the ensuing North East monsoon which will set in by first week of October 2020.

Cooum River is one of the major flood carriers in Chennai City which drains the surplus water from upper tanks spread around 400 sq km and discharge the flood into the Bay of Bengal at Chepauk. The proposed site lies in close proximity with river front and hence any developments in the site requires scientific analysis taking into account the river slope, river width and the maximum probable flood discharge and the existing discharging capacity of the river stretch etc considering the possibility of flood prone phenomena. The yester-year flood in 2015 was catastrophic and the River experienced a huge bulge due to massive discharge

during 2015 and outflanked at several stretches along the banks. The Maximum flood level observed near the site under reference during the 2015 floods was found as (+).11.375m MSL. However, the adjoining Poonamalle Road abutting the site is at a higher elevation of (+) 12.875m MSL. Hence it is quite imperative that the road level has to be taken as datum for analysis of flood inundation on comparison with the existing field levels.

To ascertain the gravity of inundation, levels were transferred from Inner Ring Road Bridge road top level (+)12.370m MSL to the proposed site to evaluate the existing ground level of various survey numbers within the site boundary. The field levels were taken in a closed grid and for examining inundation point of view, lowest ground level in each survey number has been chosen for comparison against the Road level to determine the depth of filling required. As safety is the predominant factor, the site must be raised to a minimum level of 60cm above the Road level. Hence the site must be above the level of (+) 12.875m +0.60m = (+) 13.475m.

A statement of existing ground level on the respective survey numbers within the site boundary and the depth of filling required are indicated below:

Sl.No.	Field Survey Nos.	Existing field level	Maximum Flood Level during 2015	Proposed level (+)12.875m + 0.60m =13.475m	Required depth of filling in m.
1	249	(+) 8.150	(+) 11.375	(+)13.475	5.33
2	250	(+) 8.750			4.73
3	251	(+) 7.865			5.61
4	252	(+) 11.890			1.59
5	Poonamalle Road	(+) 12.875			—

The tabulation above indicates that the terrain of Site is a low lying area below the anticipated maximum flood level and needs filling to a depth ranging from 1.59metre to 5.61metre to counteract any inundation in the near future.

The present proposal consists of construction of high rise commercial cum residential building group development viz Block – 1: Double basement floor + ground floor + 22 floors – commercial office building; combined double basement floor for tower – 2 & 3 + combined stilt floor cum ground floor for tower – 2 & 3;

Tower – 2 :1st floor to 19th floor – residential tower with 152 dwelling units; Tower – 3 : 1st floor to 19th floor – residential tower with 152 dwelling units (Totally 304 dwelling units). It envisages 2 Basement floors each of 3.50m height with ramps for vehicle parking. The total depth is 7.00m below the proposed Stilt floor. Although the site requires filling to the required depth as indicated above, the TNHB has proposed to construct (2B+S+19/22 Floors) where in Stilt is exclusively meant for parking amenities. Hence the Stilt floor shall be fixed above the level of (+) 13.475m MSL to safeguard against inundation in any form. Moreover the applicant should form the internal storm water drainage network of size not less than 1.50 x 1.20m as peripheral and 0.90 x 0.75m as lateral drain with road side drains to drain the rain water towards Northern side Cooum river and, at present the applicant lands is functioning as flood plains along the right side of Cooum river.

The applicant site is assessed to be a flood prone area during 2015 floods, the technical feasibility of proposed basement floor is not advisable. If applicant proposed 2 basement means it is upto the applicant risk. If any panic situation arises during future floods the applicant is held responsible, since the entire surrounding area on all directions rain water should be drained into the Cooum river due to all are at lower level (at present the TNHB land functioned as flood bowl). The entire pavement level of the proposed site should not be less than (+).13.475m.

The site is abutting Cooum river and hence a minimum buffer zone of 15m for construction of permanent buildings structures should be left vacant within the applicant lands i.e.S.F.No.249, 250, 251 & 252 as per the circular issued by the office of the Commissioner of Town & Country Planning, Chennai – 2 vide Roc.No.4367 / 2019-BA2 / 13.03.2019 which should be left vacant from the Revenue boundary of the river course (1906 year Revenue records). This is mandatory and no permanent structure should be constructed in this zone.

The Cooum river alignment falls in Survey No.97 of Naduvankarai village and in Survey No.253 of Arumbakkam Village as per the Revenue records sketch where the proposed site of TNHB exists. Presently, there is a boundary conflict between PWD and TNHB as the TNHB has fixed the site boundary inside the river course wherein the Baby canal with revetment rip-rap was already formed along the centre of the river to channelize the lean flow during the dry weather flow. The available width of the river near Inner Ring Road Bridge (LS14740m) is 130metre while the width at Naduvankari Bridge (LS 13320m) is found to be 120metre. The river width

has been reduced to 40metre width at this stretch against average width of about 118m (116m, 118m & 120m) which is available as per Revenue records at the stretch of Cooum river abutting the proposed TNHB site. This could create flood surge and afflux during heavy flood and inundate the adjoining areas

Based on the previous floods during the year 1976, 1985, 1996, 1998, 2005 & 2015 various studies were taken up from 1943 to 2013 to improve Chennai City Water Ways and to reduce risk during floods and delivered that acute hindrance to hydraulic functions, restricted vent way in old arch bridges causing flood hazard disposal of solid waste and construction debris and legal & illegal encroachments in the flood plains and flood bowls along the coast. Regarding Cooum river specific study with History of Cooum river for Cooum improvement scheme from 1968 also with above studies and available old year 1906 Revenue records the Flood relief works in Cooum river under the HUDCO Assistance the Government accorded the Administrative sanction vide G.O.Ms.No.321 / H&UD / Dt.12.8.1998, the work was taken up estimate prepared and tender called for agency also concluded and then cancelled due to encroachment eviction of Government policy having CMDA as Nodal Agency. Subsequently the execution of Eco-restoration Project, the river bouncary was demarcated in co-ordination with the Revenue Department and accordingly the river bund was formed. Since the present boundary of TNHB contradicts with the demarcated boundary during the CRRT scheme, **a minimum offset of 15metre shall be kept devoid of any construction activities and the site should be as it is in conditions before filling the earth and the Cooum river width of about 118m should be permanently provided otherwise the technical opinion along with NOC of this department will be deferred without any correspondence and PWD/WRD will not be held responsible.**

Moreover, the Elevated Corridor between Chennai Port and Maduravoyal has been already finalized by NHAI along the Cooum River bank and the alignment falls at this location, forming of Technical committee regarding NHAI alignment confirmation and the same was submitted to the Hon'ble Supreme Court and the case is pending before the Hon'ble Supreme court. Also there was Notification published under section (3) & (4) of section 3G of NH Act, 1956 (48 of 1956), a part of TNHB land in Block 4 s.f.No.2/2 for Land Acquisition in Times of India on 25.08.2020 and Dhinakaran on 26.08.2020, works should be taken up in this area only after the pending case gets resolved in the Hon'ble Supreme Court.

Based on the available old Revenue records as much as considering the prevailing site conditions, with respect to the Government orders, Circulars as well as Hon'ble Supreme Court & High Court judgments, NGT judgments, Tank Protection Act 2007 & G.O.Ms.No.78 / H&UD (UD4(3)) D / 04.05.2017, NHAI Notification and the Chief Secretary to Government of Tamil Nadu Minutes of Meeting held on 08.09.2020, necessary Technical opinion along with NOC only on inundation point of view for the Planning permission for the construction of high rise commercial cum residential building group development viz Block – 1: Double basement floor + ground floor + 22 floors – commercial office building, combined double basement floor for tower – 2 & 3 + combined stilt floor cum ground floor for tower – 2 & 3; Tower – 2 :1st floor to 19th floor – residential tower with 152 dwelling units; Tower – 3 : 1st floor to 19th floor – residential tower with 152 dwelling units (Totally 304 dwelling units) by availing premium FSI at old S.No.249/1, 3, 4 & 5, 250/1, 2, 3, 4, 5 & 6, 251, 252/2A and T.S.No.2 Block No.4 of Arumbakkam village, Poonamallee High Road, GCC" in favour of the Executive Engineer & ADO, TNHB, Thirumangalam, Chennai – 600 101 is hereby issued to CMDA subject to the following Technical points besides any other mandatory clearance and statutory permission from any other organizations (or) departments for the consideration of planning permission by the Chennai Metropolitan Development Authority existing Norms & Rules in force.

Terms and Conditions:

1. The applicants' land should be filled with earth filling with proper compaction to the minimum level of (+)13.475m i.e.1.11m above the TBM on Inner Ring Road Bridge road top level (+)12.370m MSL on Southern side to protect the site from inundation during floods. The process of earth filling and compaction should be done in layers of not more than 0.30m depth to achieve the required degree of compaction for the depth varying from 1.59m to 5.61m depending upon the existing field levels. Hence, the stilt floor should be kept above the level of (+)13.475m MSL to safeguard against inundation in any form. The TNHB shall allocate the Stilt floor/basement floor exclusively for parking amenities to avoid human casualties. The resident should reside only in the first floor. Also, the applicant should provide emergency pumping operation for the seepage water, if it is proposed to have basement floor and as well as dewatering arrangements during flood periods.

2. The TNHB should construct an all round RCC Flood Protection Wall for their premises with the top level of the wall fixed at (+) 13.475m on the Northern side leaving 15m width of buffer zone along the river stretch boundary.

3. A minimum offset of 15metre (circular issued by the office of the Commissioner of Town & Country Planning, Chennai – 2 vide Roc.No.4357 / 2019-BA2 / 13.03.2019) should be kept devoid of any construction activities and the site should be as it is in conditions before filling the earth and the Cooum river width of about 118m should be permanently provided excluding the width of buffer zone otherwise the technical opinion along with NOC of this department will be deferred without any correspondence and PWD/WRD will not be held responsible. The width of the river earmarked in the sketch should never be altered and must be maintained at all time as per Revenue records. This is mandatory and no permanent structure should be constructed to allow water to drain without causing inundation or afflux on the upstream side of the river.

4. The applicant should prepare the layout proposal by considering the suitable internal storm water drainage network of suitable size not less than (peripheral-1.50m x 1.50m & lateral-0.90m x 0.75m), rainwater harvesting, roads along with road side drain on both sides and sewerage alignment and its disposal & garbages/debris and other solid waste management as per norms in existence within the applicants' land according to the existing rules in force and should get proper approval from the competent authority without fail.

The sewage or any unhygienic drainage (i.e.treated or untreated) should not be let into the drain/river course at any cost and the debris and other materials should not be dumped into the drain/river course obstructing free flow of water. The applicant should make drain networks at their own cost and the same is to be connected to the natural storm water drainage or river. There should not be any hindrance to the free flow of internal drain to the downside area. It must be ensured that any treated / untreated sewage from the TNHB property shall never be let into the river at any event of time.

5. At present the applicant fixing their Northern boundary with available latest documents as FMB, Block Map & Patta which lies along the middle portion of the existing Cooum river where the Baby canal recently formed during the restoration works by CRRT which seems to be an encroachment in S.F.No.253 of Arumbakkam

and S.F.No.97 of Naduvankarai village. Originally the Baby canal width formed for about 14m along the middle portion of Cooum river reduced to 4m wide at this stretch due to dumping of earth by TNHB without concurrence and prior permission from PWD/WRD. In case of any legal proceedings in respect of the developmental activities in the said water course poromboke, since it is violation against prevailing Government orders, Circulars, Hon'ble Supreme Court & High Court, NGT judgments, Tank Protection Act 2007 and G.O.Ms.No.78 / H&UD (UD4(3) D / 04.05.2017 etc. This was already brought to the notice of TNHB officials during marking. Hence, the PWD/WRD will not held responsible if any litigation arises. The above proposal is to be deferred due to the above said reasons. Also if there is any discrepancy in the Revenue records produced by the applicant, and the applicant will be held responsible. Hence, the applicant should immediately restore the Cooum river with baby canal to its original standards as per G.O.Ms.No.78 / H&UD (UD4(3) D / 04.05.2017 or otherwise upper reaches will out flank and leads to inundation and affect public and property and this could create flood surge and afflux during heavy flood and inundate the adjoining areas. It should be restored before the ensuing North East monsoon which will set in by first week of October 2020.

6. The TNHB should not carry out any other cross masonry structures across the river without prior permission from PWD/WRD.

7. The TNHB must get the clearances from relevant Departments such as MoEF, Pollution Control Board and CRZ, CRRT etc., if mandatory, before executing the project including NHAI alignment clearance in court case and which is pending in Honb'le Supreme Court.

8. The applicant should do proper soil test, and suitable foundation should be selected depending upon the soil condition and the structural design should be obtained from the approved and qualified Structural Engineer.

9. The PWD/WRD., will not be held responsible for the Structural Stability, safety and soundness of the building proposed by the applicant and PWD/WRD specifically recommend only for inundation point of view. The applicant is solely responsible for the structural safety and stability of the proposed building and at any cost PWD/WRD will not be held responsible for design and drawing adopted for proposed construction.

10. The applicants should obtain clearance for the dry lands are to be converted into other zone from the agricultural zone by the competent authority. The applicant should get clearance certificate for their site from the Revenue department to make sure that the site is not an encroached property from the water body as well as confirming this proposed site boundaries.

11. The PWD/WRD officers should be allowed to inspect the site at any time during execution and thereafter, if necessary. Advance intimation should be given to the PWD/WRD officers concerned before commencement of work. PWD/WRD is giving opinion only in connection with inundation aspects and does not deliver any rights to the applicants to encroach the PWD / Government Lands.

12. The permission granted to the applicant, should not be altered/modified, changed to any others. Based on the records submitted by the applicant, the inundation as well as permission is granted. If any documents seem to be fake/manipulated/fabricated, in future the above inundation NOC along with permission will be cancelled without any correspondence and deposited amount for caution deposit will not be refunded. Hence, the applicant is solely responsible of genuinety of the documents submitted.

13. The applicants should abide by the rules and regulation of the PWD/WRD from time to time. The applicants should also abide court of law in both State & Central level from time to time.

14. PWD/WRD is giving opinion only in connection with the inundation aspect and does not deliver any rights to the applicants to encroach the PWD / Government Lands. The NOC for their site issued from PWD/WRD is purely issued on the basis of inundation point of view.

15. The applicant should provide adequate passage along the Cooum river course which is necessity for accessing the heavy machinery for maintenance work improvements work of the river to be carried out by PWD/WRD. The applicant should not object at any time for the maintenance work / improvements work of the Cooum river to be carried out by PWD/WRD. The applicant should give an undertaking in writing to the effect that the above proposal will not obstruct in case any maintenance/improvement/development works in Cooum river lies lands as per Revenue records [FMB] which are to be carried out by PWD/WRD in future periodically.

16 And it is found that the TNHB also encroached in S.F. No.127, 128 & 129 as well as TNSCB in S.F. No.117 in Naduvankarai village (left bank on Northern side of river of the proposed site. Cooum river should be widen and the river width restored with respect to the old year 1906 Revenue record reinforcement as per G.O.Ms.No.78 / H&UD (UD4(3)) / 04.05.2017 immediately.

The owner of the document received from the applicants in relation to the ownership is purely of applicant's responsibility and it is only for reference purpose to this department. The legal validity of this document should be verified by the Development / Revenue authorities / CMDA. The specific remarks on inundation are purely issued on technical grounds in respect to the physical location of land.

Failing to comply with any of the above conditions, PWD/WRD reserves rights to withdraw the Technical opinion with NOC on inundation point of view for the above proposed site and in event the applicants shall not be eligible for any compensation whatsoever and as well as legal entity.

For Chief Engineer, PWD., WRD.,
Chennai Region, Chennai-5.

31x/20.

ANNEXURE VII

SOIL TEST REPORT

GEO MARINE
THE SPIRIT OF ENGINEERING

GEO MARINE CONSULTANTS (P) LTD.,
11, 2nd Main Road, Kannappa Nagar Ext,
Kottivakkam, Chennai – 600 041.
Ph. No. 044 - 24481485 & 24480305.
Email: geotech@geomarineindia.com / drcvp@geomarineindia.com

NAME OF PROJECT

PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (TWO BASEMENT + GROUND + 22 UPPER FLOORS) AT ARUMBAKKAM, CHENNAI

CLIENT

RDX ARCHITECTS,
#2,4TH STREET, KAMARAJ NAGAR,
SATHYA GARDEN, SALIGRAMAM,
CHENNAI – 600 093

TITLE

GEOTECHNICAL INVESTIGATION REPORT

REPORT NO.: GT- 2057

DATE	REVISON	DESCRIPTION		AUTHORISED SIGNATORY
03/03/2020	FIRST SUBMISSION	SUBMISSION OF GEOTECHNICAL REPORT	SIGN	
			DATE	03/03/2020
			DESIGNATION	MANAGING DIRECTOR
			NAME	DR. C.V.PRASAD

CONTENTS

CHAPTER-1

INTRODUCTION

1.0 Project Information Matrix

Nature of project : Residential Building (2 Basement + G +22 Floors)

Project Client : **RDX Architects**

Project Owner : **TAMILNADU HOUSING BOARD**

Project Location : Arumbakkam, Chennai

Job Code : GT-2057

1.1 Scope Of Work

1.1.1 Field Work

- Conducting five soil investigation bore holes of 150 mm diameter up to a maximum depth of 30m depth.
- Conducting Standard Penetration Test (SPT) within the borehole at every 1.0m depth interval up to 10.0m and thereafter at every 1.5m up to the borehole termination depth
- Collection of soil samples and undisturbed samples from the clayey strata with SPT-value greater than 2 to less than 15 if met within the investigation depth
- Collection of water samples if groundwater table met within the investigation depth

1.1.2 Laboratory Work

- Natural Moisture Content
- Atterberg limits
- Grain Size Analysis
- Chemical Analysis test on soil and water samples to give pH, Chlorides and Sulphates

1.2 Structure of the Report

- Contents
- Introduction
- Investigation Methodology & Test Results
- Sub-Surface Stratification
- Foundation System
- Recommendation
- Annexure

CHAPTER-2

INVESTIGATION METHODOLOGY & TEST RESULTS

2.0 Preamble:

Five soil investigation boreholes were put as per the planning of the engineer in-charge and these locations are shown in Fig.2.0.The equipment used and the methodology adopted to carry out the fieldwork is described below.

2.1 Methodology of Field Work:

2.1.1 Equipment Used and Method of Drilling:

All the boreholes were sunk by conventional rotary drilling rigs. For borehole Methodology followed for boring conformed to IS: 1892 -2000, Boring was progressed by the cutting action of rotating bit with water circulation and stabilizing the side of the boreholes by using casing pipes/bentonite slurry up to required depth to prevent collapse of sidewall. Boring was continued by normal boring process using MS soil cutter in soil. However Tungsten Carbide (TC) bit drilling was resorted to drill in highly weathered rock stratum where the normal boring process became slow. Diamond Core (DC) bit drilling was adopted in moderately weathered rock formations where penetration using TC bit was became slow.

2.1.2 Standard Penetration Tests:

This is a field test to determine "Penetration Resistance of Stratum at the Test Depth". This has been conducted in the boreholes generally up to refusal depth using procedures described in IS: 2131- 2002. In this test, split spoon sampler (50.8 mm OD and 35 mm ID) has replaced driving bit. Sampler is then driven by dropping 63.5 kg hammer on top of driving collar with free fall of 75 cm. The length of sampler is 60 cm.

The tests were conducted at the depth intervals indicated in Chapter-1 (Sec.1.1.1).

2.1.3 Collection of Soil Samples:

2.1.3.1 Disturbed Samples:

The SPT-samples collected were used as disturbed soil samples. These samples were used for visual and physical identification and for conducting laboratory classification tests as per I.S.1498-1970.

2.1.4 Collection of Ground Water Samples:

One representative water sample from each borehole was collected after 24 hours of completing the borehole if water table met within the investigated depth.

Note on Groundwater Table Record:

- Groundwater table observation in geotechnical report is predominantly to arrive at foundation design criteria and shall not be construed as design guidelines for the design of dewatering systems
- The groundwater level indicated in the bore logs is specific to the duration of investigation and intensity of the monsoon rains during the time of investigation. Hence, the level shall be taken as guidelines only to plan the investigation for the dewatering system

- ❖ No foundation excavation or basement excavations if anticipated within the groundwater table zone shall be carried out without implementing groundwater lowering schemes

2.2 Laboratory testing:

2.2.1 On Coarse Grained Soil

On the representative samples, sieve analysis tests were conducted to arrive at grain size distribution. These tests were conducted as per I.S.2720 (part 4)-1985 and the results are presented in Tables-2.1 to 2.5. The graphical representation of grainsize distribution curve for the representative samples in each bore is presented in Fig. 2.7 to 2.11.

2.2.2 On Fine Grained Soil

On the SPT sample index property tests were conducted to estimate consistency. These test results are presented in Tables-2.1 to 2.5. The graphical representation of hydrometer analyses curve for the representative samples in each bore is presented in Fig. 2.12 to 2.21.

2.2.3 Chemical Analysis Tests

On representative soil and water samples chemical analysis tests were conducted to estimate pH, Chloride and Sulphates and these results are presented in Table - 2.6.

2.3 Summary:

The locations of the field investigation boreholes are shown in site plan given in Fig.2.0. The average sub soil profiles encountered at each location along with their classification and engineering properties are presented in Figs.2.1 to 2.5. Further, the cross sectional variation of the sub surface profile through different bore holes in different directions are presented in Fig.2.7.

FIGURE 2.1 SITE PLAN CONSISTING OF FIELD INVESTIGATION BOREHOLE LOCATIONS

GEOMARINE

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-01
PAGE No.	1
DIA OF BORE HOLE	150mm ✓ / NX

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING					BORE START DATE	21/01/2020
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	23/01/2020
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TC8 / TC6)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No.	Layer Data: Depth	Geotechnical Description
1	21/01/2020	16	59															
		To																
2		17	48															
3																		
4																		
5	22/01/2020	11	09															
		To																
6		11	50												L1	6.0		Filled up Materials consisting of old building debris, Brick pats & soil mixture
7	23/01/2020	14	50	SC	-	-	9	20	23	43	7.00	1	SS	-7.0				
		To									7.45 ▽				L2	8.5		Brownish yellow,Moist,Poorly Graded,Fine to Medium Grains, Dense to Very Dense,Silty SAND (SM) With Clay Binder at times
8		15	05				18	28	34	62	8.00	2	SS	-8.0				
											8.45 ▽							Borehole at this location is terminated at 8.0m due to uncontrollable water loss
9																		
10																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	Nurulkrishnan K.	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SCZ - Soil Cutter	DATE	23/01/2020	E.G.L WRT ROAD LEVEL(m) 0.00	Water table could not be established due to uncontrollable water loss
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m) -	
WS - Wash Sample	DB - Diamond Bit	DATE	23/01/2020	CASING DEPTH (m) 0.0	

Borehole terminated at 8 m depth below E.G.L

FIG.2.1 Sub Soil Profile at BH-01 Location

SITE INVESTIGATION RECORD

GEOMARINE

BORE HOLE No.	BH-02		
SHEET	1	OF	3
DIA OF BORE HOLE	150mm ✓ / NX		
BORE START DATE	10/01/2020		
BORE END DATE	20/01/2020		
TOTAL DRILL DAYS	5		

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING						
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-	
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E	-	

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
1	10/01/2020	-	-	SC	-	-	3	5	8	13	1.00	1	SS	-1.0				
											1.45							
2		-	-	SC	-	-	4	3	3	6	2.00	2	SS	-2.0				
											2.45							
3		-	-	SC	-	-	-	-	-	-	3.00	-	-	-3.0				Filled up Materials consisting of old building debris, Brick pats & soil mixture
4		-	-	SC	-	-	9	5	9	17	4.00	3	SS	-4.0				
											4.45							
5		-	-	SC	-	-	8	11	13	24	5.00	4	SS	-5.0				
		09	31								5.45					L1	5.8	
6		To 09	33	SC	-	-	3	7	16	23	6.00	5	SS	-6.0				Brownish Grey,Moist,Poorly Graded, Fine to Medium Grains,Medium Dense, Clayey Silty SAND (SC)
		09	58								6.45							
7		To 10	00	SC	-	-	25	24	22	46	7.00	6	SS	-7.0		L2	7.0	
	11/01/2020	10	20								7.45							
8		To 10	22	SC	-	-	15	24	29	53	8.00	7	SS	-8.0				Greyish Brown,Grey,Moist,Poorly Graded, Fine to Medium Grains,Dense to Very Dense,SAND - Silty SAND (SP/SP-SM) to Silty SAND (SM)
		10	41								8.45							
9		To 10	43	SC	-	-	20	14	19	33	9.00	8	SS	-9.0				
		11	06								9.45							
10		To 11	08	SC	-	-	7	5	5	10	10.00	9	SS	-10.0		L3	10.0	
											10.45							Grey,Moist,Stiff,Silty CLAY (CI) Lean Clay of Medium Plasticity

CS - Core Sample	DS - Disturbed Sample	LOGGED	Loganathan K.	PROJECT SITE DETAILS		REMARKS	
SS - Split Spoon Sample	SC - Soil Cutter	DATE	11/01/2020	E.G.L WRT ROAD LEVEL(m)	0.00	Water table could not be established due to uncontrollable water loss	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m)	-		
WS - Wash Sample	DB - Diamond Bit	DATE	20/01/2020	CASING DEPTH (m)	0.00		

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02						
SHEET	2	OF	3				
PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING			DIA OF BORE HOLE	150mm ✓ / NX		
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	10/01/2020
STRUCTURE	2 Basement + G+22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	20/01/2020
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	5

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blowcount 0-15	SPT Details: Blowcount 15-30	SPT Details: Blowcount 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
11	11/01/2020	11	35 To 11 39	SC	-	-	1	2	3	5	11.50 / 11.95	10	SS	-11.5		L4	11.5	Grey,Moist,Stiff,Silty CLAY (CI) Lean Clay of Meidum Plasticity
12		12	17 To 12 19	SC	-	-												
13							7	10	17	27	13.00 / 13.45	11	SS	-13.0		L5	13.0	Grey,Moist,Poorly Graded,Fine to Medium Grains,Loose,Clayey Silty SAND (SC)
14		13	45 To 13 47	SC	-	-												
							13	20	26	46	14.50 / 14.95	12	SS	-14.5				
15		14	30 To 14 32	SC	-	-												Grey,Moist,Poorly Graded,Fine to Medium Grains,Medium Dense to Dense,Clayey Silty SAND (SC) to Silty SAND (SM)
16							15	17	30	47	16.00 / 16.45	13	SS	-16.0				
17		16	02 To 16 04	SC	-	-										L5	17.5	
							16	36	37	73	17.50 / 17.95	14	SS	-17.5				
18	12/01/2020			SC	-	-												Grey,Moist,Poorly Graded,Fine to Medium Grains,Very Dense,Silty SAND (SM)
19							13	31	37	68	19.00 / 18.45	15	SS	-19.0		L7	19.0	
20																		Brownish Grey,Moist,Hard,Compacted CLAY (CH) Clays of High Plasticity

CS - Core Sample	DS - Disturbed Sample	LOGGED	Loganathan K.	PROJECT SITE DETAILS		REMARKS	
SS - Split Spoon Sample	SC - Soil Cutter	DATE	12/01/2020	E.G.L WRT ROAD LEVEL(m)	0.00	Water table could not be established due to uncontrollable water loss	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m)	-		
WS - Wash Sample	DB - Diamond Bit	DATE	20/01/2020	CASING DEPTH (m)	0.00		

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02						
SHEET	3	OF	3				
PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING			DIA OF BORE HOLE	150mm	✓	
					NX		
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	10/01/2020
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	20/01/2020
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	5

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
21	12/01/2020	Total Drilling Time 10 Mins		SC	-	-	15	23	34	57	21.00	17	SS	-21.0				
											21.45							Brownish Grey,Moist,Hard,Compacted CLAY (CH) Clays of High Plasticity
22		Total Drilling Time 6Mins		SC	-	-												
23	13/01/2020						33	15Cm Penet for 60Blows		>100	23.00	18	SS	-23.0		L8	23.0	
											23.30							
24		Total Drilling Time 9Mins		SC	-	-												Brownish Grey,Moist,Poorly Graded, Fine Grains,Very Dense,Clayey Silty SAND (SC)
25							23	57	11Cm Penet for 52Blows	>100	25.00	19	SS	-25.0		L9	25.0	
											25.41							
26	20/01/2020	14 To 15	55 05	SC	-	-												Brownish Green,Moist,Hard, Compacted CLAY (CI to CL) Clays of Medium to Low Plasticity
27							40	40	8Cm Penet for 45Blows	>100	27.00	20	SS	-27.0		L10	27.5	
											27.38							
28																		Borehole at this location is terminated at 27.0m due to uncontrollable water loss
29																		
30																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	Loganathan K.	PROJECT SITE DETAILS		REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	20/01/2020	E.G.L WRT ROAD LEVEL(m)	0.00	Water table could not be established due to uncontrollable water loss
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m)	-	
WS - Wash Sample	DB - Diamond Bit	DATE	29/01/2020	CASING DEPTH (m)	0.00	

Borehole terminated at 27 m depth below E.G.L

FIG.2.2 Sub Soil Profile at BH-02 Location

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03		
SHEET	1	OF	3
DIA OF BORE HOLE	150mm	✓	
	NX	✓	
BORE START DATE	22/01/2020		
BORE END DATE	28/01/2020		
TOTAL DRILL DAYS	6		

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING						
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-	
JOB CODE	GT-2357	FLUSHING MEDIUM	Bentonite		E	-	

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
1		10	45															
		To		SC	-	-												
2		11	15													L1	2.5	Filled up Materials consisting of old building debris, Brick pats & soil mixture
3		12	15				2	5	2	7	3.00	1	SS	-5.5				
		To		SC	-	-					3.45							
4		12	27				3	3	4	7	4.00	2	SS	-6.5				Black,Moist,Medium Stiff,Silty CLAY (CH) Clays of High Plasticity
		14	07								4.45							
		To		SC	-	-												
5	22/01/2020	14	30				6	12	14	26	5.00	3	SS	-7.5		L2	5.2	
		14	57								5.45							
		To		SC	-	-												
6		15	09				5	6	8	14	6.00	4	SS	-8.5				
		15	19								6.45							
		To		SC	-	-												
7		15	21				5	4	6	10	7.00	5	SS	-9.5				Brownish Grey,Moist,Poorly Graded, Fine to Medium Grains,Medium Dense to Dense, Clayey Silty SAND (SC)
		15	42								7.45							
		To		SC	-	-												
8		15	47				7	12	8	20	8.00	-	*SS	-10.5		L3	8.0	
		16	14								8.45							
		To		SC	-	-												
9		16	16				12	15	19	34	9.00	6	SS	-11.5				Grey,Moist,Poorly Graded,Fine to Medium Grains,Medium Dense to Dense,Silty SAND (SM)
	23/01/2020	10	45								9.45							
		To		SC	-	-												
10		10	47				13	15	15	30	10.00	7	SS	-12.5				
											10.45							

CS - Core Sample	DS - Disturbed Sample	LOGGED	Muralikrishnan K.	PROJECT SITE DETAILS		REMARKS	
SS - Split Spoon Sample	SC - Soil Cutter	DATE	23/01/2020	E.G.L WRT ROAD LEVEL(m)	-2.50		
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m)	4.50		
WS - Wash Sample	DB - Diamond Bit	DATE	28/01/2020	CASING DEPTH (m)	0.00		

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03						
SHEET	2	OF	3				
PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING			DIA OF BORE HOLE	150mm	✓	
					NX		
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	22/01/2020
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	28/01/2020
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	6

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
11	23/01/2020	11	40 To 11 50	SC	-	-												
12		12	16 To 12 20	SC	-	-	11	14	19	33	11.50 / 11.95	8	SS	-14.0				Grey,Moist,Poorly Graded,Fine to Medium Grains,Medium Dense to Dense,Silty SAND (SM) to Clayey Silty SAND (SC)
13							15	17	17	34	13.00 / 13.45	9	SS	-15.5				
14		10	18 To 10 31	SC	-	-												
15	24/01/2020	Total Drilling Time 42 Mins		SC	-	-	33	57	10Cm Penet for 50Blows	>100	14.50 / 14.90	10	SS	-17.0		L4	14.5	
16							15	20	29	49	16.00 / 16.45	11	SS	-18.5				Greyish Brown,Moist,Hard,Compacted CLAY (CH) Clays of High Plasticity
17		16	05 To 16 54	SC	-	-												
18	25/01/2020	11	05 To 11 28	SC	-	-	14	44	46	90	17.50 / 17.95	12	SS	-20.0				
19							37	55	10Cm Penet for 51Blows	>100	19.00 / 19.40	13	SS	-21.5		L5	19.0	
20																		Greyish Brown,Moist,PoorlyG raded, Fine to Medium Grains,Very Dense, Silty SAND (SM)

CS - Core Sample	DS - Disturbed Sample	LOGGED	Muralikrishnan K.	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	25/01/2020	E.G.L WRT ROAD LEVEL(m) -2.50	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kandasamy	WATER TABLE (m) 4.50	
WS - Wash Sample	DB - Diamond Bit	DATE	25/01/2020	CASING DEPTH (m) 9.00	

GROMARINE

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03
SHEET	3 OF 3
DIA OF BORE HOLE	150mm ✓ / NX ✓
BORE START DATE	22/01/2020
BORE END DATE	28/01/2020
TOTAL DRILL DAYS	6

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING				
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES N	-
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite	CO-ORDINATES E	-

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: RQD %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
21	25/01/2020	12	30	SC	-	-	21	35	12Cm Penet for 55Blows	>100	21.00	14	SS	-23.5		L6	21.0	Greyish Brown,Moist,PoorlyG raded, Fine to Medium Grains,Very Dense, Silty SAND (SM)
		To 12	50								21.42							
22		Total Drilling Time 90 Mins		SC	-	-												
23							23	40	10Cm Penet for 60Blows	>100	23.00	16	SS	-25.5				Brownish Grey,Moist,Hard,Compacted CLAY (CH) Clays of High Plasticity
											23.40							
24		09	55	SC	-	-												
		To 10	30															
25							9Cm Penet for 55Blows			>100	25.00	15	SS	-27.5		L7	25.0	
											25.09							
26	27/01/2020	11	18	SC	-	-										L8	26.0	Brownish Grey,Moist,Poorly Graded, Fine to Medium Grains,Very Dense, Silty SAND (SM)
		To 12	40															
27							3Cm Penet for 55Blows			>100	27.00	-	*SS	-29.5				
		14	45								27.03							
		To 15	40	DB	0	0												
28							SPT Hammer Rebound			>100	28.00	-	*SS	-30.5				Grey,Fine Grains,Argillaceous,Flasile, Hard, SHALE (Gondwana Formation)
		15	25															
		To 16	35	DB	0	0												
29							SPT Hammer Rebound			>100	29.00	-	*SS	-31.5				
	28/01/2020	10	20															
		To 12	10	TCB	30	0												
30							-		-	-	30.00	17	CS	-32.5		L9	30.0	

CS - Core Sample	DS - Disturbed Sample	LOGGED	Muralikrishnan K.	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	28/01/2020	E.G.L WRT ROAD LEVEL(m) -2.50	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m) 4.50	
WS - Wash Sample	DB - Diamond Bit	DATE	28/01/2020	CASING DEPTH (m) 9.00	

Borehole terminated at 30 m depth below E.G.L

FIG.2.3 Sub Soil Profile at BH-03 Location

SITE INVESTIGATION RECORD

GEOMARINE

BORE HOLE No.	BH-04		
SHEET	1	OF	3
DIA OF BORE HOLE	150mm	✓	
	NX	✓	

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING								
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-			BORE START DATE	28/01/2020
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-		BORE END DATE	31/01/2020
JOB CODE	GT-2357	FLUSHING MEDIUM	Bentonite		E	-		TOTAL DRILL DAYS	4

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Layer Data: Geotechnical Description
0	28/01/2020	16	04	SC	-	-												
		To																
		16	15															
		16	24	SC	-	-												
		To																
		16	33															
		16	48	SC	-	-												
		To																
		16	58															
3		10	15	SC	-	-	17	18	20	38	3.00	1	SS	-5.5				Filled up Materials consisting of old building debris, Brick pats & soil mixture
		To									3.45							
		10	25															
4		10	55	SC	-	-	5	7	8	15	4.00	2	SS	-6.5		L1	4.0	
		To									4.45							
		11	00															Grey,Moist,Stiff to Very Stiff,Silty CLAY (CH to CL) Clays of High to Low Plasticity
5		11	27	SC	-	-	6	8	10	18	5.00	3	SS	-7.5				
		To									5.45					L2	5.5	
		11	30															
6		11	52	SC	-	-	8	11	11	22	6.00	4	SS	-8.5				
	29/01/2020	To									6.45							
		11	55															
7		12	24	SC	-	-	6	10	8	18	7.00	5	SS	-9.5				Grey,Moist,Poorly Graded,Fine to Medium Grains,Medium Dense, Silty SAND (SM) to Clayey Silty SAND (SC)
		To									7.45							
		12	27															
8		12	46	SC	-	-	3	6	9	15	8.00	6	SS	-10.5				
		To									8.45							
		12	48															
9		13	49	SC	-	-	10	14	17	31	9.00	7	SS	-11.5		L3	9.0	
		To									9.45							
		14	00															Grey,Moist,Poorly Graded,Fine to Medium Grains,Dense, Clayey Silty SAND (SC)
10							12	21	25	46	10.00	8	SS	-12.5				
											10.45							

CS - Core Sample	DS - Disturbed Sample	LOGGED	Murali Krishnan K	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	29/01/2020	E.G.L WRT ROAD LEVEL(m) -2.50	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m) 4.50	
WS - Wash Sample	DB - Diamond Bit	DATE	05/02/2020	CASING DEPTH (m) 0.00	

GEOMARINE

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-04		
SHEET	2	OF	3
DIA OF BORE HOLE	150mm	✓	
	NX	✓	

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING						BORE START DATE	28/01/2020
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-		BORE END DATE	31/01/2020
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-	TOTAL DRILL DAYS	4
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E	-		

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/6cm: 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
11	29/01/2020	14	18	SC	-	-	19	24	25	49	11.50	9	SS	-14.0				Grey,Moist,Poorly Graded,Fine to Medium Grains,Dense,Clayey Silty SAND (SC) to Silty SAND (SM)
		To									11.95							
12		16	25															
		15	10	SC	-	-												
		To																
13		15	30				34	40	12Cm Penet for 55Blows	>100	13.00	10	SS	-15.5		L4	13.0	
		16	25								13.42							
		To																
14		16	40	SC	-	-												
		10	19				45	10Cm Penet for 50Blows		>100	14.50	11	SS	-17.0				Grey,Moist,Poorly Graded,Fine to Medium Grains,Very Dense,Silty SAND (SM)
		To									14.75							
15		11	55	SC	-	-												
16							11	20	24	44	16.00	12	SS	-18.5		L5	16.0	
											16.45							
		Total Drilling Time 57Mints		SC	-	-												
17	30/01/2020						12	21	25	46	17.50	13	SS	-20.0				Brownish Grey,Moist,Hard,Compacted CLAY (CH to CI) Clays of High to Medium Plasticity
											17.95							
18		Total Drilling Time 43Mints		SC	-	-												
19							21	28	39	67	19.00	14	SS	-21.5				
											19.45							
20																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	Murali Krishnan K	PROJECT SITE DETAILS		REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	30/01/2020	E.G.L WRT ROAD LEVEL(m)	-2.50	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m)	4.50	
WS - Wash Sample	DB - Diamond Bit	DATE	06/02/2020	CASING DEPTH (m)	6.00	

SITE INVESTIGATION RECORD

GEOMARINE

BORE HOLE No.	BH-04		
SHEET	3	OF	3
DIA OF BORE HOLE	150mm ✓ / NX ✓		
BORE START DATE	28/01/2020		
BORE END DATE	31/01/2020		
TOTAL DRILL DAYS	4		

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING						
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-	CO-ORDINATES	N - / E -
STRUCTURE	2 Basement + G+ 22 Floors	DRILLING METHOD	Rotary				
JOB CODE	GT-2857	FLUSHING MEDIUM	Bentonite				

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm 0-15	SPT Details: Blows/cm 15-30	SPT Details: Blows/cm 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
21	30/01/2020	15	14 To 15 35	SC	-	-	26	25	30	55	21.00 / 21.45	15	SS	-23.5				Brownish Grey,Moist,Hard,Compacted CLAY (CH to CI) Clays of High to Medium Plasticity
22		15	55 To 16 18	SC	-	-												
23							45	50Cm Penet for 55Blows		>100	23.00 / 23.23	16	SS	-25.5		L6	23.0	
24		16	40 To 17 10	SC	-	-												Grey,Moist,Poorly Graded,Fine to Medium Grains,Very Dense,Silty SAND (SM)
25							25	50Cm Penet for 46Blows		>100	25.00 / 25.23	17	SS	-27.5		L7	25.0	
26		10	46 To 11 22	SC	-	-												
27	31/01/2020						25	40	SPT Hammer Rebounded	>100	27.00 / 27.30	18	SS	-29.5				Grey,Moist,Poorly Graded,Fine to Medium Grains,Very Dense,Clayey Silty SAND (SC)
28		11	55 To 12 30	SC	-	-												
29								50Cm Penet for 55Blows		>100	29.00 / 29.05	19	SS	-31.5		L8	29.0	
		12	46 To 14 15	TC	55	0												Grey,Greyish Green,Fine Grains, Argillaceous,Fissile, Hard, SHALE (Gondwana Formation)
30					-	-	-	-	-	-	30.00	20	CS	-32.5		L9	30.0	

CS - Core Sample	DS - Disturbed Sample	LOGGED	Murali Krishnan K	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	31/01/2020	E.G.L WRT ROAD LEVEL(m) -2.50	*(F) - Sample Failed
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m) 4.50	
WS - Wash Sample	DB - Diamond Bit	DATE	05/02/2020	CASING DEPTH (m) 0.00	

Borehole terminated at 30 m depth below E.G.L

FIG.2.4 Sub Soil Profile at BH-04 Location

SITE INVESTIGATION RECORD

GEOMARINE

BORE HOLE No.	BH-05						
SHEET	1 OF 3						
PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING					DIA OF BORE HOLE	150mm ✓ / NX ✓
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	- -	BORE START DATE	03/02/2020
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	06/02/2020
JOB CODE	GT-2357	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	4

Drilling progress per metre / Core Details

Date	Time (Hr. Min.)	Type of Drill Bit (SC / TCB / DB)	Total Core Recovery %	R.Q.D %
03/02/2020	12 40 To 12 57	SC	-	-
03/02/2020	13 50 To 13 58	SC	-	-
03/02/2020	15 57 To 16 10	SC	-	-
03/02/2020	16 35 To 16 38	SC	-	-
03/02/2020	16 55 To 16 58	SC	-	-
03/02/2020	17 10 To 17 13	SC	-	-
04/02/2020	10 05 To 10 10	SC	-	-
04/02/2020	10 25 To 10 33	SC	-	-
04/02/2020	11 02 To 11 06	SC	-	-

SPT Details / Sample Details

Depth below E.G.L. (m)	Blows/cm 0-15	15-30	30-45	SPT 'N' Value	Depth	No.	Type	RL (m)
3	7	10	11	21	3.00 – 3.45	1	SS	-5.5
4	4	8	9	17	4.00 – 4.45	2	SS	-6.5
5	4	7	8	15	5.00 – 5.45	3	SS	-7.5
6	3	5	4	9	6.00 – 6.45	4	SS	-8.5
7	5	8	9	17	7.00 – 7.45	5	SS	-9.5
8	4	9	9	18	8.00 – 8.45	6	SS	-10.5
9	5	11	11	22	9.00 – 9.45	7	SS	-11.5
10	7	15	18	33	10.00 – 10.45	8	SS	-12.5

Layer Data

No	Depth	Geotechnical Description
L1	3.0	Filled up Materials consisting of old building debris, Brick pats & soil mixture
L2	5.3	Brown,Grey,Moist,Poorly Graded,Fine to Medium Grains. Medium Dense,Silty SAND (SM)
L3	7.0	Grey,Moist,Poorly Graded,Fine to Medium Grains,Fine to Medium Grains, Loose,Silty SAND (SM) With Lenses of Clay
		Grey,Moist,Poorly Graded,Fine to Medium Grains,Fine to Medium Grains,Medium Dense,Silty SAND (SM) to Clayey Silty SAND (SC)

CS - Core Sample	DS - Disturbed Sample	LOGGED	Muralikrishnan K.	PROJECT SITE DETAILS		REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	04/02/2020	GROUND LEVEL (m)	-2.50	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kandusamy	WATER TABLE (m)	3.60	
WS - Wash Sample	DB - Diamond Bit	DATE	11/02/2020	CASING DEPTH (m)	9.00	

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-05		
SHEET	2	OF	3

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING					DIA OF BORE HOLE	150mm ✓ / NX ✓
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	03/02/2020
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	06/02/2020
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	4

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: 15-30	SPT Details: 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
11		11	32	SC	-	-												
		To																
		11	37															
		12	08	SC	-	-												
		To																
		12	14															
13		13	48	SC	-	-												
		To																
		14	05															
14	04/02/2020						8	15	15	30	11.50	9	SS	-14.0				Grey,Moist,Poorly Graded,Fine to Medium Grains,Fine to Medium Grains,Medium Dense,Silty SAND (SM) to Clayey Silty SAND (SC)
											11.95							
		14	22	SC	-	-	7	12	13	25	13.00	10	SS	-15.5				
		To									13.45							
		14	49															
16		15	09	SC	-	-	14	23	25	48	14.50	11	SS	-17.0		L4	14.5	
		To									14.95							
		15	44															
17							14	21	27	48	16.00	12	SS	-18.5				
											16.45							Greenish Grey to Brown,Moist,Hard, Compacted CLAY (CH) Clay of High Plasticity
							16	41	46	87	17.50	13	SS	-20.0				
18											17.95							
		Total Drilling Time 38mins		SC	-	-												
19	05/02/2020						15	31	36	67	19.00	14	SS	-21.5		L5	19.0	
											19.45							
20																L6	20.0	Brown,Moist,Poorly Graded,Fine to Medium Grains,Very Dense,Clayey Silty SAND (SC)

CS - Core Sample	DS - Disturbed Sample	LOGGED	Muralikrishnan K.	PROJECT SITE DETAILS		REMARKS	
SS - Split Spoon Sample	SC - Soil Cutter	DATE	05/02/2020	GROUND LEVEL (m)	-2.50		
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m)	3.50		
WS - Wash Sample	DB - Diamond Bit	DATE	11/02/2020	CASING DEPTH (m)	8.00		

SITE INVESTIGATION RECORD

GEOMARINE

BORE HOLE No.	BH-05		
SHEET	3	OF	3
DIA OF BORE HOLE	150mm ✓ / NX ✓		
BORE START DATE	03/02/2020		
BORE END DATE	06/02/2020		
TOTAL DRILL DAYS	4		

PROJECT NAME	PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING						
LOCATION	Arumbakkam, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	2 Basement + G + 22 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -		
JOB CODE	GT-2057	FLUSHING MEDIUM	Bentonite		E -		

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm 0-15	SPT Details: 15-30	SPT Details: 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
21	05/02/2020	Total Drilling Time 82mins		SC	-	-	20	33	11Cm Penet for 55Blows	>100	21.00 / 21.41	15	SS	-23.5				
22		14	52	SC	-	-												
		To																
23		15	28				21	35	8Cm Penet for 45Blows	>100	23.00 / 23.38	16	SS	-25.5				Greyish Brown,Moist,Hard,Compacted CLAY (CI to CH) Clay of Medium to High Plasticity
24		15	50	SC	-	-												
		To																
26		16	27				23	7Cm Penet for 55Blows		>100	25.00 / 25.22	-	*SS	-27.5		L7	26.6	
26		Total Drilling Time 59mins		TCB	0	0												
27							8Cm Penet for 55Blows			>100	27.00 / 27.06	17	SS	-29.5				
28	06/02/2020	11	04	TCB	0	0												Grey,Greenish Grey,Fissile, SHALE
		To																
29		11	58				SPT Hammer Rebound			>100	29.00	-	*CS	-31.5				
30		Total Drilling Time 59mins		TCB	-	-	-	-	-	-	30.00	-	*CS	-32.5		L8	30.0	

CS - Core Sample	DS - Disturbed Sample	LOGGED	Muralikrishnan K.	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	05/02/2020	GROUND LEVEL (m) -2.50	*(F) - Sample Failed
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	Anitha Kondusamy	WATER TABLE (m) 3.50	
WS - Wash Sample	DB - Diamond Bit	DATE	11/02/2020	CASING DEPTH (m) 6.00	

Borehole terminated at 30 m depth below E.G.L

FIG.2.5 Sub Soil Profile at BH-05 Location

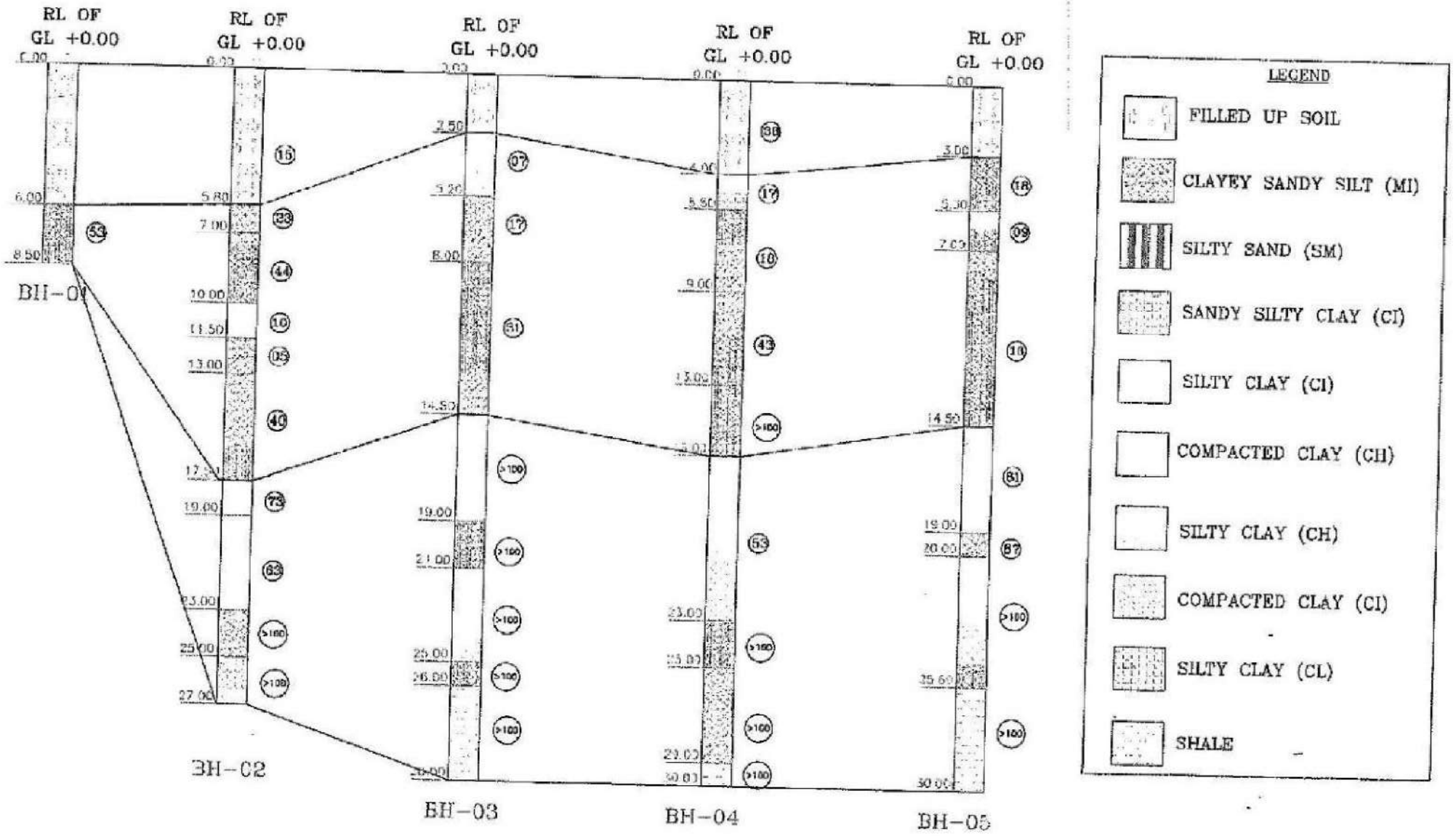

FIG.No.2.6 CROSS SECTIONAL VARIATION OF SUB SOIL PROFILE THROUGH BH-01 TO 05

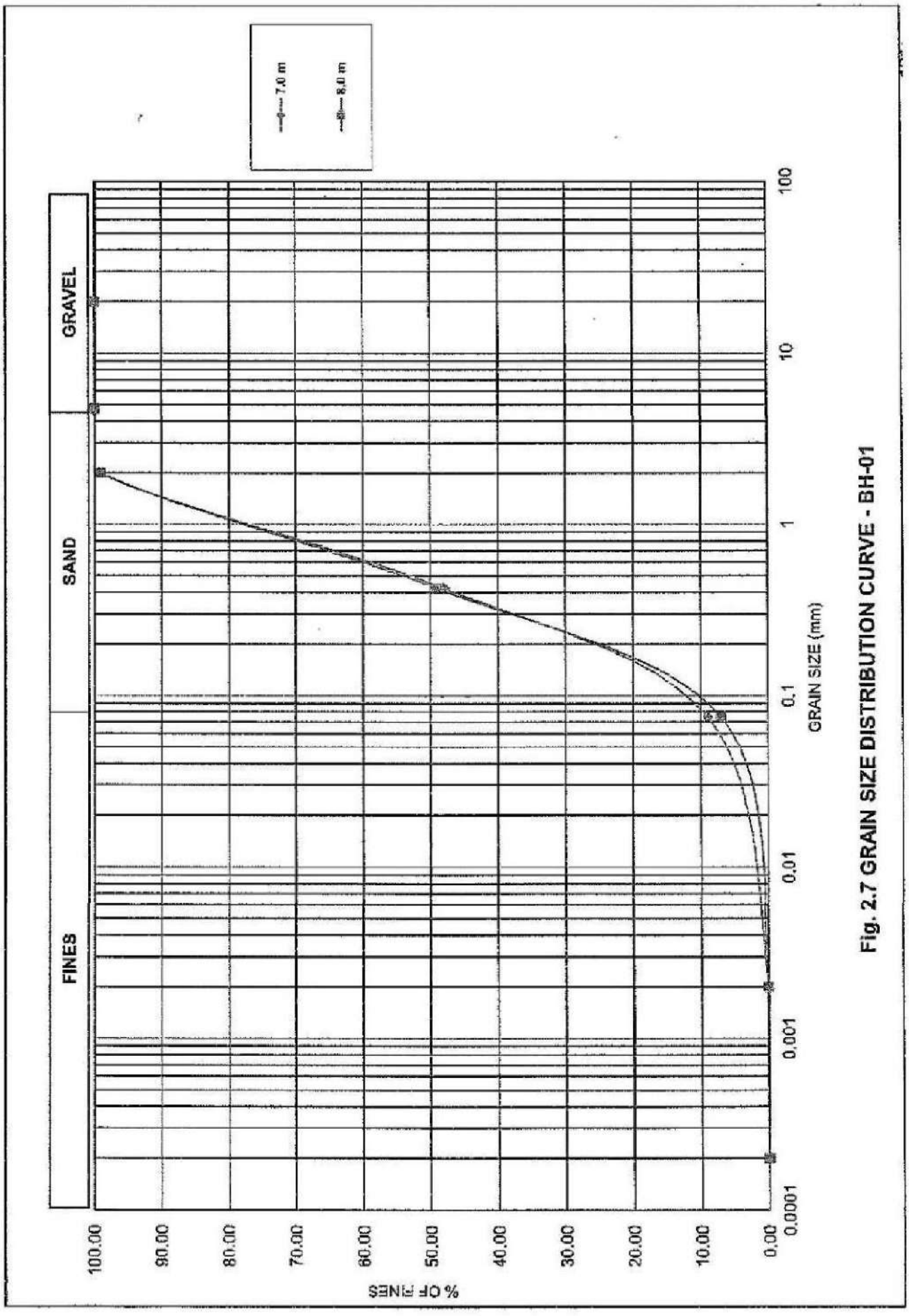

Fig. 2.7 GRAIN SIZE DISTRIBUTION CURVE - BH-01

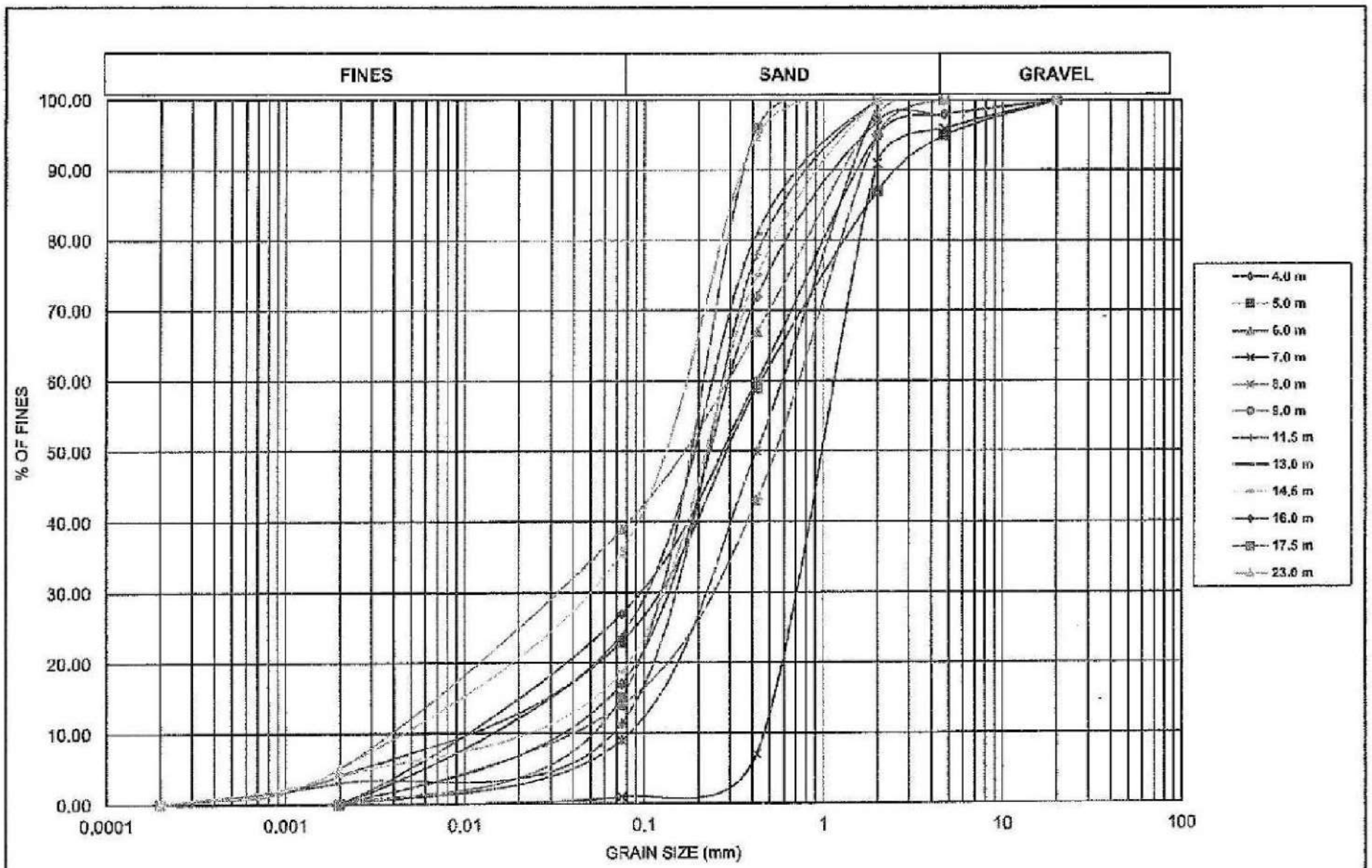

Fig. 2.8 GRAIN SIZE DISTRIBUTION CURVE - BH-02

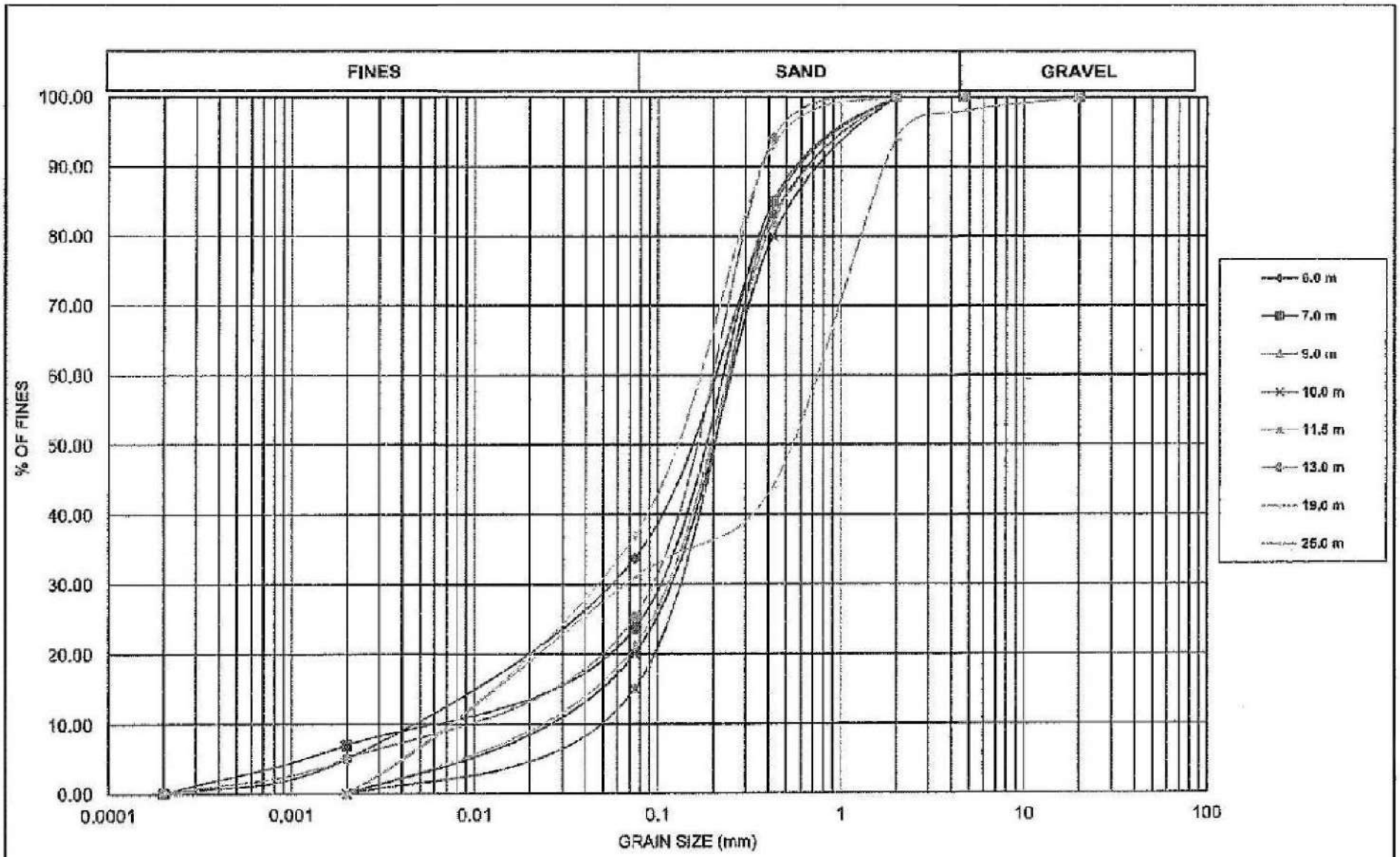

Fig. 2.9 GRAIN SIZE DISTRIBUTION CURVE - BH-03

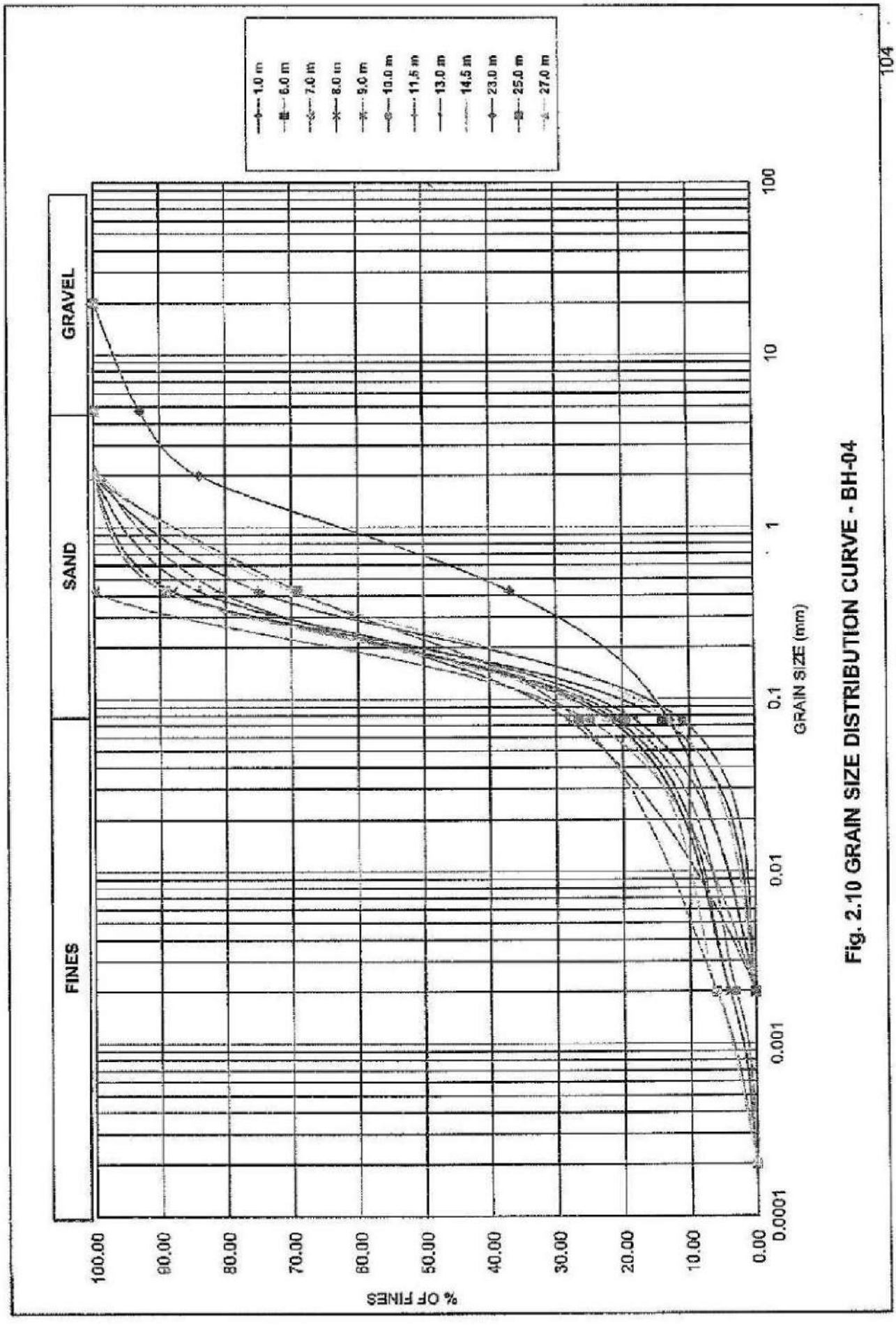

Fig. 2.10 GRAIN SIZE DISTRIBUTION CURVE - BH-04

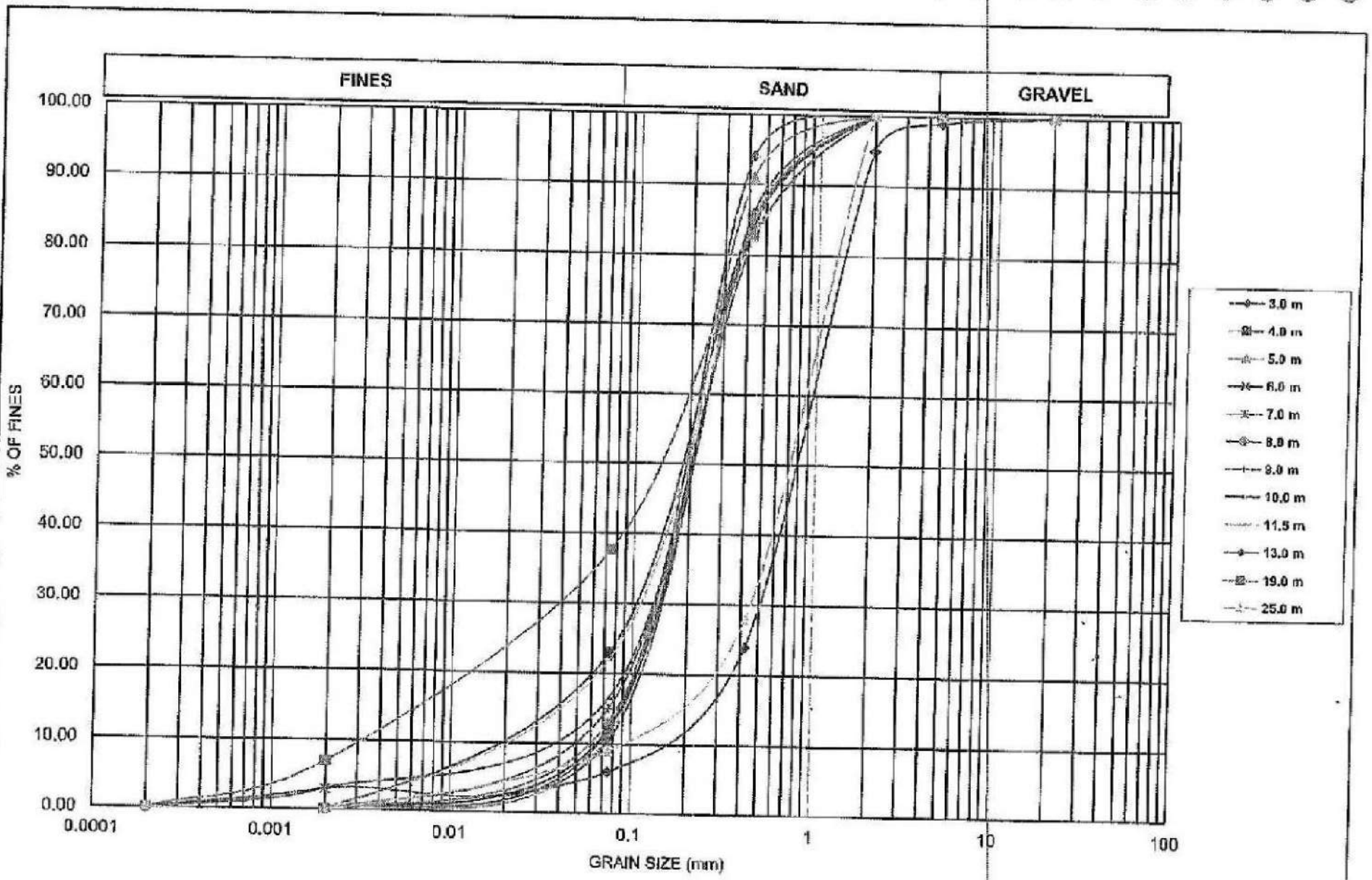

Fig. 2.11 GRAIN SIZE DISTRIBUTION CURVE - BH-05

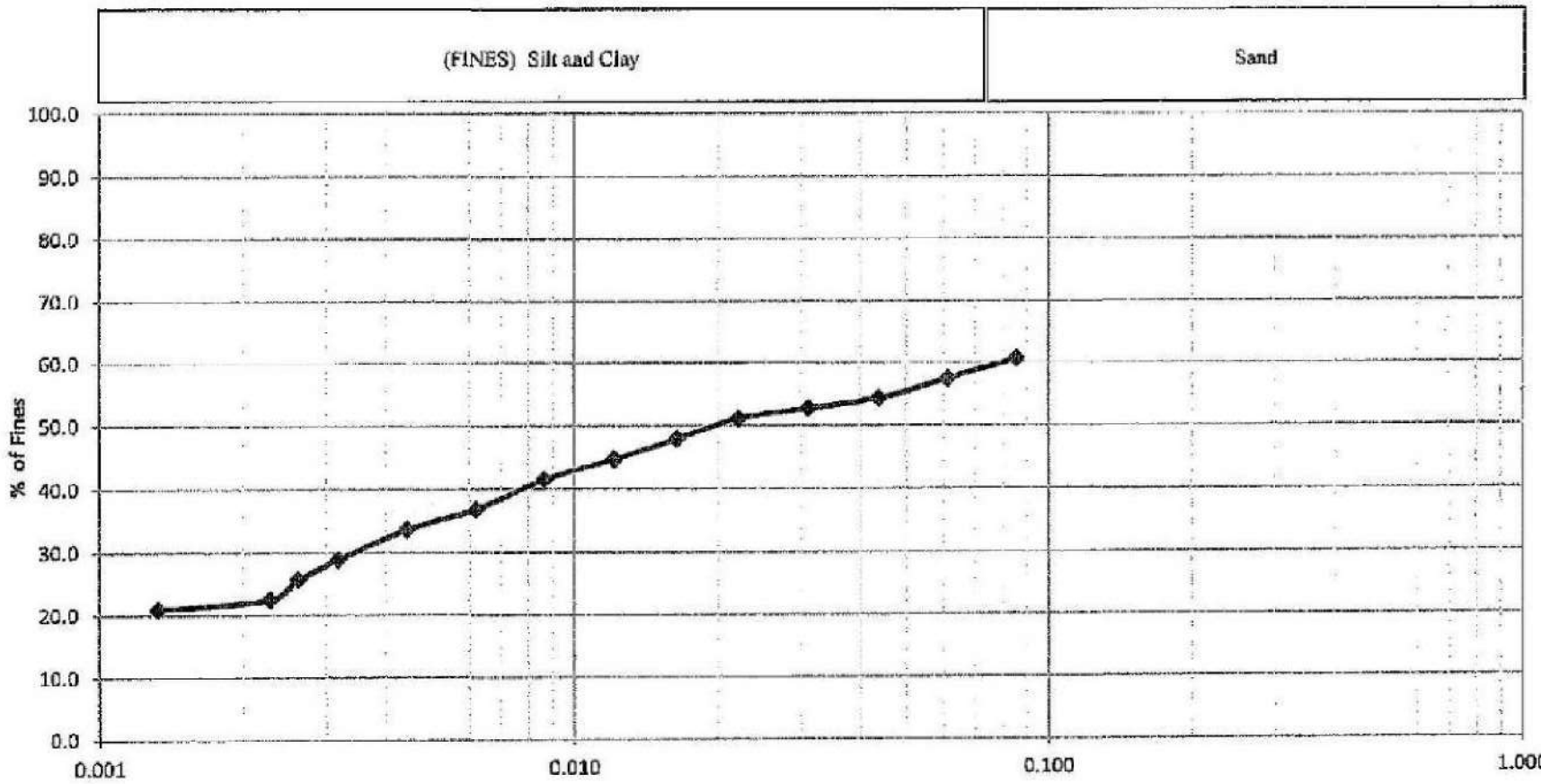

Fig 2.12 Hydrometer Analysis Master Curve

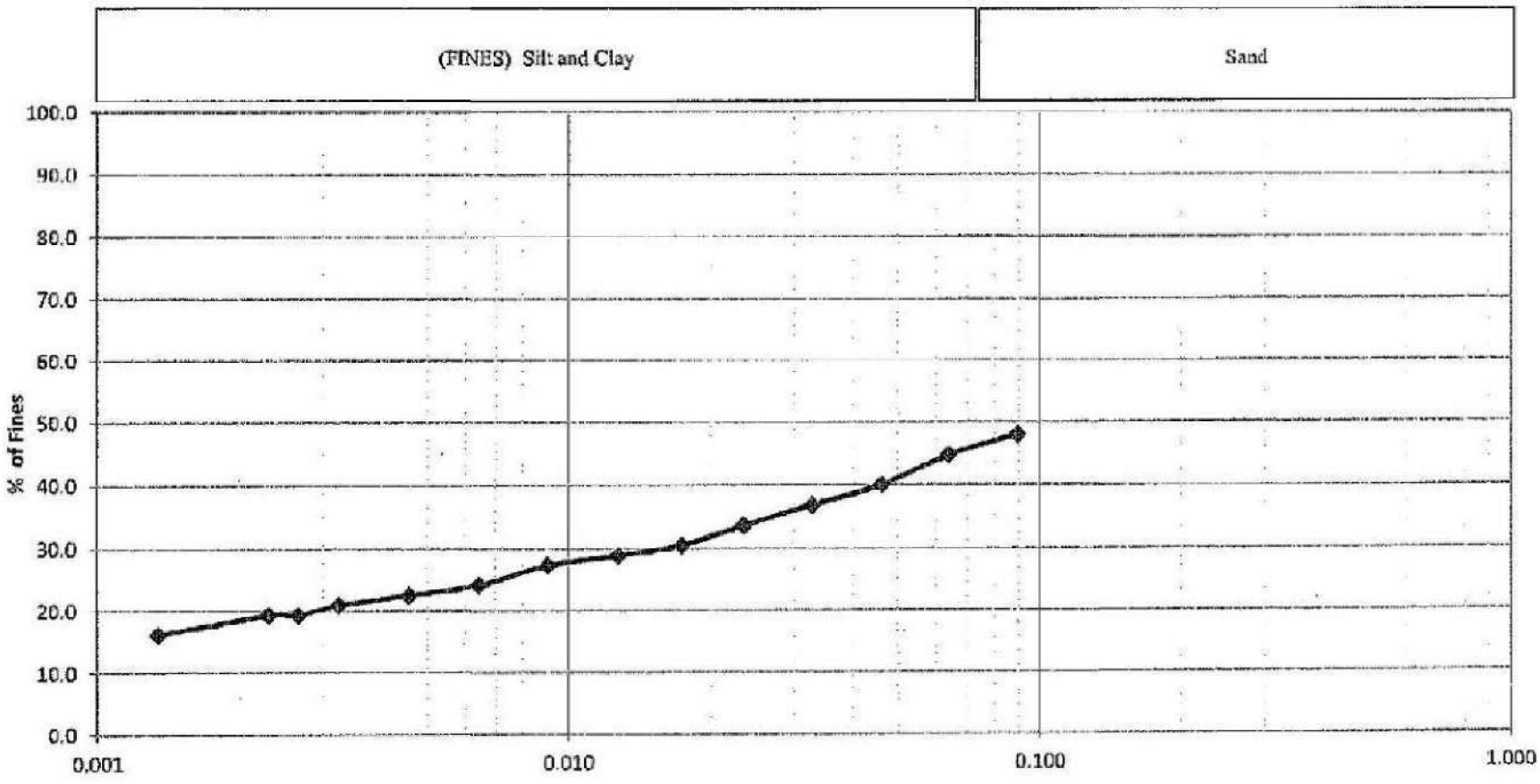

Fig 2.13 Hydrometer Analysis Master Curve

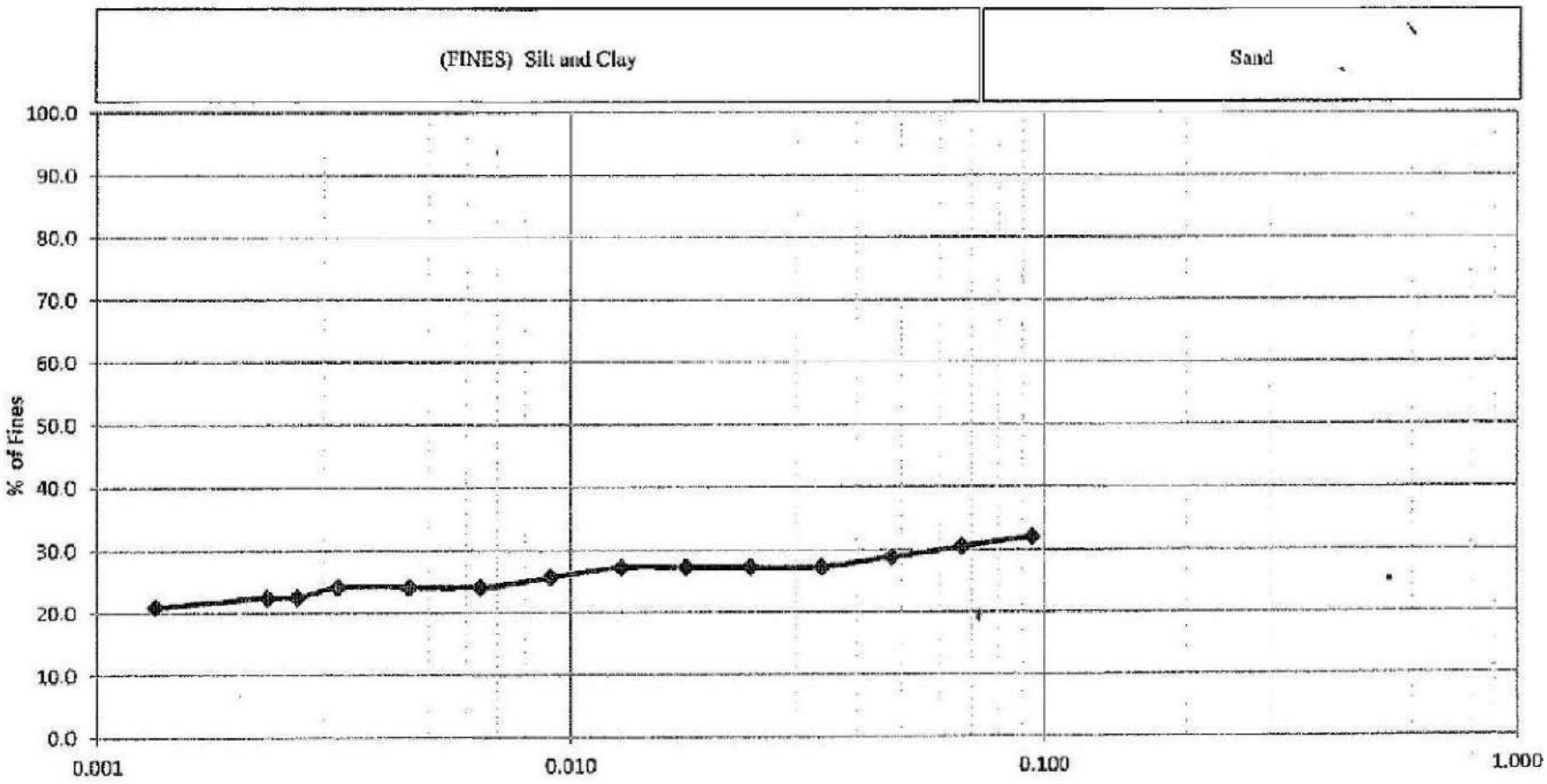

Fig 2.14 Hydrometer Analysis Master Curve

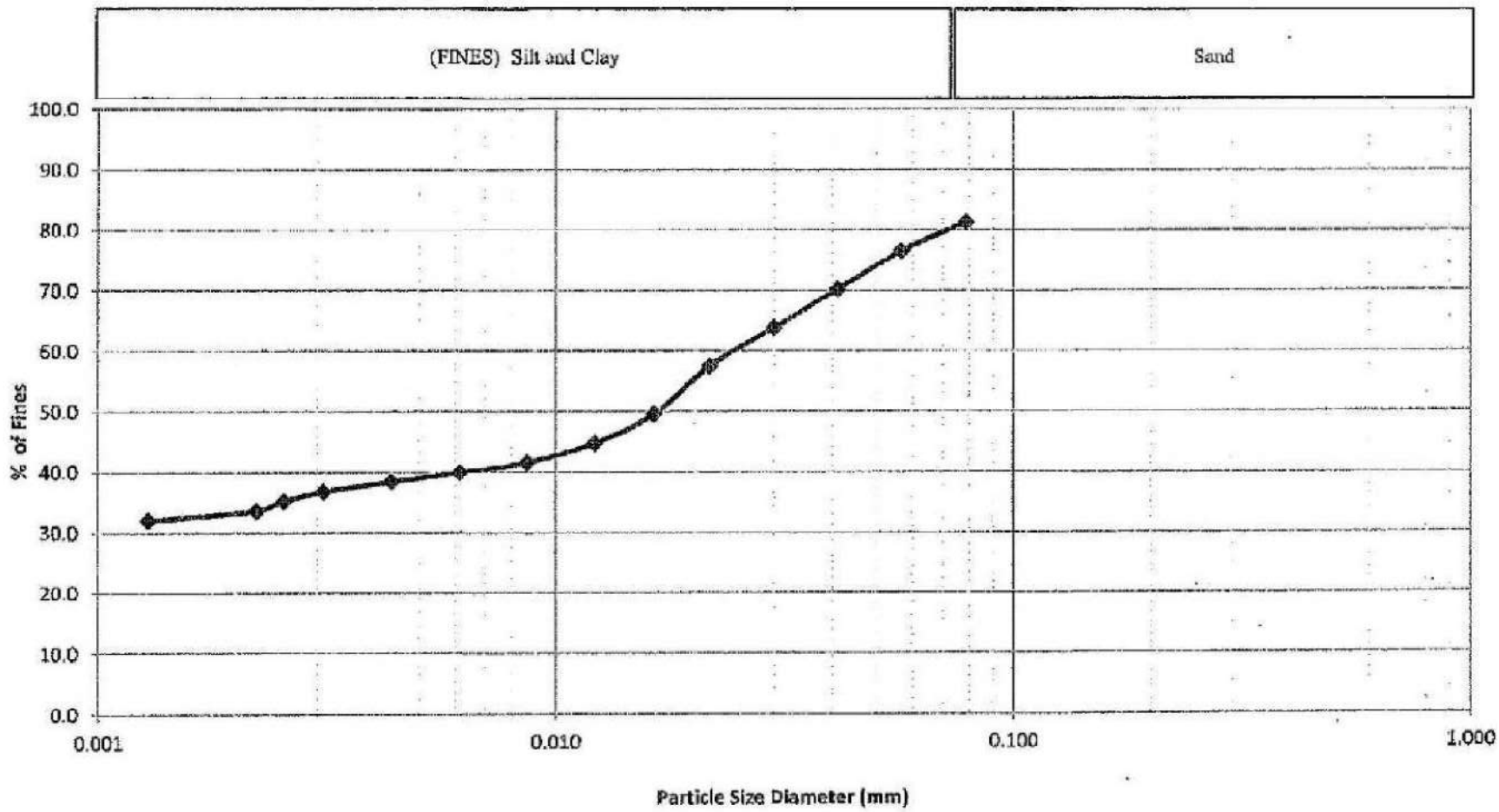

Fig 2.15 Hydrometer Analysis Master Curve

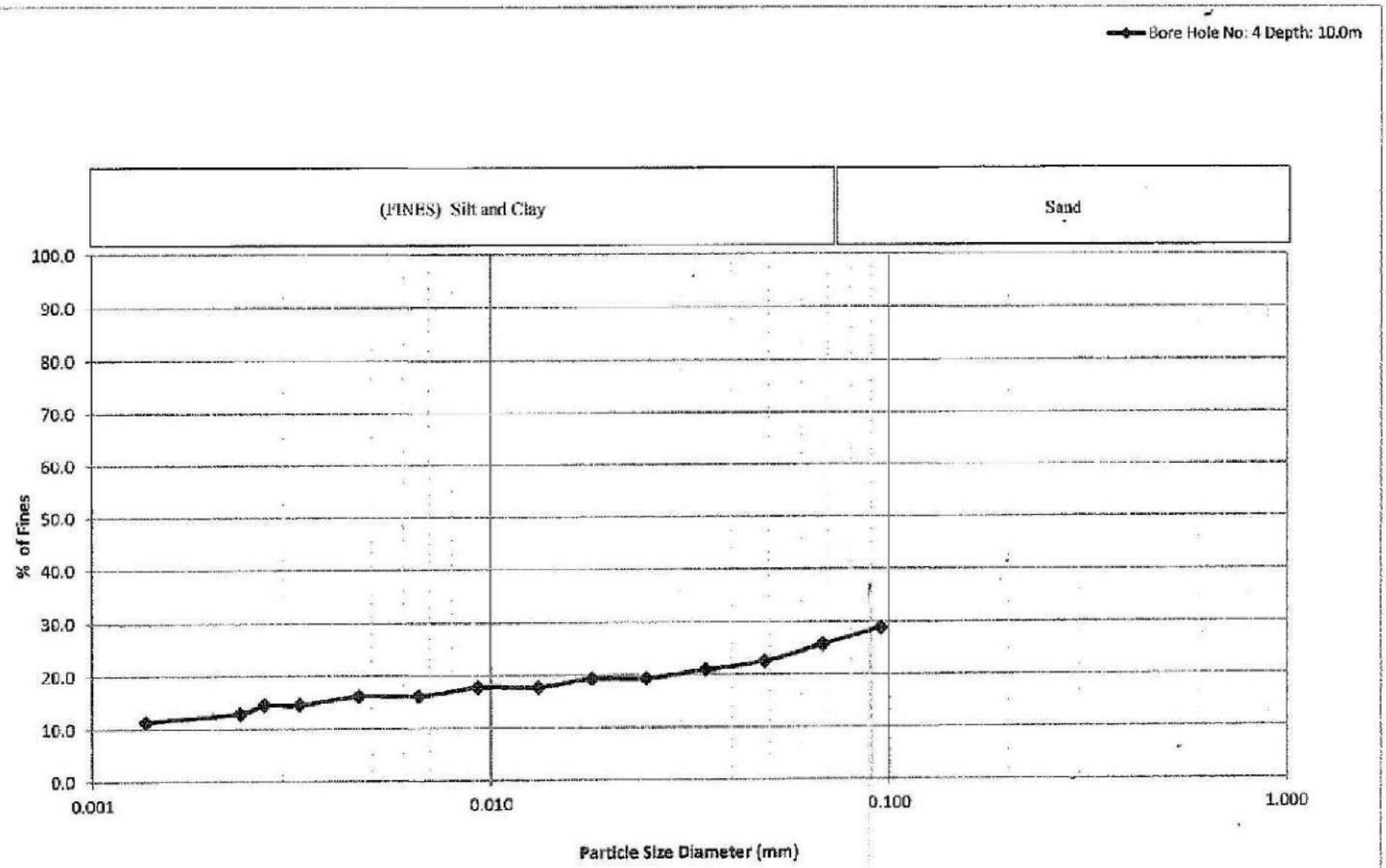

Fig 2.16 Hydrometer Analysis Master Curve

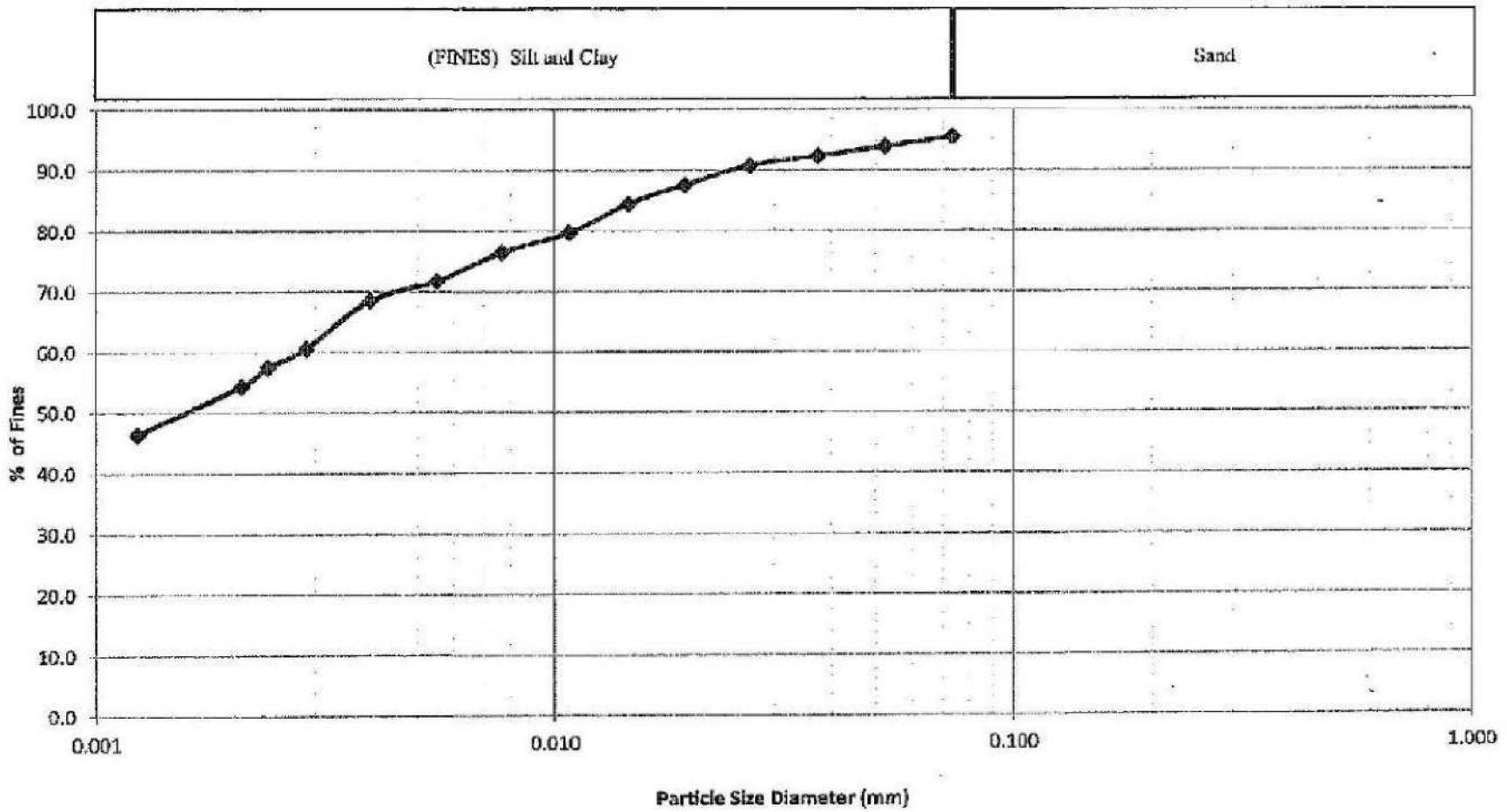

Fig 2.17 Hydrometer Analysis Master Curve

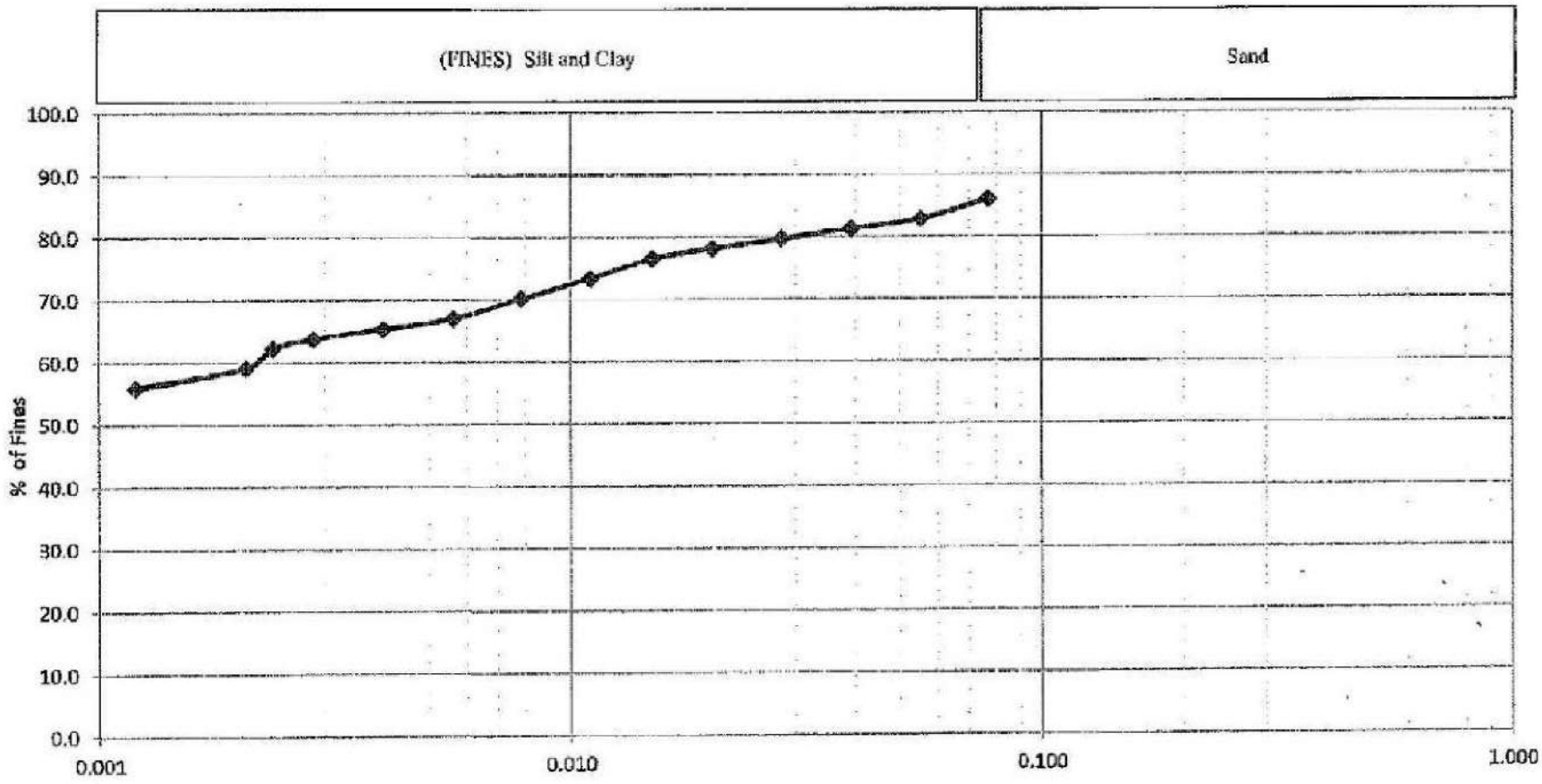

Fig 2.18 Hydrometer Analysis Master Curve

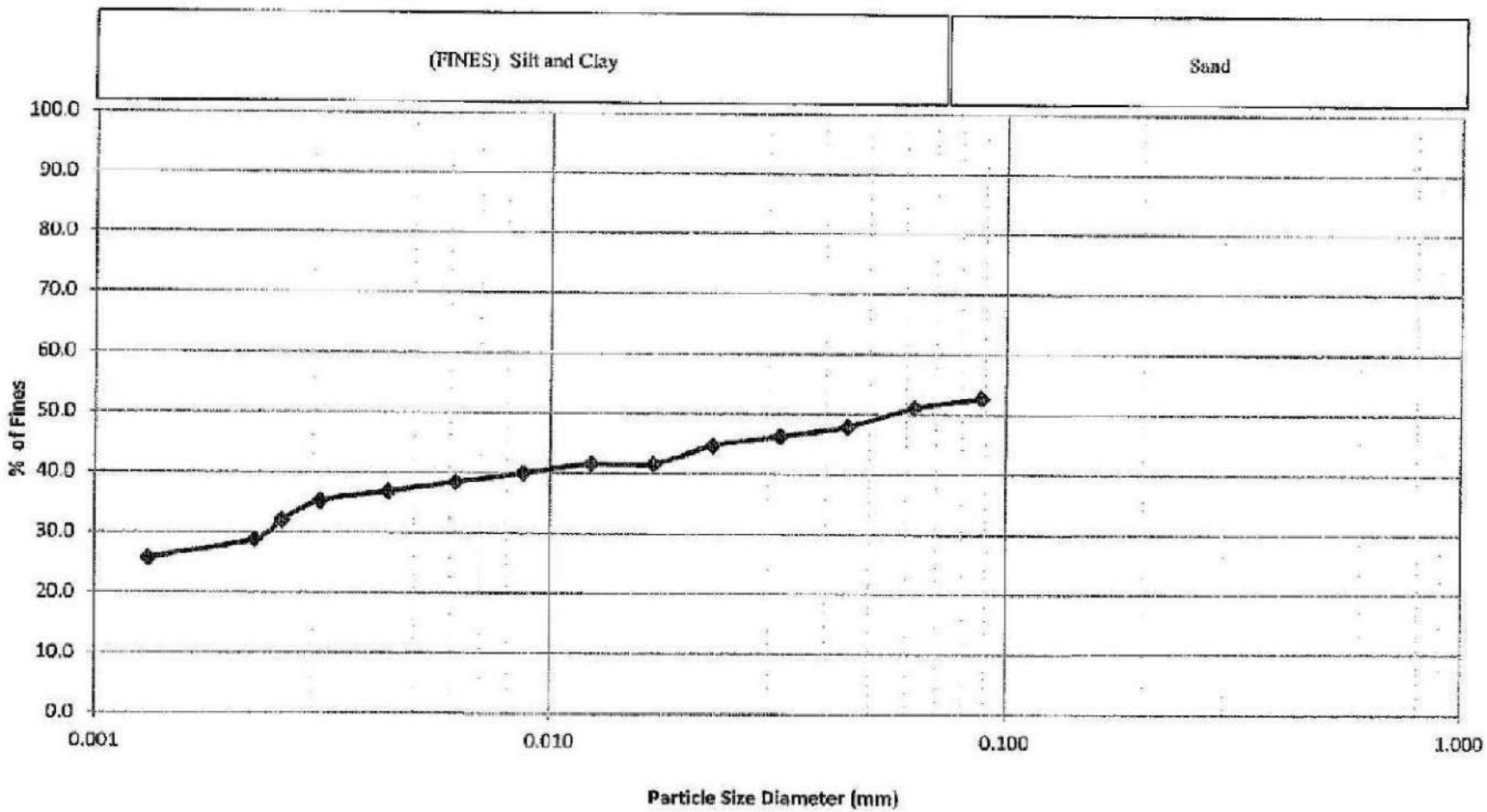

Fig 2.19 Hydrometer Analysis Master Curve

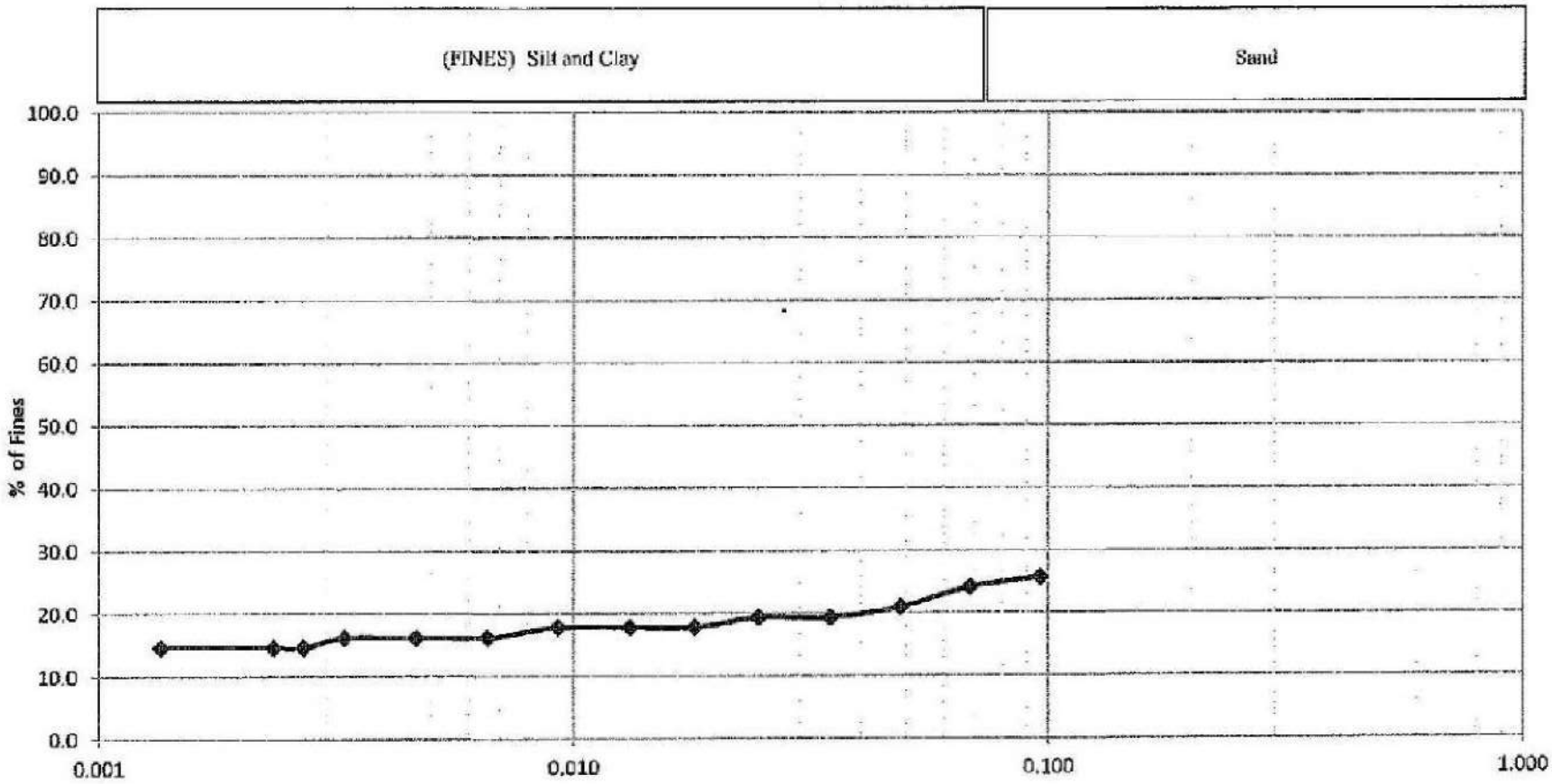

Fig 2.20 Hydrometer Analysis Master Curve

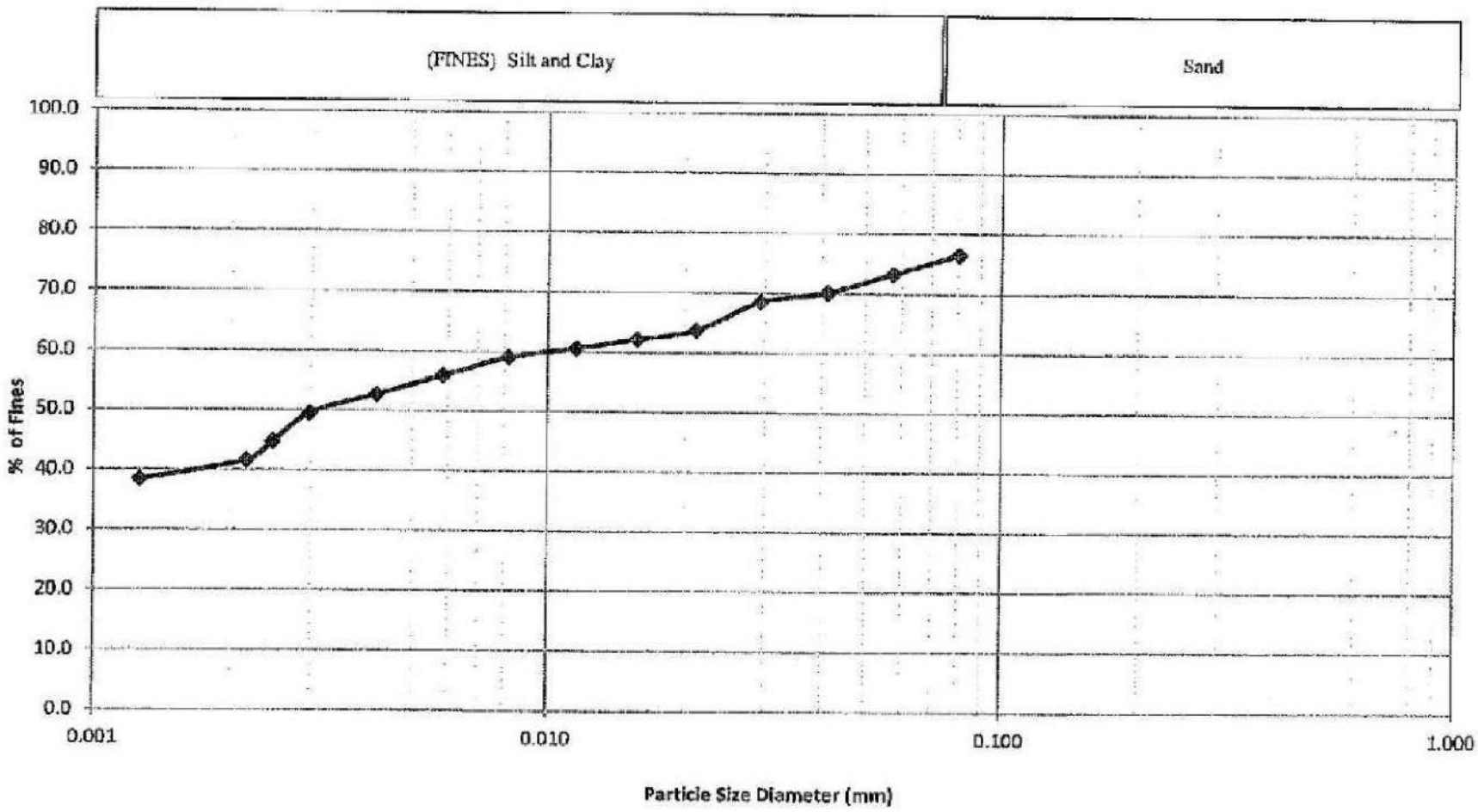

Fig 2.21 Hydrometer Analysis Master Curve

Table-2.1 Laboratory Classification of Soil Samples from BH-01

Depth of Sample below E.G.L. (m)	SPT-Value	Type of Sample	Sub Soil Classification																										
			Fine Grained (FG)										Coarse Grained (CG)														IS-Notation		
			N.M.C(%)	L.L (%)	P.L (%)	I_p	I_c	Shrinkage (cm^3)	D.F.S (%)	Consistancy	Position With Respect to A-Aline	IS:Notation	Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)	D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	$C_U=D_{60}/D_{10}$	$C_c=D_{30}^2/(D_{10}*D_{60})$	Relative Density	Gravel	Sand
7.0	43	SC	-	-	-	-	-	-	-	CG>50%	-	-	0	1	51	39	9	0	-	-	-	-	-	Dense	<50%	SP-SM
8.0	62	SC	-	-	-	-	-	-	-	CG>50%	-	-	0	1	50	42	7	0	-	-	-	-	-	V.Dense	<50%	SP-SM

FG = Fine Grained
CG = Coarse Grained
PL = Plastic Limit
Ip = Plasticity Index
FS = Differential Free Swell Index
C_u = Uniformity Coefficient
NMC= Nature Moisture Content
C_c = Coefficient of Curvature
Ic = (LL-NMC)/Ip
SL = Shrinkage Limit
LL = Liquid Limit

Table-2.2 Laboratory Classification of Soil Samples from BH-02

Depth of Sample below E.G.L. (m)	SPT-Value	Type of Sample	Sub Soil Classification																												
			Fine Grained (FG)										Coarse Grained (CG)															IS-Notation		
			N.M.C(%)	L.L (%)	P.L (%)	I_p	I_c	Shrinkage (cm^3)	D.F.S (%)	Consistency	Position With Respect to A-Alins	IS:Notation	Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)	D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	$C_U=D_{60}/D_{10}$	$C_c=D_{30}^2/(D_{10}xD_{60})$	Relative Density	Gravel	Sand
1.0	13	DS	Filling Soil (Mixture of clayey sand and brick pats)																												
2.0	6	SS																													
3.0	-	DS																													
4.0	17	SS											2	3	35	33	27	0	-	-	-	-	-	M.Dense	<50%	SM					
5.0	24	SS	Filling Soil										5	8	28	36	23	0	-	-	-	-	-	M.Dense	<50%	SM					
6.0	23	SS	17	29	21	8	1.51	18	22	CG>50%	Above	-	0	2	31	25	37	5	-	-	-	-	-	M.Dense	<50%	SC					
7.0	46	SS	-	-	-	-	-	-	-	CG>50%	-	-	4	5	84	6	1	0	-	-	-	-	-	Dense	<50%	SP					
8.0	53	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	1	49	41	9	0	-	-	-	-	-	V.Dense	<50%	SP-SM					
9.0	33	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	5	52	29	14	0	-	-	-	-	-	Dense	<50%	SM					
10.0	10	SS	31	47	27	20	0.80	14	56	Stiff	Above	CI	-	-	-	-	78	22	-	-	-	-	-	FG>50%	FG>50%	FG>50%					
11.5	5	SS	22	25	20	5	0.67	19	39	CG>50%	Above	-	0	8	22	64	11	3	-	-	-	-	-	Loose	<50%	SC					
13.0	27	SS	14	27	20	8	1.75	20	20	CG>50%	Above	-	0	0	19	54	23	4	-	-	-	-	-	M.Dense	<50%	SC					
14.5	46	SS	13	29	19	10	1.54	18	44	CG>50%	Above	-	0	0	25	53	18	4	-	-	-	-	-	Dense	<50%	SC					
16.0	47	SS	-	-	-	-	-	-	-	CG>50%	-	-	2	1	25	55	17	0	-	-	-	-	-	Dense	<50%	SM					
17.5	73	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	4	81	15	0	-	-	-	-	-	V.Dense	<50%	SM					
19.0	68	SS	33	94	40	54	1.13	9	110	Hard	Above	CH	-	-	-	-	46	54	-	-	-	-	-	FG>50%	FG>50%	FG>50%					
21.0	67	SS	31	99	38	61	1.13	8	92	Hard	Above	CH	-	-	-	-	40	60	-	-	-	-	-	FG>50%	FG>50%	FG>50%					
23.0	>100	SS	16	27	21	7	1.21	19	50	CG>50%	Above	-	0	0	5	56	34	5	-	-	-	-	-	V.Dense	<50%	SC					
25.0	>100	SS	20	30	21	9	1.13	18	50	Hard	Above	CL	0	1	14	20	55	10	-	-	-	-	-	FG>50%	FG>50%	FG>50%					
27.0	>100	SS	14	42	18	24	1.20	15	43	Hard	Above	CI	0	0	4	30	54	12	-	-	-	-	-	FG>50%	FG>50%	FG>50%					

FG = Fine Grained PL = Plastic Limit FS = Differential Free Swel Index NMC= Nature Moisture Content Ic = (LL-NMC)/Ip LL = Liquid Limit

CG = Coarse Grained Ip = Plasticity Index C_U = Uniformity Coefficient C_c = Coefficient of Curvature SL = Shrinkage Limit

Table-2.3 Laboratory Classification of Soil Samples from BH-03

Depth of Sample below E.G.L (m)	SPT-Value	Type of Sample	Sub Soil Classification																										
			Fine Grained (FG)										Coarse Grained (CG)													IS-Notation	
			N.M.C(%)	L.L (%)	P.L (%)	I_p	I_c	Shrinkage (cm³)	D.F.S (%)	Consistancy	Position With Respect to A-Aline	IS:Notation	Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)	D_{60} (mm)	D_{30}(mm)	D_{10} (mm)	$C_u=D_{60}/D_{10}$	$C_c=D_{30}^2/(D_{10}xD_{60})$	Relative Density	Gravel	Sand
4.0	7	SS	43	71	30	40	0.69	10	43	M.Stiff	Above	CH	-	-	-	-	60	40	-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	14	SS	16	26	13	13	0.77	18	11	CG>50%	Above	-	0	0	17	46	32	5	-	-	-	-	-	M.Dense	<50%	SC
7.0	10	SS	15	27	13	14	0.86	18	30	CG>50%	Above	-	0	0	15	56	22	7	-	-	-	-	-	Loose	<50%	SC
8.0	20	SS	Sample Failed																										
9.0	34	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	18	61	21	0	-	-	-	-	-	Dense	<50%	SM
10.0	30	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	29	60	20	0	-	-	-	-	-	M.Dense	<50%	SM
11.5	33	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	16	69	15	0	-	-	-	-	-	Dense	<50%	SM
13.0	34	SS	18	32	19	13	1.06	15	30	CG>50%	Above	-	0	0	6	65	24	5	-	-	-	-	-	Dense	<50%	SC
14.5	>100	SS	24	56	29	27	1.17	11	31	Hard	Above	CH	-	-	-	-	66	34	-	-	-	-	-	FG>50%	FG>50%	FG>50%
16.0	49	SS	33	101	40	62	1.12	7	53	Hard	Above	CH	-	-	-	-	40	60	-	-	-	-	-	FG>50%	FG>50%	FG>50%
17.5	90	SS	25	63	30	33	1.15	11	54	Hard	Above	CH	0	0	0	15	50	35	-	-	-	-	-	FG>50%	FG>50%	FG>50%
19.0	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	7	56	37	0	-	-	-	-	-	V.Dense	<50%	SM
21.0	>100	SS	21	72	27	45	1.14	10	67	Hard	Above	CH	-	-	-	-	68	32	-	-	-	-	-	FG>50%	FG>50%	FG>50%
23.0	>100	SS	14	46	20	26	1.22	13	19	Hard	Above	CI	0	0	0	28	55	17	-	-	-	-	-	FG>50%	FG>50%	FG>50%
25.0	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	2	4	50	13	31	0	-	-	-	-	-	V.Dense	<50%	SM

FG = Fine Grained PL = Plastic Limit FS = Differential Free Swell Index NMC= Nature Moisture Content Ic = (LL-NMC)/Ip LL = Liquid Limit

CG = Coarse Grained Ip = Plasticity Index C_u = Uniformity Coefficient C_c = Coefficient of Curvature SL = Shrinkage Limit

Table-2.4 Laboratory Classification of Soil Samples from BH-04

Depth of Sample below E.G.L. (m)	SPT-Value	Type of Sample	Sub Soil Classification																									
			Fine Grained (FG)										Coarse Grained (CG)													IS-Notation	
			N.M.C(%)	L.L (%)	P.L (%)	Ip	Ic	Shrinkage (cm^3)	D.F.S (%)	Consistancy	Position With Respect to A-Aline	IS:Notation	Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)	D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	$C_U=D_{60}/D_{10}$	$C_c=D_{30}^2/(D_{10}xD_{60})$	Relative Density	Gravel	Sand
3.0	38	SS	-	-	-	-	-	-	-	-	-	-	7	9	47	24	13	0	-	-	-	-	-	Dense	<50%	SM
4.0	15	SS	31	57	24	32	0.81	13	15	Stiff	Above	CH	-	-	-	-	65	35	-	-	-	-	-	FG>50%	FG>50%	FG>50%
5.0	18	SS	15	30	15	15	1.02	16	20	V.Stiff	Above	CL	-	-	-	-	85	15	-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	22	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	11	75	14	0	-	-	-	-	-	M.Dense	<50%	SM
7.0	18	SS	Plastic Clay No LL/PL carried out						25	CG>50%	Above	-	0	0	0	76	26	0	-	-	-	-	-	M.Dense	<50%	SC
8.0	15	SS	15	25	13	12	0.79	19	4	CG>50%	Above	-	0	0	12	63	21	4	-	-	-	-	-	M.Dense	<50%	SC
9.0	31	SS	15	27	15	11	1.05	18	-5	CG>50%	Above	-	0	0	12	84	20	4	-	-	-	-	-	Dense	<50%	SC
10.0	46	SS	14	27	15	12	1.06	18	-5	CG>50%	Above	-	0	0	11	87	19	3	-	-	-	-	-	Dense	<50%	SC
11.5	49	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	1	18	53	28	0	-	-	-	-	-	Dense	<50%	SM
13.0	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	16	66	18	0	-	-	-	-	-	V.Dense	<50%	SM
14.5	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	1	29	57	13	0	-	-	-	-	-	V.Dense	<50%	SM
16.0	44	SS	31	92	38	54	1.13	9	64	Hard	Above	CH	-	-	-	-	46	54	-	-	-	-	-	FG>50%	FG>50%	FG>50%
17.5	46	SS	27	98	35	63	1.12	8	108	Hard	Above	CH	-	-	-	-	41	59	-	-	-	-	-	FG>50%	FG>50%	FG>50%
21.0	55	SS	18	37	19	18	1.05	13	55	Hard	Above	CI	0	0	0	41	40	19	-	-	-	-	-	FG>50%	FG>50%	FG>50%
23.0	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	25	64	11	0	-	-	-	-	-	V.Dense	<50%	SP-SM
25.0	>100	SS	15	34	15	19	1.02	18	9	CG>50%	Above	-	0	0	31	38	26	6	-	-	-	-	-	V.Dense	<50%	SC
27.0	>100	SS	14	33	16	16	1.13	18	30	CG>50%	Above	-	0	0	11	82	21	6	-	-	-	-	-	V.Dense	<50%	SC
29.0	>100	SS	25	46	26	20	1.06	14	-13	Hard	Above	CI	-	-	-	-	80	20	-	-	-	-	-	FG>50%	FG>50%	FG>50%

FG = Fine Grained PL = Plastic Limit FS = Differential Free Swell Index NMC= Nature Moisture Content Ic = (LL-NMC)/Ip LL = Liquid Limit

CG = Coarse Grained Ip = Plasticity Index C_U = Uniformity Coefficient C_C = Coefficient of Curvature SL = Shrinkage Limit

Table-2.5 Laboratory Classification of Soil Samples from BH-05

Depth of Sample below E.G.L. (m)	SPT-Value	Type of Sample	Sub Soil Classification																										
			Fine Grained (FG)										Coarse Grained (CG)													IS-Notation	
			N.M.C(%)	L.L (%)	P.L (%)	I_p	I_c	Shrinkage (cm^3)	D.F.S (%)	Consistancy	Position With Respect to A-Aline	IS:Notation	Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)	D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	$C_U=D_{60}/D_{10}$	$C_c=D_{30}^2/(D_{60}xD_{10})$	Relative Density	Gravel	Sand
3.0	21	SS	-	-	-	-	-	-	-	CG>50%	-	-	1	4	71	18	6	0	-	-	-	-	-	M.Dense	<50%	SP-SM
4.0	17	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	5	15	52	23	0	-	-	-	-	-	M.Dense	<50%	SM
5.0A	15	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	9	80	11	0	-	-	-	-	-	M.Dense	<50%	SP-SM
5.0B			28	56	25	31	0.90	12	13	Stiff	Above	CH	-	-	-	-	71	29	-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	9	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	16	72	12	0	-	-	-	-	-	Loose	<50%	SP-SM
7.0	17	SS	11	23	12	11	1.09	16	10	CG>50%	Above	-	0	0	14	73	10	3	-	-	-	-	-	M.Dense	<50%	SC
8.0	18	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	15	72	13	0	-	-	-	-	-	M.Dense	<50%	SM
9.0	22	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	18	66	16	0	-	-	-	-	-	M.Dense	<50%	SM
10.0	33	SS	12	25	13	12	1.08	16	11	CG>50%	Above	-	0	0	18	63	16	3	-	-	-	-	-	Dense	<50%	SC
11.5	30	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	18	60	22	0	-	-	-	-	-	M.Dense	<50%	SM
13.0	25	SS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	6	82	12	0	-	-	-	-	-	M.Dense	<50%	SP-SM
14.5	48	SS	32	69	37	53	1.10	10	75	Hard	Above	CH	-	-	-	-	52	48	-	-	-	-	-	FG>50%	FG>50%	FG>50%
16.0	48	SS	32	65	36	49	1.08	10	78	Hard	Above	CH	-	-	-	-	55	45	-	-	-	-	-	FG>50%	FG>50%	FG>50%
17.5	67	SS	33	63	37	46	1.06	12	69	Hard	Above	CH	-	-	-	-	58	42	-	-	-	-	-	FG>50%	FG>50%	FG>50%
19.0	67	SS	16	36	19	17	1.16	15	78	CG>50%	Above	-	0	0	17	41	35	7	-	-	-	-	-	V.Dense	<50%	SC
21.0	>100	SS	28	62	31	31	1.10	11	58	Hard	Above	CH	-	-	-	-	65	35	-	-	-	-	-	FG>50%	FG>50%	FG>50%
23.0	>100	SS	16	36	17	19	1.06	15	0	Hard	Above	CI	-	-	-	-	74	26	-	-	-	-	-	FG>50%	FG>50%	FG>50%
25.0	>100	WS	-	-	-	-	-	-	-	CG>50%	-	-	0	0	72	19	9	0	-	-	-	-	-	V.Dense	<50%	SP-SM
27.0	>100	SS	23	45	26	19	1.17	14	15	Hard	Above	CI	-	-	-	-	72	28	-	-	-	-	-	FG>50%	FG>50%	FG>50%

FG = Fine Grained; CG = Coarse Grained; PL = Plastic Limit; I_p = Plasticity Index; FS = Differential Free Swell Index; C_U = Uniformity Coefficient; NMC= Nature Moisture Content; C_c = Coefficient of Curvature; I_c = (LL-NMC)/Ip; SL = Shrinkage Limit; LL = Liquid Limit

CHAPTER-3

GEOLOGY & SUB-SURFACE STRATIFICATION

3.0 Preamble:

Geotechnical investigation carried out at a specific site provides location specific sub surface characteristics based on which the design of sub structures/foundations is generally carried out. However, the macro-level understanding of the sub surface is also needed for a comprehensive understanding of the sub structure/foundation response to naturally super imposed loads like earthquake forces etc., The macro level understanding of the sub surface is better provided through the knowledge of the Geology of the region. Since, it is beyond the scope of the present study to carry out geological investigation to establish the geology of the study region; published data are presented below along with the sub surface stratification observed through the direct borehole investigation carried out at the specified locations.

3.1 Geology of Study Area (based on the published data)

Geologically, the present site is located close vicinity to coastal region with sub surface consisting of sedimentary deposits. The top sedimentary deposit is under laid by upper gondwana shale formation, particularly lower stage of Sriperumpudur formation. The formation mechanism of the sediments is chiefly due to transportation of surface water deposition.

Though the gondwana shale formation is not encountered within the investigation depth, however the geological characteristics observed in the direct borehole investigation confirms that the present site does not depict any surprising geological features that are different from that of the region.

3.2 DESIGN SUB SOIL PROFILE: (WRT Foundation Engineering Application)

The sub soil characteristics obtained at the test location are further processed to arrive at the design soil parameters required for the design of sub structure using the following shear strength correlations with respect to the Standard Penetration Test Values of different layers.

- For Coarse Grained Material, Ref. IS: 6403 to estimate Angle of Shearing Resistance (Reproduced and shown in Fig.A1)
- For Fine Grained Material, Ref. Terzaghi & Peck, 1948, to estimate Unconfined Compressive Strength (Reproduced and shown in Fig.A2)

Based on the above, the average design soil characteristics are given below:

REFERENCE BORE HOLE-BH:					1	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top. R.L.	Bot. R.L.	Thickness							(C_u) kPa	(ϕ) Deg.
1	0.00	6.00	6.00	Filled up Soil	-	-	-	-	-	-	-
2	6.00	8.50	2.50	Silty Sand	Brownish Yellow	53	Very Dense	-	20.5	-	41.45

REFERENCE BORE HOLE-BH:					2	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top. R.L.	Bot. R.L.	Thickness							(C_u) kPa	(ϕ) Deg.
1	0.00	5.80	5.80	Filled up Soil	-	-	-	-	-	-	-
2	5.80	7.00	1.20	Clayey Silty Sand	Brownish Grey	23	Medium Dense	-	18.5	-	33.9
3	7.00	10.00	3.00	Silty Sand	Brownish Grey	44	Dense	-	20	-	39.65
4	10.00	11.50	1.50	Silty Clay	Grey	10	-	Stiff	17.5	67	-
5	11.50	13.00	1.50	Clayey Silty Sand	Grey	5	Loose	-	14	-	20.37
6	13.00	17.50	4.50	Clayey Silty Sand	Grey	40	Dense	-	20	-	38.75
7	17.50	19.00	1.50	Silty Sand	Grey	73	Very Dense	-	21	-	42.5
8	19.00	23.00	4.00	Compacted Clay	Brownish Grey	63	Very Dense	-	21	-	42.5
9	23.00	25.00	2.00	Clayey Silty Sand	Brownish Grey	>100	Very Dense	-	21	-	42.5
10	25.00	27.50	2.50	Compacted Clay	Brownish Green	>100	Very Dense	-	21	-	42.5

REFERENCE BORE HOLE-BH:					3	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top. R.L.	Bot. R.L.	Thickness							(Cu) kPa	(ϕ) Deg.
1	0.00	2.50	2.50	Filled up Soil	-	-	-	-	-	-	-
2	2.50	5.20	2.70	Silty Clay	Black	7	-	Medium Stiff	16	47	-
3	5.20	8.00	2.80	Clayey Silty Sand	Brownish Grey	17	Medium Dense	-	18	-	32.1
4	8.00	14.50	6.50	Silty Sand	Grey	30	Medium Dense	-	19	-	36
5	14.50	19.00	4.50	Compacted Clay	Greyish Brown	80	Very Dense	-	21	-	42.5
6	19.00	21.00	2.00	Silty Sand	Greyish Brown	>100	Very Dense	-	21	-	42.5
7	21.00	25.00	4.00	Compacted Clay	Brownish Grey	>100	Very Dense	-	21	-	42.5
8	25.00	26.00	1.00	Silty Sand	Brownish Grey	>100	Very Dense	-	21	-	42.5
9	26.00	31.50	5.50	Shale	Grey	>100	Very Dense	-	22	400	-
10	31.50	32.50	1.00	Completely Weathered Rock	Grey	CRR 30% RQD 0%					

REFERENCE BORE HOLE-BH:					4	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top. R.L.	Bot. R.L.	Thickness							(Cu) kPa	(ϕ) Deg.
1	0.00	4.00	4.00	Filled up Soil	-	-	-	-	-	-	-
2	4.00	5.50	1.50	Silty Clay	Grey	17	-	Very Stiff	20	113	-
3	5.50	9.00	3.50	Silty Sand	Grey	18	Medium Dense	-	18	-	32.4
4	9.00	13.00	4.00	Clayey Silty Sand	Grey	42	Dense	-	20	-	39.2
5	13.00	16.00	3.00	Silty Sand	Grey	>100	Very Dense	-	21	-	42.5
6	16.00	23.00	7.00	Compacted Clay	Brownish Grey	54	Very Dense	-	20.5	-	41.6
7	23.00	25.00	2.00	Silty Sand	Grey	>100	Very Dense	-	21	-	42.5
8	25.00	29.00	4.00	Clayey Silty Sand	Grey	>100	Very Dense	-	21	-	42.5
9	29.00	30.00	1.00	Shale	Grey	CRR 30% RQD 0%					

REFERENCE BORE HOLE-BH:					5	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m^3	Shear Parameters	
	Top. R.L.	Bot. R.L.	Thickness							(C_u) kPa	(ϕ) Deg.
1	0.00	3.00	3.00	Filled up Soil	-	-	-	-	-	-	-
2	3.00	5.30	2.30	Silty Sand	Brown	18	Medium Dense	-	18	-	32.4
3	5.30	7.00	1.70	Silty Sand	Grey	9	Loose	-	14.5	-	29.8
4	7.00	14.50	7.50	Silty Sand	Grey	26	Medium Dense	-	19	-	34.8
5	14.50	19.00	4.50	Compacted Clay	Greenish Grey	61	Very Dense	-	21	-	42.5
6	19.00	25.60	6.60	Compacted Clay	Greyish Brown	>100	Very Dense	-	21	-	42.5
7	25.60	30.00	4.40	Shale	Grey	>100	Very Dense	-	22	400	-

CHAPTER-4

FOUNDATION SYSTEM

4.0 Preamble:

In the design of foundation system, the stress-strain compatibility of the super structure, sub structure and the bearing strata should be satisfied both individually and as a combined system. In view of this, the following data are needed for the design of foundation system, defined in terms of the type of sub structure and the bearing strata characteristics.

- The super structure characteristics along with the loading pattern on the sub structure
- The sub soil characteristics that define the required substructure configuration for a safe transfer of super-structural loads to the bearing strata

Considering the above aspects of the foundation design, the suitable type of foundation system is presented below.

4.1 Proposed Structures

An understanding of the proposed construction and the order of loads on the foundations is needed for choosing the appropriate foundation system. In the present case, the proposed structure is configured with two basement floors and twenty two upper floors, and is meant for resicential purpose. For this kind of structure, the column loads could vary between 6500 kN to 7500 kN.

The above mentioned loads have no bearing on the design of either sub or super structures and are mentioned just to provide an insight to choose an appropriate foundation system with respect to subsoil conditions.

4.2 Foundation System

The depth of two basement floor is informed to be about 7.0m with respect to the adjacent road level.

Hence, for the kind of proposed structure and the sub soil conditions, it is not possible to adopt any kind of open foundation system from both shear and settlement considerations. Hence, it is advisable to adopt deep pile foundation system.

The piles can be installed by drilling with direct mud circulation technique **(Bored Cast Insitu Piles)** and the recommended safe load carrying capacity of bored cast insitu piles in compression, tension and lateral for different diameters is worked out as per IS 2911-Part-I-Section-2 and are presented in Table 4.1.

Typical computations are presented in Annexure

TABLE:- 4.1 RECOMMENDED SAFE LOAD CARRYING CAPACITIES OF BORED CAST-IN SITU PILES								
Sl.No	Reference Bore hole No.	Length of Pile below Adjacent Road Level	Assumed Length of Cut-Off Below E.G.L	Length of Pile below Cut-off	Dia.of Pile in (mm)	SAFE LOAD CARRYING CAPACITY (kN)		
						Vertical Load Carrying Capacity	Pull Out Capacity	Lateral Load Carrying Capacity
1	BH-03	28.0	7.5	20.50	600	1800	900	60
2					650	2000	1000	70
3					750	2300	1200	90
4					800	2600	1300	95
5					900	3000	1500	120
6					1000	3500	1700	140

CHAPTER-5

RECOMMENDATIONS

5.1 Recommendation for Deep pile foundation system

- For the kind of proposed structure and sub soil condition deep pile foundation is the suitable foundation to adopt. In the present case, **Bored Cast in situ piles** are recommended as the suitable foundation system.
- The allowable safe load carrying capacities of different diameters of piles as given in Table-4.1.can be adopted as provisional design loads, as the load carrying capacity of piles not only depends upon the sub soil properties, but also depends on the care and experience of installation of piles.
- The theoretical load carrying estimates of piles shall be confirmed by conducting pile loads tests as per the guide lines laid down in IS: 2911-Part-IV.
- The boring shall be carried out using direct mud circulation prepared out of sodium bentonite.
- After reaching the borehole termination depth, the borehole shall be cleaned using mud circulation for a minimum period of 30min or till the return mud is relatively clear of soil particles.
- After ensuring the borehole is clean, the tremie pipe shall be lowered and concreting can be done.

5.2 Construction method statement of pile foundation:

- The mud used shall be made out of sodium bentonite with minimum free swell index of more than 300% and liquid limit more than 100%. The silt content in bentonite shall not be more than 5%.
- The mud should be prepared using sodium bentonite with a density of 1.10 to 1.15 g/cc.

5.3 General Recommendation

- Since, chlorides and sulphates are well within the permissible limits, no special steel or cement is required for the construction.

AUTHORISED SIGNATORY

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ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile	Bored	Diameter of Pile	Length of Pile below G.L. (m)	-28	As Per IS:2911-(P-I,S-2)-2010
Reference Bore Hole	BH-03	600 mm	Surcharge Pressure	0	kPa

Layer No.	Layer Thk. (m) Top. R.L.	Bot. R.L	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(φ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN		
1	0.0	-7.5	7.5	Cut-Off Level													
2	-7.5	-10.5	3.0	Sand	17	18.0	18.0	-	32.1	0.0	24.0	12.0	-	1.1	qf	2	47.1
3	-10.5	-17.0	6.5	Sand	31	19.5	18.8	-	36.3	24.0	85.8	54.9	-	1.3	qf	3	650.3
4	-17.0	-21.5	4.5	Clay	60	22.0	20.8	400	-	85.8	138.8	112.8	0.3	-	qf	4	882.2
5	-21.5	-23.5	2.0	Sand	60	20.5	21.3	-	42.5	138.8	160.8	150.3	-	1.5	qf	5	779.4
6	-23.5	-28.0	4.5	Clay	60	22.0	21.3	400	-	160.8	214.8	187.8	0.3	-	qf	6	882.2

Summation of Positive Skin Resitance (kN) Q_f= 3241.05

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

		SPT	ϕ	C_u	N_q	N_c	
Bearing Stratum	Shale	100	-	600	-	9	Eff.Ht.of Overburden 9 m
							Effective Overburden Pressure 101.25 kN/m²

End Bearing Resistance (kN) Q_p= 1526.81

Ultimate Load Carrying Capacity (Q_{ult})	$Q_u=Q_f-Q_f+Q_p$ (kN)	4767.86
Safe Load Carrying Capacity (Q_{safe})	$Q_u/2.5$ (kN)	1907.15
Allowable Safe Load Carrying Capacity	$Q_{A\text{-}safe}$ (kN)	1907.15
Allowable Safe Pull out Capacity	$Q_{A\text{-}pull}$: Qf/3 (kN)	1080.35

Skin Resistance in Clay Layer is $\pi^*d^*T_i^*C_u^*\alpha$

Skin Resistance in Sand Layer is $\pi^*d^*T_i^*q_i^*K^*\tan(\phi)$

End Bearing Resistance in Clay Layer is $\pi^*d^2/4^*C_u^*N_c$

End Bearing Resistance in Sand Layer is $\pi^*d^2/4^*Q^*N_q$

Where

Cu=Undrained Shear Strength of Clay

ϕ=Angle of Shearing Resistance

N_c=Bearing Capacity Factor = 9

K=Coef. Earth Pressure at Rest

q_i=Effective Overburden Pressure at middle of Layer

N_q=Bearing Capacity Factor, Ref. Fig.1 of IS: Code Referred above

d=Dia. Of Pile

α=Adhesion Factor

T_i=Thickness of Layer

Q (i.e) Effecitve Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

LATERAL LOAD CARRYING CAPACITY OF BORED CAST-SITU PILES

Reference Bore Hole : BH-03

1 Geometrical Data

Type of Pile Head Considered	Fixed	
Diameter of Pile (d) :	0.60	m
Free standing Length of Pile (e) :	0	m
Length of Pile below Adjacent Road Level (Le) :	28.0	m
Cut-Off Level From E.G.L :	7.5	
Length of Pile below Cut-Off Level (Le) :	20.5	m
Grade of Concrete (M) :	25	MN/m^2
Young's Modulus of Concrete (E) :	25000000	kN/m^2
Momemnt of Inertia (I) :	0.006362	m^4

2 Determination of Depth of Fixity

Type of Soil Strata :	Sand	
Ground water Condition :	Submerged	
Design SPT "N" Value :	14	
T=(EI/nh)1/5		

(n can be read as h in the above and below equation in case of Sand)

nh= :	1976	kN/m^3
In Case of Sand :	-	kN/m^4
T= :	2.41	m
L1/T :	0.00	
Lf/T :	2.20	
Depth of Fixity below Cut off (z_f) :	5.29	m

3 Determincation of Lateral Load and Moment Carrying Capacity for 0.005 m Lateral Deflection:

Allowable Lateral Deflection (Y) :	0.005	m
Lateral Load Carrying Capacity (H)= Y*12EI/(e+zf)^3 :	64.41	kN
Recommended Design Lateral Load carrying Capacity :	**64**	**kN**
Fixed End Moment, M_F=H(e+z_f)/2	170	
Reduction Factor (L_1/T) :	0.83	m
Actual Moment (Fixed End Moment/Reduction Factor), M_F	**141**	kN-m

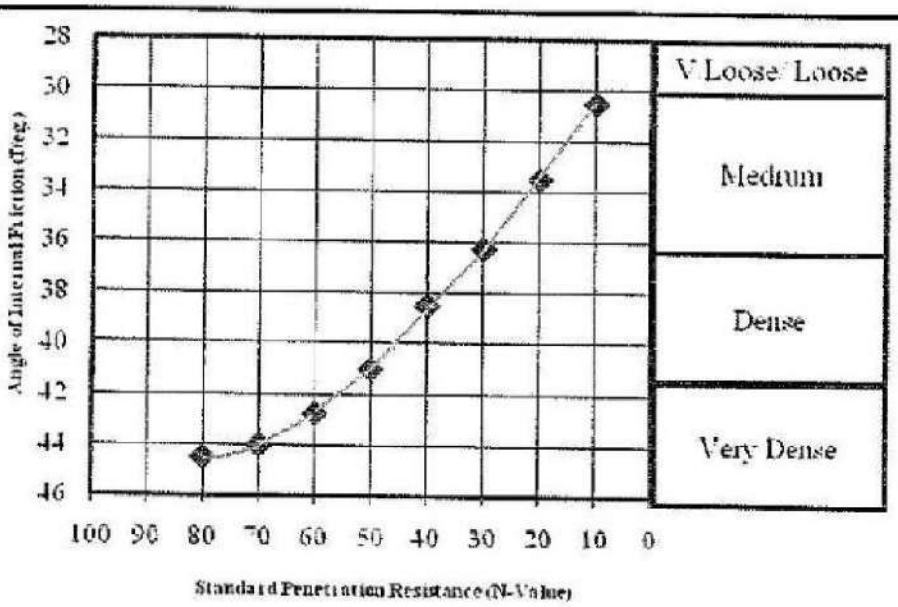

FIG. A1 Relation Ship between Angle of Internal Friction & N-value (Reproduced from IS:6403-1981)

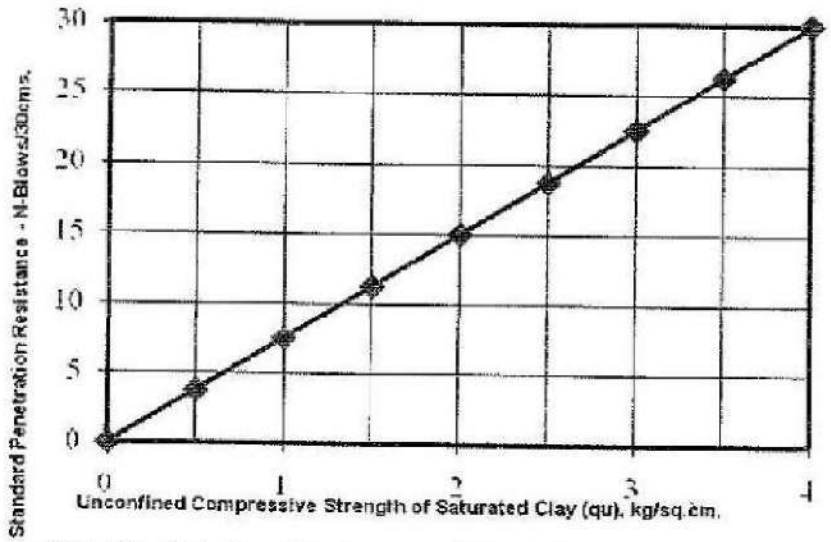

FIG. A2 : Relationship between UCC & SPT-Value (N) of Saturated Clay (AfterTerzhagi & Peck, 1948)

for BH-1 Co-ordinates : N13.077317, E80.205147

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-01					
PAGE No.	01					
PROJECT NAME	TNHB - Arumbakkam, Chennai				DIA OF BORE HOLE	150mm / 100mm
LOCATION	Arumbakkam	MACHINE No.	H-DY...	CHAINAGE (m)	BORE START DATE	21-01-2020
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES N 13.0773...	BORE END DATE	23-01-2020
JOB CODE		FLUSHING MEDIUM	Bentonite	CO-ORDINATES E 80.2051...	TOTAL DRILLING DAYS	3

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC/TCB/DB)	Total Core Recovery %	R.Q.D %	SPT Blows 0-15	SPT Blows 15-30	SPT Blows 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
	21-01-2020	16	59												Filled up Building Materials, Concrete Do Top to 2 m + ...
		17	15												
1											1				
		17	35				Water loss				1.50m				
		17	48												
2											2				
				TC											
3											3				Filled up Rubbles Building Stones
		11	09												
		11	45	DB			10 cm SPT Rbd. SPT ...				4.0	D	SPT Nil Sample		
4															
		11	28												
		11	50												
5		11	57	DB							5				
							Water loss				5.5m				
	22/01/2020	12	55												
6											6.0			6	
		10	45	SC											
		10	58												
7							9	20	23	43	7.0	1	SS		YELLOWISH BROWN CEMENTED SILTY SAND FINE TO MEDIUM & V. DENSE
	23/01/20	14	50												
		15	05	SC											
8							18	28	34	62	8.0	2	SS		
							Water loss				8.5m				

This borehole for Geotechnical Soil Investigation could not be continued due to water loss starting from depth of 1.50 m below G.L to 8 m deeper depth. The borehole terminated at 8.00 m.

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME		PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE		WATER TABLE (m)	—
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

Remarks: water loss due to Building Materials not properly maintaining & drilling ... [illegible] ... sample ... [illegible] ... filled ... water loss 1.50 m

GEOMARINE

SITE INVESTIGATION RECORD

BORE HOLE No. BR.
PAGE No. 01
DIA OF BORE HOLE 150mm U1 / 100mm
BORE START DATE 10/01/2020
BORE END DATE 20/01/2020
TOTAL DRILLING DAYS 5

PROJECT NAME: TNHB - Ayanambakkam - Chennai
LOCATION:
MACHINE No.:
CHAINAGE (m):
STRUCTURE: SA + Core 25
DRILLING METHOD: Rotary
CO-ORDINATES: N / E
JOB CODE:
FLUSHING MEDIUM: Bentonite

Depth below E.G.L (m)	Drilling progress date Hr/Hr	Time Hr	Time Min	Type of Drilling Bit (SC / TCB / DD)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Depth (m)	Geotechnical Description
1	10-01-2020			Soil Cutter			3	5	8	13	1.00	01	DS		Filled up Soil Building materials & clayey Soil
2							4	3	3	6	2.00	2	SS		
3											3.00	3	DS		
4							9	8	9	17	4.00	4	SS		
5							8	11	13	24	5.00	5	SS	5.50	
6		9	31												Blaenish Grey M. Dense fine Sand with clay packets
		9	33				3	7	16	23	6.00	6	SS		
7		9	55												Greyish Brown Dense M. coarse to fine Sand
		10	00				25	24	22	46	7.00	7	DS		
		10	20												
8		10	22												Dry
		10	41				15	24	29	53	8.00	8	SS		
9		10	63												
		11	06				20	14	19	33	9.00	9	SS		Brownish Dense fine to M. coarse Sand
10		11	68												
							7	5	5	10	10.00	10	SS		Blaenish Grey stiff silty Clay with Sand packets

CS - Core Sample
SS - Split Spoon Sample
UDS-Undisturbed Sample
WS - Wash Sample

DS - Disturbed Sample
SC - Soil Cutter
TCB - Tungsten Carbide Bit
DD - Diamond Bit

SUPERVISOR NAME: M. Gopinathan
SIGNATURE: M. Gopi
DATE: 11/01/2020
CLIENT IN-CHARGE:

PROJECT SITE DETAILS
GROUND LEVEL (m):
WATER TABLE (m): —
CASING DEPTH (m):

GEOMARINE
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SITE INVESTIGATION RECORD

BORE HOLE No. 02
PAGE No. 01

PROJECT NAME: TNHB - Arumbakkam - Chennai
DIA OF BORE HOLE: 150mm 4, 100mm
LOCATION:
MACHINE No.:
CHAINAGE (m):
BORE START DATE: 10/01/2020
STRUCTURE:
DRILLING METHOD: Rotary
CO-ORDINATES: N, E:
BORE END DATE: 20/01/2020
JOB CODE:
FLUSHING MEDIUM: Bentonite
TOTAL DRILLING DAYS: 5

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: RQD %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Depth (m)	Geotechnical Description
0															
1		11	36												
		11	39	SC			1	2	3	5	1.50	11	SS		Greyish loose clayey Sand
2															
		12	17												
3	11-01-2020	12	19	R			7	10	17	27	3.00	12	SS		Greyish M. Dense Cemented Sand
4		1	45												
		1	47												
5				SC			13	20	26	46	4.50	13	SS		Greyish Dense Cemented Sand
		2	30												
6		2	32												
				SC			15	17	30	47	6.00	14	SS		Greenish Grey Dense Cemented Sand.
7		4	02												
		6	04												
				SC			15	30	37	73	7.50	15	SS		Greyish very Dense silty fine Sand (Sandy Si.
8															
9	12-01-2020			SC			13	31	37	68	9.00	16	SS		Brownish Grey very Hard Compacted Clay
10															

CS - Core Sample
SS - Split Spoon Sample
UDS - Undisturbed Sample
WS - Wash Sample

DS - Disturbed Sample
SC - Soil Cutter
TCB - Tungsten Carbide Bit
DB - Diamond Bit

SUPERVISOR NAME: Logeshwaran R
SIGNATURE:
DATE:
CLIENT IN-CHARGE:

PROJECT SITE DETAILS
GROUND LEVEL (m):
WATER TABLE (m):
CASING DEPTH (m):

SITE INVESTIGATION RECORD

GEOMARINE — THE SPIRIT OF ENGINEERING

PROJECT NAME	TNHB - Arumbakkam				BORE HOLE No.	08
					PAGE No.	03
					DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	Arumbakkam	MACHINE No.	YELLAND	CHAINAGE (m)	BORE START DATE	10/01/2020
STRUCTURE	TNHB Commercial	DRILLING METHOD	Rotary	CO-ORDINATES N	BORE END DATE	20/01/2020
JOB CODE		FLUSHING MEDIUM	Bentonite	CO-ORDINATES E	TOTAL DRILLING DAYS	5

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC/TCB/DB)	Total Core Recovery %	R.Q.D %	Blows/cm 0-15	Blows/cm 15-30	Blows/cm 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Depth (m)	Geotechnical Description
	17/01/2020	4 4	35 38												
1		3 3	37 40	SC			15	23	34	57	21.00	17	SS		Greyish Brown V. Hard Compacted Clay
2		0	56												
3	17/01/2020			SC			33	15cm/50 blows Hammer Blow	N>100		23.00	18	SS		Greyish Brown Very Dense Silty fine sand
4		0	3												
5				SC			23	57	11cm 52 blows	N>100	25.00	19	SS		— Do —
	20/01/2020	14 15	35 05												
6-7				SC			40	8cm 45 blows 10	SPT U-Refusal No Penetration		27	20	SS		Hard, Brownish Greenish colour compacted clay Hard (SHALE YOUNGER STAGE)

This bore hole for investigating soil investigation has been terminated at the depth of 27 mts of Terminated due to water loss continuously occurring

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN K	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	[signature]	GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	20.01.2020	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE — SITE INVESTIGATION RECORD

PROJECT NAME	TNHB – Arumbakkam, Chennai					BORE HOLE No.	BH-03
						PAGE No.	01
						DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	Arumbakkam	MACHINE No.		CHAINAGE (m)		BORE START DATE	22-01-2020
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N	BORE END DATE	28-01-2020
JOB CODE		FLUSHING MEDIUM	Bentonite		E	TOTAL DRILLING DAYS	6

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC/TCB/DB)	Total Core Recovery %	R.Q.D %	SPT Blows 0-15	SPT Blows 15-30	SPT Blows 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Depth (m)	Geotechnical Description
		10 to	45	SC									↓		Filled up Bricks Concrete material (0m Depth to 2.50mts)
3	–	11	15				2	5	2	7	3.10	1	SS		Blackish Loose, Sandy clay
4	22/01/2020	12 to 12	15 / 27		–		3	3	4	7	4.0	2	SS		Blackish M. stiff clay
5		14 to 14	07 / 30		–		5	12	14	26	5.0	3	SS	4/c (5.30m)	Blackish to Greyish color M.Stiff clay to M.Dense Silty fine Sand.
											Large loss 4/c				
		14	57												
6		15	00	↓			5	6	8	14	6.0	4	SS		BLACKISH GREY COLOUR M.DENSE, FINE TO MEDIUM GRAINS SILTY SAND
		15 to 15	19 / 21	SC											
7							5	4	6	10	7.0	5	SS		LOOSE, COMPACTED CLAYEY SILTY SAND. (FINE TO MEDIUM GRAINS)
		15	42	SC											
8		15	47				7	12	8	20	8	6	SS		SPT SAMPLE SLIPPED IN BORE HOLE.
							SAMPLE SLIPPED IN BLOWS								
		16	14	SC											
9		16	16				18	15	19	34	9	7	(SS)		GREENISH COLOURED MEDIUM TO FINE SILTY SAND
	23/01/2020	10	45	SC											
		10	47												
10							13	15	15	30	10	8	(SS)		GREENISH, M.DENSE, DENSE CEMENTED SAND FINE TO MEDIUM GRAINS
											M. Venugopal Sir				

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN C	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	[signature]	GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	22/01/2020	WATER TABLE (m)	4.5
WS - Wash Sample	DB - DIAMOND BIT	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03
PAGE No.	02
PROJECT NAME	TNHB - Arumbakkam
DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	ARUMBAKKAM
MACHINE No.	HD-2
CHAINAGE (m)	
BORE START DATE	23-01-2020
STRUCTURE	
DRILLING METHOD	Rotary
CO-ORDINATES	N: / E:
BORE END DATE	28-01-2020
JOB CODE	
FLUSHING MEDIUM	Bentonite
TOTAL DRILLING DAYS	6

Depth below E.G.L. (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC/TCB/DB)	Total Core Recovery %	R.Q.D %	Blows/cm 0-15	Blows/cm 15-30	Blows/cm 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
1	23-01-2020	11	40	SC											
		11	50												DENSE, GREENISH GREY,
2							11	14	19	33	11.50	9	SS		SILTY SAND (COMPACTED)
				SC											FINE TO MEDIUM GRAINS
		12	16												
3		12	20				15	17	17	34	13.0	10	SS		DENSE, GREENISH & GREY
	24/01/2020	10	36	SC											(V-FINE GRAINS OF
4		10	43								14.0				SILTY SOILS) & SILTY SAND
							33	57	100cm/100	SPT Hammer Rebounded	14.5	11	SS	14.0	LAYER CHANGES 14.0 HARD, GREENISH & BROWN
5		14	40												COMPACTED CLAY.
		14	47	SC											(SHALE) HARD CLAY
		14	55												
6		14	30				15	20	29	49	16.0	12	SS		HARD, GREENISH BROWN (COMPACTED CLAY
				SC											SHALE) HARD SHALE
7		16	05												HARD ~ LAYER CHANGE
		16	54				14	44	46	90	17.5	13	SS		BROWN, GREENISH COLOR
8	25/01/2020	11	05	SC											COMPACTED HARD CLAY
		11	10												(SHALE) WITH VERY FINE SILTY SAND)
		11	28				37	55	10cm 51/12cm	SPT Rebounded	19.0	14	SS	19.0	HARD & V. DENSE
9		12	30												COMPACTED CLAY (SHALE)
10		12	50	SC											LOOK LIKE VERY VERY FINE SILTY SAND

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN R
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	R. Murali
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	9/01/2020
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE	

PROJECT SITE DETAILS	
GROUND LEVEL (m)	
WATER TABLE (m)	4.5
CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02.	PAGE No.	03				
PROJECT NAME	TNHB - Arumbakkam			DIA OF BORE HOLE	150mm ✓ / 100mm		
LOCATION	ARUMBAKKAM	MACHINE No.	HD-2	CHAINAGE (m)		BORE START DATE	22-01-2020
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N	BORE END DATE	28-01-2020
JOB CODE		FLUSHING MEDIUM	Bentonite		E	TOTAL DRILLING DAYS	6

Depth below E.G.L (m)	Date	Drilling progress per metre Time Hr.	Min	Type of Drill Bit (SC / TCB / DB)	Core Details Total Core Recovery %	R.Q.D %	SPT Blows/cm 0-15	15-30	30-45	SPT 'N' Value	Sample Depth	No.	Type	Layer Depth (m)	Geotechnical Description
				SC											
1	25/01/2020	Total Drilled Time Hours (11 1/2 hrs)		(4 1/2 hr) SC			21	35	19cm 55 Blows	SPT Hammer Rebound	21.0	15	(SS)		HARD, BROWNISH GREEN COMPACTED SILTY CLAY
3		09 to 10	55 / 30				23	40	10cm 50 blows	>100 Spt Hammer Rebound	23.0	16	(SS)		HARD GREYISH GREEN COMPACTED SILTY CLAY
4											L/C 4.2m			L/C	L/C
5	27/01/2020	11 to 12	18 / 40	SC			9cm 55 Blows No penetration SPT Rebound			>100	25.0	17	(SS)		V. DENSE, BROWNISH & GREY, COARSE SAND. MEDIUM TO COARSER GRAINS
6											L/C			L/C	L/C 26m
7		14 / 15	45 / 40	SC / DB	0%	0%	3cm 55 Blows SPT Hammer Rebound, No penetration			>100	27.0	18	WS / (SS) NIL		V. HARD SHALE DARK GREY, (COMPACTED SILTY CLAY ROCK) SPT SAMPLE SLIPPED (WS) only
8		15 to 16	25 / 35		0%	0%	SPT Hammer Rebound No penetration			>100	28	19	CS / WS		- do -
9	28/01/2020	10 to 12	20 / 10	DB / TC	30%	0%	SPT Hammer Rebound			>100	29.0	20	WS / (SS) / CS		V. HARD, SHALE ROCK Dark Greyish.
10							—	—	—	.	30	21	CS		V. HARD, SILTY COMPACTED CLAY, SHALE Rock GREY, SEDIMENTARY ROCK ORIGINE

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN E	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	R. Murali...	GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	28/01/2020	WATER TABLE (m)	4.5
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE THE SPIRIT OF ENGINEERING	SITE INVESTIGATION RECORD		BORE HOLE No.	04.
			PAGE No.	01
PROJECT NAME	TNHB - ARUMBAKKAM,		DIA OF BORE HOLE	150mm / 100mm
LOCATION	ARUMBAKKAM	MACHINE No. HD-2 / CHAINAGE (m)	BORE START DATE	28-01-2020
STRUCTURE		DRILLING METHOD Rotary / CO-ORDINATES N	BORE END DATE	31-01-2020
JOB CODE		FLUSHING MEDIUM Bentonite / E	TOTAL DRILLING DAYS	4

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drilling (SC / TCB / DB)	Total Core Recovery %	R.Q.D %	Blows/cm 0-15	Blows/cm 15-30	Blows/cm 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
	28-01-2020	16	04												Filled up Soil
		16	15	Sc											Building Demolished Stones Concretes Rubbles Material
1							Concreted & Filled up Rubbles			—	1.0	—	NIL		
		16	24												
		16	33	Sc			Concreted & Filled up Rubbles								0.0m top to below 2mts
2										—	2.0	—	NIL		
		16	40	Sc											2.50 mts LL
		16	58												GREYISH YELLOW,
3							17	18	20	38	3.0	1	(SS)		DENSE, SILTY SAND MEDIUM TO COARSE GRAINS & GRAVELS WITH FILLED UP SOILS COVERED LL
		10	15	Sc											
		10	25												
4							5	7	8	15	4.0	2	(SS)	LL	
	29-01-2020	10	56	Sc											STIFF, SILTY CLAY, DARK BLACK COLOURS, WET.
		11	00												
5							6	8	10	18	5.0	3	SS		STIFF, SILTY CLAYEY DARK BLACK COLOURS SILTY SANDY CLAY LAYER CHANGES LL
		11	27											5.5	
		11	30	Sc											
6							8	11	11	22	6.0	4	SS		M.DENSE TO DENSE SILTY SAND
		11	52												
		11	55	Sc											
7							6	10	8	18	7.0	5	SS		M. DENSE, SILTY SAND
		12	24	Sc											
		12	27												
8							3	6	9	15	8.0	6	SS		M-DENSE, GREENISH GREY, CLAYEY SILTY SAND FINE TO MEDIUM GRAINS
		12	46	Sc											
		12	48												
9							10	14	17	31	9.0	7	SS		DENSE, GREYISH GREEN CLAYEY SILTY SAND
		13	49	Sc											
		14	00												
10							12	21	25	46	10.0	8	SS		DENSE, GREYISH GREEN, CLAYEY SILTY SAND

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN C	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	[signature]	GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	29/01/2020	WATER TABLE (m)	4.5
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

PROJECT NAME	TNHB- ARUMBAKKAM					DIA OF BORE HOLE	150mm / 100mm ✓
LOCATION	ARUMBAKKAM	MACHINE No.	HD-2	CHAINAGE (m)		BORE HOLE No.	04
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N	PAGE No.	02
JOB CODE		FLUSHING MEDIUM	Bentonite		E	BORE START DATE	28-01-2020
						BORE END DATE	31-01-2020
						TOTAL DRILLING DAYS	4

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC / TCB / DB)	Total Core Recovery %	R.Q.D %	SPT Blows/cm 0-15	SPT Blows/cm 15-30	SPT Blows/cm 30-45	SPT "N" Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
	29-01-2020	14	18												
1		16	25	Sc											
							19	24	25	49	11.50	11	SS		DENSE, DARK GREENISH COLOUR GREY, SILTY VERY FINE GRAINS SAND
2		15	10												
		15	30	Sc											
3							34	40	12cm / 55	>100	13.0	12	(SS)		DENSE, DARK, GREENISH GREY SILTY VERY - FINE TO MEDIUM SAND
							SPT Hammer Rebound								
		16	25	Sc											
4		16	40												
							45	10cm / 50R		100	14.50	13	SS		DENSE, DARK GREEN & GREY SILTY SAND FINE TO MEDIUM COARSE GRAINS
							SPT Hammer Rebound								
5		10 to 10	19 to 55	Sc											
											4.5		SS	4.5	
6	30-01-2020	12 to 12	12 to 50				19	20	24	44	16.0	14	SS		HARD, GREY BROWNISH RED COMPACTED SILTY CLAY (SHALE)
7		13 to 13	05 to 34	Sc											
		13	50	13.50 to 14.45			12	21	25	46	17.5	13	SS		V. HARD, GREY, BROWNISH RED, COMPACTED SILTY CLAY (SHALE)
8		14 to 14	18												
		14	35	Sc 14.35 to 14.58											
9		14	58				21	28	39	67	19.0	14	SS		V. HARD & V. DENSE, DARK BROWNISH GREY WITH SILTY CLAYEY SAND. (CEMENTED SAND)
		15 to 15	14 to 35	Sc											
10															

15.

4.5

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN K	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	K. Murali Krishnan	GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	30-01-2020	WATER TABLE (m)	4.5m
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE THE SPIRIT OF ENGINEERING	SITE INVESTIGATION RECORD					BORE HOLE No.	
						PAGE No.	03
PROJECT NAME	TNHB- ARUMBAKKAM					DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	ARUMBAKKAM	MACHINE No.	HD-2	CHAINAGE (m)		BORE START DATE	28-01-2020
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N	BORE END DATE	31-01-2020
JOB CODE		FLUSHING MEDIUM	Bentonite		E	TOTAL DRILLING DAYS	4

Depth below E.G.L. (m)	Date	Time Hr.	Time Min	Type of Drilling (SC / TCB / DB)	Total Core Recovery %	R.Q.D %	Blows/cm 0-15	Blows/cm 15-30	Blows/cm 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
	30-01-2020			SC											
1							25	25	30	55	21.0	15	SS		HARD & VERY DENSE COMPACTED CLAYEY SILTY SAND BROWNISH YELLOW, (CEMENTED SAND)
		15 to 16	55 18	SC											
3							45	8cm / 55 blows SPT Hammer Rebound		>100	23.0	16	SS		V. DENSE, HA SILTY SAND (CEMENTED SAND) Very Fine to medium grained.
4		16 to 17	40 10	SC											
5	31-01-2020						25	8cm / 48 blows SPT Hammer Rebound No penetration		>100	25.0	17	SS		V. DENSE, GREYISH GREEN CEMENTED SILTY SAND VERY FINE TO MEDIUM GRAINS SOILS.
6		10 to 11	46 22	SC											
7											27	18	SS		V. DENSE, GREYISH GREEN COLOUR SILTY SAND VERY FINE TO MEDIUM GRAINS SOILS.
8		11 to 12	55 30	SC											
9							SPT No penetration 5cm / 55 Blows SPT Hammer Rebound			>100	29	19	SS	4cm	L change — V. HARD, GREYISH GREEN SHALE ROCK. COMPACTED SILTY CLAY.
		12 to 14	46 15	TC	35%	0%									
10											30	20	CS		HARD SHALE ROCK

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNA K	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	[signature]	GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	31/01/2020	WATER TABLE (m)	4.5
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE THE SPIRIT OF ENGINEERING	SITE INVESTIGATION RECORD					BORE HOLE No.	BH-5.
						PAGE No.	01
PROJECT NAME	TNHB- ARUMBAKKAM					DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	Arumbakkam Block	MACHINE No.	H-D-2	CHAINAGE (m)		BORE START DATE	03-02-2020
STRUCTURE	24 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	BORE END DATE	06/02/2020
JOB CODE		FLUSHING MEDIUM	Bentonite		E	TOTAL DRILLING DAYS	4

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC / TCB / DB)	Total Core Recovery %	R.Q.D %	SPT Blows/cm 0-15	15-30	30-45	SPT 'N' Value	Sample Depth (m)	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
0	03-02-2020	12	40												Filled up soil at
1		to		SC			-	-	-	-	1	-	-		0.0 m depth to 2.350 above G.L depth. NO SPT Sample
2		12	57				-	-	-	-	2	-	-		Building Material Concrete
		13	50												
3		13	58				7	10	11	21	3.0	1	SS		M DENSE, COARSE SILTY SAND, MEDIUM TO COARSE YELLOWISH BROWN COLOUR,
		15	57	SC							Water level below 3.5 m				
		16	10												
4		16	25				4	8	9	17	4.0	2	SS		M DENSE, SILTY SAND
		16	38	SC											
5		16	55				4	7	8	15	5.0	3	SS		BLACKISH GREY MEDIUM TO COARSE
		16	58	SC							LC			5.15 m	LAYER CHANGES WITH CLAY BOULDERS — 5.15 m — CLAYEY SILTY SAND
6		17	10				3	5	4	9	6.0	4	SS		
		17	13	SC											— Do —
7							5	8	9	17	7.0	5	SS		LOOSE TO MEDIUM DENSE SILTY SAND BLACKISH GREY.
	04-02-2020	10	05	SC											
		10	10												
8							4	9	9	18	8.0	6	SS		M DENSE, SILTY SAND BLACKISH GREY FINE TO MEDIUM GRAINS
		10	29												
		10	33	SC											
9							6	11	11	22	9.0	7	SS		M DENSE SILTY SAND: BLACKISH GREY, FINE TO MEDIUM GRAINS.
		11	02												
		11	06												
10				SC			7	15	18	33	10.0	8	SS		DENSE, SILTY SAND.

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN K	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	K. Muralikrishnan	GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	04/02/2020	WATER TABLE (m)	3.60m
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE THE SPIRIT OF ENGINEERING	SITE INVESTIGATION RECORD	BORE HOLE No.	BH-5.
		PAGE No.	2

PROJECT NAME	TNHB- ARUMBAKKAM.	DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	Arumbakkam 3rd Ph	MACHINE No. H-D-2	CHAINAGE (m)
BORE START DATE	03-02-2020		
STRUCTURE		DRILLING METHOD: Rotary	CO-ORDINATES N / E
BORE END DATE	06/02-2020		
JOB CODE		FLUSHING MEDIUM: Bentonite	
TOTAL DRILLING DAYS	4		

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC / TCB / DB)	Total Core Recovery %	RQD %	SPT Blows/cm 0-15	15-30	30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
	04/02/2020	11.	32												
		11	37	SC											
1							8	15	15	30	11.50	9	SS		DENSE, SILTY SAND, GREYISH GREEN, V.FINE. MEDIUM GRAINS
2		12 to 12	08 / 14	SC											
3							7	12	13	25	13.0	10	SS	14.0	DENSE, SILTY SAND GREENISH GREY, V-FINE TO MEDIUM GRAINS SOILS.
4		13 to 14	48 / 05	SC											
							14	23	25	48	14.50	11	SS		HARD, SILTY CLAY, (SHALE) (COMPACTED HARDCLAY)
5		14 to 14	22 / 49	SC											
6							14	21	27	48	16	12	SS		V.HARD, - SILTY CLAY (SHALE) REDISH GREY, GREEN, BROWN
7		15 to 15	09 / 44	SC											
							16	41	46	87	17.50	13	SS		V. HARD, CLAY SHALE. REDISH BROWN, GREY SHALE
8		16 to 16	10 / 25	SC							water level ↓ below 18. m				
	05/02/2020	10	05												
9		11	28				15	31	36 (9cm)	67	19.0	14	SS	19.20	V. HARD TO V. DENSE. COMPACTED HARD CLAY TO SILTY MEDIUM GRAINS SAND SOILS
		11 to 12.	56 / 30				SPT Hammer Rebound								LAYER CHANGES (19.20M B)
10															

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN K	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	(signature)	GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	05-2-2020	WATER TABLE (m)	3.60
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	BH-5
PAGE No.	03
DIA OF BORE HOLE	150mm ✓ / 100mm
BORE START DATE	03/02/2020
BORE END DATE	06/02/2020
TOTAL DRILLING DAYS	4

PROJECT NAME	TNHB – Arumbakkam.				
LOCATION	ARUMBAKKAM – BUS Stn	MACHINE No.	H-D-2	CHAINAGE (m)	
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N / E
JOB CODE		FLUSHING MEDIUM	Bentonite		

Depth below E.G.L (m)	Date	Time Hr.	Time Min	Type of Drill Bit (SC / TCB / DB)	Total Core Recovery %	R.Q.D %	Blows/cm 0-15	Blows/cm 15-30	Blows/cm 30-45	SPT 'N' Value	Sample Depth	Sample No.	Sample Type	Layer Depth (m)	Geotechnical Description
	05/02/2020	12 to 13	47 to 15												
		14 to 14	05 to 23												
1							20	33	11cm 55 blows	100	21.0	15	SS		V. HARD SILTY CLAY (or) HARD CLAY, (SHALE)
		14 to 15	48 to 18	SC											
3							21	35	8cm 45 Blows	100	23.0	16	SS		CLAYEY SILTY SAND
		15	50				SPT Hammer bolt								--- 23.40 mts L/C --- SILTY SAND V. VERY FINE SAND BROWNISH-GREY
4		16	37	SC											
5		16	54				23	7cm 55 Blows (SS)		100	24.80 m / 25	17	UC / SS / WS		REFUSE SILTY SAND. SPT SAMPLE SLIPPED IN THE BORE HOLE
		17	30												
6	06/02/2020	10 to 10	12 to 35	TC	0%	0%					26.50 Hard Strata		UC	26.50	Hard Strata Starting at the 26.50 mts depth
7		11 to 11	04 to 56				8cm 55 Blows Hammer lift				27	18	SS		V. Hard. SHALE COMPACTED HARD CLAY [SHALE ROCK pieces] GREY & BLUISH GREY
8		12			0%	0%									weathered, COMPLETELY TO HIGHLY WEATHERED
9		12 to 12	16 to 48				No penetration SPT Hammer Rebounded			100	29.0	19	SS		(COMPACTED CLAY) SHALE ROCK
10		14 to 14	08 to 35								30.0	20	SS		--- DO ---

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	MURALI KRISHNAN K	PROJECT SITE DETAILS
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	K. Murali	GROUND LEVEL (m)
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	06/02/2020	WATER TABLE (m): 3.60
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)

ANNEXURE VIII

TRAFFIC STUDY & CIRCULATION SYSTEM

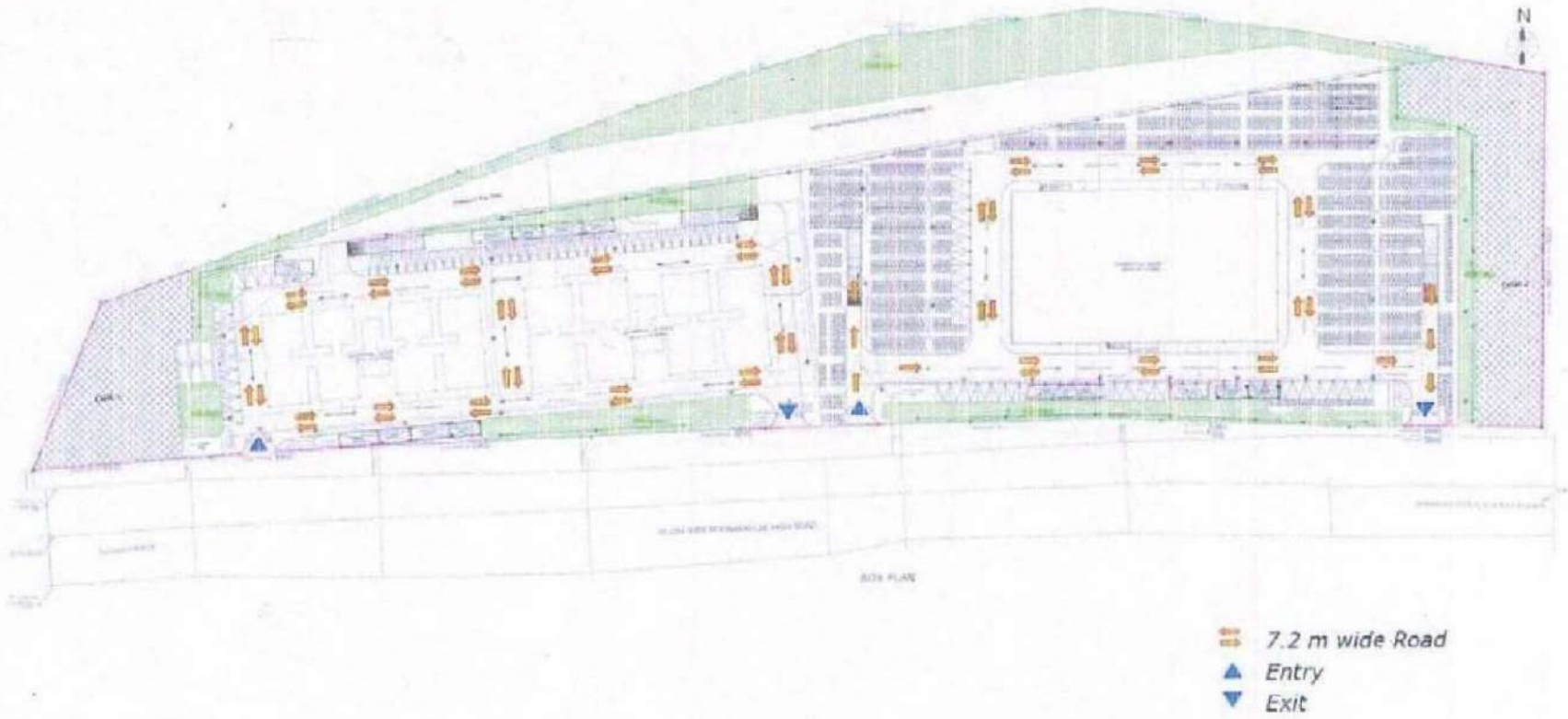


Figure 1 - Internal Roads of the Project Site

TRAFFIC CONGESTION STUDY REPORT

The traffic studies have been conducted to know the prevailing traffic volumes on the existing roads. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project. The variations of traffic densities depend upon the working days and time and also vary in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities. The traffic study was conducted at one location for 24 hours.

METHODOLOGY

- ***Vehicle Count***

The vehicles passing through the road (in both ways) were counted separately for 24 hours at the three selected locations from 0600 hrs to 0600 hrs next day continuously. Category-wise vehicle counting has been done continuously and recorded in the traffic volume count on hourly basis under respective categories.

- ***Categorization of Traffic***

The engine driven vehicles were categorized into various heads viz. two wheelers, three wheelers, four wheelers and trucks/bus.

SAMPLING LOCATIONS

The traffic location is represented in **Table-1** and **Figure - 2.**

Table - 1 Details of Traffic Monitoring Location

Location Code	Location Detail
T1	Poonamallee High Road

Figure 2 - Traffic Monitoring Location

PRESENTATION OF RESULTS

The hourly vehicular traffic densities for continuous normal day at each location observed during the study period and the same are presented below.

Location Number : T1

Details of Location : Poonamallee High Road

SUMMARY OF PCUS OBSERVED ON POONAMALLEE HIGH ROAD ADJECENT TO THE PROJECT SITE

Total PCUs per day	8,714	
Min.	773	PCU/hr
Max.	2,367	PCU/hr
Average	363	PCU/hr

OPERATING CONDITION OF ROAD IN TERMS OF V/C AS PER INDIAN ROADS CONGRESS (IRC) 106 - 1990

Level of Service	General Operating conditions	Range of V/C
A	Free flow (traffic flows at or above speed limit and motorists have complete mobility between lanes)	<0.30
B	Reasonable flow (slightly more congested, with some maneuverability)	0.3 - 0.47
C	Stable flow (more congested than B, loads close to capacity)	0.48 - 0.68
D	Approaching unstable flow (speeds are somewhat reduced, example: busy corridor during middle of a weekday, or a functional urban highway during rush hour)	0.69 - 0.88
E	Unstable flow (flow becomes irregular, speed varies widely and rarely reaches speed limit)	0.88 - 1.00
F	Forced or breakdown flow (a constant traffic jam)	>1.00

The peak hour traffic was found to be 2,367 PCU/hr. The capacity of road for 2 lane (Two way) road due to medium cross traffic is taken as 1,200 PCU/hr as per IRC Standards. Hence the V/C Ratio for the road is found to be 2,367/1,200 = 1.9. Hence the level of service for the road is "F" & the performance is "Forced Flow".

PROPOSED TRAFFIC EXPECTED

Type of Vehicles	No of Vehicles	PCU
4 wheelers	987	987
2 Wheelers	2015	1612

Future traffic scenario:

Based on the above increase in the vehicular count the modified Level of service & performance for the road is as shown in the below table.

Modified Level of Service

Sampling Location	Existing Volume (PCU/hr)	Additional Volume (PCU/hr)	Modified Volume (PCU/hr)	Modified Volume/Capacity ratio	Modified LOS
Poonamallee High Road	2,367	503	2,599	2.1	*F

(* F - Forced flow)

Onsite Mitigation Measures

- Internal roads are proposed for smooth Traffic flow.
- The site has 4 gates for entry and exit.
- Traffic Islands within the premises will be maintained.
- Sufficient number of traffic marshals will be deployed for smooth flow of traffic.

Measures for Preventing Traffic Congestion

- Proper signalization, signage and marking plans are provided.
- Encroachments and impediments to be removed to provide more space for pedestrians 'Short-Term' and 'Long term' parking spaces may be provided.
- In congested areas, 'park and walk'/ 'park and ride' facilities may be planned. Street improvements shall be implemented in about 10-minute walking catchment of such facilities to make it comfortable and convenient for commuters/ shoppers.
- The development of multilevel parking facilities will be taken up, wherever feasible.
- Advanced public information systems regarding parking supply availability should be provided though websites, on-ground display and digital media, to guide people in making travel/ mode choices
- Proper utilization of Public Transport based on the availability criteria.
- Exclusive bus ways to be provided along selected corridors.
- Proper barricading at the work site and road marshal shall be deployed.

ANNEXURE IX

MAINTENANCE OF COMMON FACILITIES

From

K. Ravichandran, B.E.,
Executive Engineer and ADO,
Anna Nagar Division,
Tamil Nadu Housing Board,
Thirumangalam Shopping Complex,
Chennai - 600101

To

The Member Secretary,
State Environment Impact
Assessment Authority, Tamil Nadu,
3rd Floor, Panagal Maligai,
No.1, Jennis Road, Saidapet,
Chennai – 600 015

Letter. No. AND/ PLG/ 849/2016 Date: 26.06.2020

Sir,

Sub: Tamil Nadu Housing Board - Anna Nagar Division - Proposed Construction of mixed use development at S.No. 2, Block No. 4 of Arumbakkam village, Egmore - Nungambakkam Taluk, Chennai District - Gross Fixed Asset (GFA) - reg.

******

TO WHOMSOEVER IT MAY CONCERN

We fully assure and commit ourselves to SEIAA, Tamil Nadu that maintenance of common facilities including greening, rain water harvesting, sewage disposal, solid waste disposal and environmental monitoring will be our responsibility. We shall consistently monitor the performance of the same and eventually the same shall be maintained for a period of 10 years.

Commitment signed by me on 26th day of June 2020 as an authorized signatory of the project proponent before the SEIAA, Tamil Nadu.

Executive Engineer & Ado
Special Project Division II

ANNEXURE X

DISASTER MANAGEMENT PLAN

DISASTER MANAGEMENT PLAN

INTRODUCTION

Disaster is an unexpected event due to sudden failure of the system, external threats, internal disturbances, earthquakes, fire and accidents. Disaster causes massive loss of life and property, Disrupts normal life, requires external aid and affects a large number of people. A common principle of disaster management involves recognition of four basic elements of disaster cycles. These include

- Mitigation
- Preparedness
- Response
- Recovery

OBJECTIVE

The objectives of DMP is to describe the emergency preparedness, the resource availability and response actions applicable to deal with various types of emergencies that could occur in shortest time possible during the emergency. In order to achieve effectively the objectives of emergency planning, the critical elements that form the backbone of Disaster Management Plan (DMP) are:

- Reliable and early detection of an emergency and immediate careful planning.
- The command, co-ordination and response organization structure along with availability of efficient trained personnel.
- The availability of resources for handling emergencies.
- Appropriate emergency response action.
- Effective notification and communication facilities.
- Regular review and updating of DMP.
- Protect training of the concerned personnel.

HAZARD, VULNERBILITY ANALYSIS

Tamil Nadu has witnessed havoc caused by cyclones and storm surge in the coastal regions, earthquakes, monsoon floods, landslides, and Tsunami. Increase in urban population coupled with the construction of man-made structures often poorly built and maintained subject cities to greater levels of risk to life and property in the event of earthquakes, flood and other natural hazards.

EARTHQUAKE PRONE AREAS:

Of all natural hazards, earthquakes seem the most terrifying. They can inflict tremendous damage within seconds and without warning at any time of day, on any day

of the year. Ground shaking and surface faulting are often just the forerunners of secondary damage, such as fires, floods (caused by dam bursts), landslides, quick soil and tsunami (seismic sea waves). The whole of Chennai Metropolitan Area falls under zone III (Moderate).

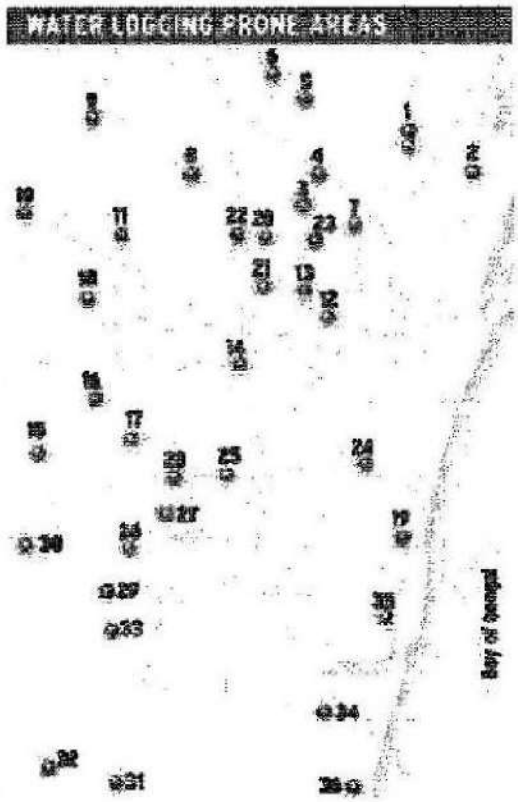
CYCLONE-PRONE AREAS

In Chennai Metropolitan Area, it extends to a distance of 20 km from the coast. In these areas, the risk is due to (a) cyclonic wind velocities combined with heavy storm, (b) flooding by seawater due to high waves and (c) flooding due to heavy storm.

FLOOD PRONE AREAS

In Chennai, there are several areas along the rivers and canals and low-lying areas, which are susceptible to flooding/inundation during heavy storms. The Chennai Corporation has identified 36 localities in the city that are prone to inundation during the monsoon.

Precautionary measures such as desilting of stormwater drains and waterways and building of new drains have been taken by the Corporation. The vulnerable areas would be given an extra attention.



The localities identified are:

1. Tondiarpet; 2. Royapuram; 3. MKB Nagar; 4. Sathyamoorthy Nagar; 5. Kannadasan Nagar; 6. Muthamizh Nagar; 7. Pulianthope; 8. Perambur; 9. Kolathur; 10. Villivakkam; 11. Ayanavaram; 12. Choolai; 13. Periamet; 14. T.P. Chathram; 15. Virugambakkam; 16. Arumbakkam; 17. Choolaimedu; 18. Anna Nagar; 19. Ice House; 20. Nammalwarpet; 21. Purasawalkam; 22. S.S. Puram; 23. Kosapet; 24. Mirsahibpet; 25. Valluvar Kottam; 26. Mambalam; 27. Rangarajapuram; 28. Trustpuram; 29. Ashok Nagar; 30. K.K Nagar; 31. East Velachery; 32. West Velachery; 33. Saidapet; 34. Adyar; 35. Foreshore Estate and 36. Tiruvanmiyur.

PREVENTION AND MITIGATION MEASURES

Prevention consists of actions that reduce risk from natural or manmade disaster incidents. **Protection** reduces or eliminates a threat to people, property and the environment. **Protection includes** actions or measures taken to cover or shield assets from exposure, injury or destruction. Protective actions may occur before, during or after an incident and prevent, minimize or contain the impact of an incident. Once the likelihood of a disaster is suspected, action has to be initiated to prevent a failure. The project in-charge, responsible for preventive action will identify sources of repair equipments, materials, labor and expertise for use during emergency. The project in-charge will notify the officer for the following information:

- ✓ Exit points for the public
- ✓ Safety areas
- ✓ Nearest medical facilities.

MITIGATION means the measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and on environment. Mitigation, with its focus on the impact of a hazard, encompasses the structural and non-structural approaches taken to eliminate or limit a hazard's exposure; impact on people, property and the environment. Besides flood proofing, river desiltation, change in land use pattern and shelter belt plantation, examples of mitigation activities also include:

- Planning, adopting and enforcing stringent building codes, flood-proofing requirements, seismic design standards and cyclone wind-bracing requirements for new construction or repairing existing buildings.
- Planning and adopting zoning ordinances that steer development away from areas subject to flooding, storm surge or coastal erosion.
- Incorporate Development Control Rules with reference to zone, location, height, number of floors, size of buildings, setback spaces to be left around, and the use of the building and land.
- Building rules under the Local Bodies Acts provide for regulation of location of buildings, foundations, plinths, superstructures-walls, floors, and rooms, licensing of surveyors and inspection of municipal engineers at various stages of constructions, regulations on dead and superimposed loads, wind load/pressure, reinforced cement concrete and framed structures, construction materials.
- Manual fire alarm call points shall be provided at all floors.
- Fire service inlets fitted with NRV at ground level shall be provided.
- No of Exit, location and their width should conform to requirements of Building code of India.

- In areas prone to cyclones, critical infrastructure, school and other community buildings to be built at elevated places. Keep trees and shrubs trimmed. Remove damaged and decayed parts of trees to make them resist wind and reduce the potential for damage. Removal of hoardings before specified period of cyclone.

Responsibility to handle the emergency situation is vested to the Safety and Health Engineer.

PREPAREDNESS MEASURES

In a disaster management cycle, **preparedness** shall be the first step, instead of waiting for a disaster to occur and then to manage it. Planning is the one of the key elements in the Preparedness cycle. When undertaking disaster management planning assessments Local residents are likely to be the first emergency responders to such incidents.Measures for preparedness include Sensitizing program, training and capacity building. It is a proven fact that human beings, when faced with adverse situations, tend to react in the way for which they have trained and practiced. Preparedness measures include:

- Each building contact and emergency preparedness coordinator will have regular meetings with people in their building to be certain everyone knows what to do and what to expect, as much as possible.
- These meetings will be held often enough to keep everyone properly informed.
- Training sessions will be coordinated through the Environmental Management Cell.
- Any change in building contacts or emergency preparedness coordinators will be immediately reported to both the Environmental management Cell and the Environmental Safety Officer.
- A volunteer force for every ward / village should be raised and they should be given all encouragement to take up disaster preparedness and mitigation activities.
- Disaster management teams at wards/panchayats level from out of the volunteer force may be created and they may be trained in specific areas like early warning, immediate rescue, first-aid, food management, shelter management, water supply and sanitation, damage assessment, etc.

RESPONSE PLAN

Response Plan for responding effectively and promptly to any threatening disastersituation or disaster.The information listed below provides basic emergencyInformation to help individuals respond thoughtfully in an emergency event.

- In the event of an emergency, all occupants are to vacate the buildings immediately. Whennotification occurs, all building occupants must evacuate from the nearest

marked exit and alertothers within close proximity to do the same. Assist mobility to impaired persons to the closest"area of rescue assistance".

- In case of Fire raise the fire alarm and communicate the same with the emergency services.
- Use stairwells to exit the buildings. Do not use elevators in the event of a fire, earthquake, orother emergencies where you could become confined inside. Proceed outside to the nearestEmergency Assembly Point.

COMMUNICATION SYSTEM

An efficient communication system is absolutely essential for the success of any disastermanagement plan. This has to be worked out in consultation with local authorities involvingpolice and fire department, hospital department considering the following points.

- Identify the relevant officials and institutions to be involved for the first, second and thirdlevel of information;
- Preparation of the telephone directory of these officials and making available to allconcerned
- Allotment of toll free number to a central communication centre;
- Provide wireless communication tools to safety and security and communication officers;
- Empowering central communication centre with latest communication equipment andtools.

REVIEW OF DMP

Evaluating the effectiveness of plans involves a combination of training events, exercises etc. to determine whether the goals, objectives, decisions, actions and timing outlined in the plan will result in an effective response. Indicative guidelines for monitoring and evaluation of the plan are as given below:

- Check the efficacy of the plan after any major disaster/emergency in the district and see what did work and what did not work and make amendments to the plan accordingly.
- As per Sub Section (4) of Section 31 of the Disaster Management Act, 2005, the plan would be reviewed and updated annually and the year in which the plan has been reviewed would be clearly mentioned in shape of header in each page of the plan.
- Update coordinates of responsible personnel and their roles / responsibility every six months or whenever a change happens. Names and contact details of the officers/officials who are the nodal officers or the in-charge of resources to be updated on regular basis.

- Plan should be circulated to all stakeholder departments, agencies and organisations so that they know their role and responsibilities and also prepare their own plans
- Regular Drills / exercises should be conducted to test the efficacy of the plan and check the level of preparedness of various departments and other stakeholders. It would ensure that all parties understand their roles and responsibilities clearly and understand the population size and needs of vulnerable groups.
- Regular training and orientation of the officers/officials responsible to implement the plan should be done so that it becomes useful document to the district administration.

EMERGENCY ACTION COMMITTEE

To ensure coordinates action, an Emergency Action Committee should be constituted. Emergency Action Committee will prepare the evacuation plan and procedures for implementation based on local needs and facilities available. The plan should include:

- ✓ Demarcation of the areas to be evacuated with priorities,
- ✓ Safe area and shelters,
- ✓ Security of property left behind in the evacuated areas,
- ✓ Functions and responsibilities of various members, and
- ✓ Setting up of joint control action.

All personnel involved in the Emergency Action Plan should be thoroughly familiar with all the elements of the project area and their responsibilities. The staff at the site should be trained for problem detection, evaluation and emergency remedial measures. Individual responsibility to handle the segments in emergency plan must be allotted. Success of an emergency plan depends on public participation, their response to warning notifications and timely action. Public has to be educated on the hazards and key role in disaster mitigation by helping in the rescue operations. It is essential to communicate by whom and how a declared emergency will be terminated. There should be proper notification to the public on de-alert signals regarding termination of the emergency. The notification should be clear so that the evacuees know precisely what to do when re-entering or approaching the affected areas.

RISK ASSESSMENT

Risk analysis involves the identification and assessment of risks the persons involved in the project and the neighbouring populations exposed to as a result of hazard occurrence. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies.

In the sections below, the identification of various hazards, probable risks in the project maximum credible accident analysis and consequence analysis which give a broad identification of risks involved are addressed.

IDENTIFICATION OF RISK

TABLE 1.1: DURING CONSTRUCTION PHASE

Activities	Air Pollution	Water Pollution	Noise pollution	Soil Pollution	Occupational Hazard
A. Material Handling:					
Cement	+M	-	-	+M	+M
Steel	-	-	-	-	+M
Sand	-	-	-	-	-
Wood	-	-	-	-	+L
Glass	-	-	-	-	-
Hardware	-	-	-	-	+H
Colour	-	+H	-	+H	-
B. Construction Machinery					
Rotary Driller	+L	-	+H	-	+H
Mixers	+M	-	+M	+L	+M
Excavator	+L	-	+L	-	+H
Material Lift	-	-	+L	-	+H

Risk Factor:

+ : Positive

- : Negative

L : Low

M : Medium

H : High

ACTIONS REQUIRED TO CONTROLLING THE RISK

A. During construction to reduce pollution:

- ✓ Manual water sprinkling during dust excavation
- ✓ Using RMC to reduce air pollution
- ✓ Dust cover for Trucks
- ✓ New Construction Machinery
- ✓ Equipment will work intermittently
- ✓ Rotary drillers instead of acoustic drillers

- ✓ Vehicular trips will not be at peak traffic hour
- ✓ Ear Plugs to workers
- ✓ No noise polluting work in night shifts

B. Safety & Hygienic Measures:

- ✓ Adequate drinking water, toilet and bathing facilities
- ✓ There will be free medical camps and first aid rooms for workers
- ✓ Safety equipments like helmets, safety shoes etc. to personnel and visitors
- ✓ Personnel protective equipments like leather gloves, goggles and ear muffs when required
- ✓ Personnel working on heights will wear safety equipments and will not work alone
- ✓ To prevent any accidents, the entire area under construction will be cordoned off with tin sheets and safety tape is run outside this fence
- ✓ Regular pest control will be done
- ✓ Adequate fire fighting equipments will be provided

OPERATIONAL PHASE

Risks in the complex will be due to natural calamities like earthquake, flooding and others such as fire and accidental hazards. All precautions will be taken to control these risks.

ANNEXURE XI

CORPORATE ENVIRONMENTAL RESPONSIBILITY

PROPOSAL FOR CORPORATE ENVIRONMENTAL RESPONSIBILITY

As per MOEF &. CC O M dated: 01.05.2018 Tamil Nadu Housing Board proposed to allocate 1.5 % of the project cost as CER fund. The following are the list of activities shall be carried out as CER.

1. Providing basic amenities like Sanitary facility, Facilitation of drinking water, books & journals, Development of knowledge Centre, computer etc., and tree plantation for **Municipal Corporation School**, Jai Nagar, Arumbakkam, Chennai, Tamil Nadu 600106 at free of cost.
2. Providing basic amenities like Sanitary facility, Facilitation of drinking water, books & journals, Development of knowledge Centre, computer etc., and tree plantation for **Chennai Corporation Government School**, No.1, School St Rathnapuri, Koyambedu, Chennai, Tamil Nadu 600107 at free of cost.
3. Maintenance and beautification of Coovum river which is located adjacent to the project site at a distance of 0.01 km on the Northern Direction.

S. No	CSR Activities	Cost (in lakhs)
A	**MUNICIPAL CORPORATION SCHOOL (ARUMBAKKAM)**	
	Water Supply, Furniture for Library, Sanitation Facilities, Books & Journals, Computer and Tree plantation	125.7
B	**CHENNAI CORPORATION GOVERNMENT SCHOOL (KOYAMBEDU)**	
	Water Supply, Furniture for Library, Sanitation Facilities, Books & Journals, Computer and Tree plantation	125
C	**MAINTENANCE AND BEAUTIFICATION OF COOVUM RIVER**	
	Bund Strengthening, Tree plantation along the bund, etc	349
TOTAL (A+B+C)		599.7 lakhs

ANNEXURE XII
BIODIVERSITY MANAGEMENT PLAN

BIODIVERSITY MANAGEMENT PLAN

The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species (genetic diversity), between species and of ecosystems.

The objectives of this BMP are as follows:

1. Minimize the loss of habitats, species and ecosystem services within and around the Project Area;
2. Develop a framework for the protection of biodiversity and raise awareness of biodiversity issues; and
3. Establish a framework for external collaboration and data dissemination for the benefit of the greater ecosystem.
4. Generate baseline data from field observations from various terrestrial and aquatic ecosystems;
5. Compare the data so generated with authentic past records to understand changes;
6. Understand the impact of the proposed project on vegetation structure in and around the project site.

FLORA

Assessment of the existing vegetation types in the study area has been done using standard procedures. The terrain of the impact zone is chiefly plain and in some places gentle undulations are observed. The study of flora is conducted as per the guidelines of the Ministry of Environment and Forests, Government of India, with respect to the scope and objectives. The study involved in collection of primary data by conducting survey in the field.

The flora of proposed region has an appreciable diversity, which may be attributed to the diversity in soil type and the physiography of the region. The buffer zone of the proposed site consists of industrial lands, habitations, waste lands, etc. The semi-arid conditions with high temperature and poor rainfall influence the nature of flora. The buffer zone is within a radius of 10 km consisting of naturally occurring species which grow in group.

In the Study Area:
Endangered Species : Nil
Endemic Species : Nil

TABLE: 1 TERRESTRIAL FLORA

S.No.	Botanical Name	Common Name	S.No.	Botanical Name	Common Name
1.	*Azadirachta indica*	Neem	2.	*Garcinia*	Manila
3.	*Annona squamosa*	Custard Apple	4.	*Guazuma*	Bastard cedar
5.	*Argemone mexicana*	-	6.	*Hibiscus lampas*	Wild Cotton
7.	*Abutilon indicum*	Thuthi	8.	*Lannea*	Othiyan
9.	*Berrya ammonila Roxb.*	Triconamalai	10.	*Murraya koeingi*	Kariveppilai
11.	*Borassus flabeilfera*	Palmyra	12.	*Miebuheria*	Thuruthi
13.	*Bambusa Bambos*	Bamboo	14.	*Moringa oleifera*	Drumstick
15.	*Caesalpinia pulcherima*	Mayilkondrai	16.	*Morinda*	Nuna
17.	*Clausena dentata*	Kattuveppilai	18.	*Mangifera indica*	Mango
19.	*Commiphora berryi*	Kiluvai	20.	*Nothapodytes*	Arali
21.	*Calophyllum inophyllum*	Punnai	22.	*Ochna obtusata*	Chilanthai
23.	*Crataeva nurvala Han.*	Mavalingam	24.	*Phoenix*	Echam
25.	*Capparis grandiflora*	Thurathumuthu	26.	*Polyalthia*	Nettilingam
27.	*Casuarina equisetifolia*	Casuarina	28.	*Pithosporum*	Suranai
29.	*Casia auriculata*	Aavarai	30.	*Rododendron*	Alinji
31.	*Calamus veminalis*	Cane Palm	32.	*Samanea saman*	Rain Tree
33.	*Cocus nucifera*	Coconut	34.	*Syzygium cumini*	Indian cherry
35.	*Euphorbia nerifolia*	Kalli	36.	*Scolopia crenate*	Kodalimaram
37.	*Euphorbia antiquorum*	Thirukalli	38.	*Salmella*	Ilavam
39.	*Euphorbia tortills*	Thirukku kalli	40.	*Tamarindus*	Tamarind
41.	*Ficus racemosa*	Athi	42.	*Tabernaemontane*	Nandiyavattai
43.	*Ficus benghalensis*	Banyan	44.	*Thespesia*	Potia
45.	*Ficus religiosa*	Peepal	46.	*Vilex negundo*	Nochi

On the basis of field studies, records of Botanical Survey of India and Forest department, Tamilnadu state did not indicate presence of any endangered and or vulnerable species in this area.

FAUNA STATUS

Wildlife being an important strand in the complex food web in most of forest ecosystems, its status symbolizes the functioning efficiency of the entire ecosystem. The forest management therefore, cannot be isolated for wood exploration and wild life conservation in the same vulnerable vegetation complex. Just as wild flora needs special treatment for preservation and growth, wild fauna as well reserves specific conservative pursuits for posterity. Unfortunately, our past efforts had been unscientific in rearing and preserving our valuable heritage resulting in dwindling of many intersecting species, which the nature had bestowed on us. The broad spectrum of colorful fauna is fading and the same is facing extinction.

Environmental changes through deforestation, spreading urbanization and destruction of habitats have been of alarmingly high magnitude during the recent past, which has totally disturbed the balance between mortality and reproduction. Some threatened faunal forms are biologically handicapped through an imbibed low rate of reproduction by nature.

Fragmentation of population also weakens the vitality of the species due to rarity and normal reproduction process is thwarted leading to extinction. Presence of wildlife could be observed during the study period and also from information from local tribal inhabitants.

Primary Survey

Field studies are conducted to assess fauna in the study area. On the basis of field studies and secondary sources, there are no endangered animal species present in the study area.

Endangered Animals

A comprehensive Central Legislation namely Wild Life (Protection) Act was enforced in 1972 to provide protection to wild animals. Schedule-I of this act contains the list of rare and endangered species, which are completely protected throughout the country. List of animals present in the study area are given in **Table - 2.**

TABLE: 2 LIST OF FAUNA

Sl.No.	Scientific Name	Common Name	WPA Schedule
		Insects	
1	*Agrion sp & Petalura sp*	Dragon fly	IV
2	*Apis indica*	Honeybee	IV
3	*Aranea sp*	Spider	IV
4	*Carausius sp*	Stick insect	IV
5	*Cicada sp.*	Cicada	IV
6	*Coccinella septempunctata*	Ladybird beetle	IV
7	*Coenagrion sp & Ischnura*	Damselfly	IV
8	*Eumenes*	Wasp	IV
9	*Hamitermes silvestri*	Termite	IV
10	*Hieroglyphus sp*	Grasshopper	IV
11	*Mantis religiosa*	Praying mantis	IV
12	*Monomorium indicum*	Ant	IV
13	*Myremeleon*	Antlion larva	IV
14	*Palamnaeus swammerdam*	Scorpion	IV
15	*Scolopendra*	Centipede	IV
16	*Terias hecabe*	Grass Yellow	IV
		Butterflies	
1	*Acraea terpsicore*	Tawny coster	IV
2	*Danaus chrysippus*	Plain tiger	IV
3	*Danaus plexipppus*	Striped tiger	IV
4	*Euthalia nais*	Baronet	IV
5	*Graphium Agamemnon*	Tailed jay	IV
6	*Ixias marianne*	White orange tip	IV
7	*Junonia almanac*	Peacock pansey	IV
8	*Junonia atlites*	Grey pansey	IV
9	*Neptis hylas*	Common sailor	IV
10	*Pachiopta hector*	Crimson rose	IV
11	*Papilio demoleus*	Lime butterfly	IV
12	*Papilio polytes*	Common mormon	IV
13	*Papilo polymnstor*	Blue mormon	IV

14	*Parantica aglea*	Glassy tiger	IV
15	*Precis hierta*	Yellow Pansy	IV
16	*Terias hecabe*	Grass yellow	IV
17	*Triodes minos*	Southern birdwing	IV
		Fish	
1	*Amblypharyngodon sp*	Carplet	IV
2	*Catla catla*	Catla	IV
3	*Chela sp*	Trout	IV
4	*Cirrhinus mrigala*	Mrigal	IV
5	*Cyprinus carpio*	Common Carp	IV
6	*Labeo rohita*	Rohu	IV
7	*Ophiocephalus punctatus*	Kuravai	IV
8	*Oreochromis mossambicus*	Tilapia	IV
		Amphibians	
1	*Bufo melanrostictus*	Common Indian Toad	IV
2	*Euphlyctis cyanophlyctis*	Skittering frog	IV
3	*Microhyla ornata*	Ornatic microhybrid	IV
4	*Rana hexadactylus*	Indian Pond frog	IV
5	*Rana tigrina*	Common frog	IV
		Aquatic Fauna	
1	*Ariophanta sheli*	Ariophanta shell	IV
2	*Helix shell*	Helix shell	IV
3	*Limnaea shell*	Pond snail shell	IV
4	*Planorbis shell*	Freshwater Snail shell	IV
5	*Pila globosa*	Apple snail	IV
		Reptiles	
1	*Ahaetulla nasuta*	Common Green Whip Snake	IV
2	*Bangarus caeruleus*	Common Indian Krait	II
3	*Boiga spp.*	Cat snake	III
4	*Calotes versicolor*	Common Garden lizard	IV
5	*Gongylophis conicus*	Rough-tailed Sand boa,	IV
6	*Hemidactylus flaviviridis*	House gecko	IV
7	*Mabuya carinata*	Brahminy Skink	II
8	*Passerina mycterizaris*	Common Green Snake	IV
9	*Ptyas mucosus*	Common rat snake	IV
		Birds	
1	*Acridotheres tristis*	Common Myna	IV
2	*Alcedo atthis*	Common Kingfisher	IV
3	*Anas acuta*	Common Teal	IV
4	*Ardeola grayii*	Pond Heron or Paddy Bird	IV
5	*Bubo bubo*	Indian great horned owl	IV
6	*Bubulcus ibis*	Cattle egret	IV
7	*Caprimulgus asiaticus*	Common Indian jar	IV
8	*Centropus sinensis*	Crow-Pheasant or coucal	IV
9	*Cinnyris asiatica*	Purple sunbird	IV
10	*Columbus livibus*	Pigeon	IV
11	*Coraclas benghalensis*	Indian Roller	IV
12	*Corvus splendens*	House Crow	V
13	*Coryllis vaeralis*	Lorikeet	V
14	*Cuculus varius*	Common-Hawk Cuckoo	IV
15	*Cypsiurus parvus*	Palm Swift	IV
16	*Dendrocitta vagabunda*	Indian Tree pie	IV
17	*Dicaeum erythrorhynchos*	Tickell's Flowerpecker	IV

18	*Dicrurus macrocerus*	Black Drongo	IV
19	*Egretta garzetta*	Little egret	IV
20	*Eudynamys scolopacea*	Koel	V
21	*Francolinus pondicerianus*	Grey Partridge	IV
22	*Haliastur Indus*	Brahmny kite	IV
23	*Hierococys varius*	Common hawk cuckoo	IV
24	*Megalaima merulinus*	Indian cuckoo	IV
25	*Microfus affinis*	House swift	IV
26	*Milyus migrans*	Common kite	IV
27	*Passer domesticus*	House Sparrow	IV
28	*Psittacula krameri*	Rose Ringed Parakeet	IV
29	*Quills contronix*	Grey quail	IV
30	*Saxicoloides fullcata*	Indian Robin	IV
31	*Tchitrea paradisi*	Paradise Flycatcher	IV
32	*Temenuchus pagodarum*	Brahmny myna	IV
33	*Tephrodornis pondiceraianus*	Common wood shrike	IV
	Mammals		
1	*Bandicota indica*	Bandicoot	IV
2	*Bos indicus*	Cow	IV
3	*Bubalus bubalis*	Buffalo	IV
4	*Canis familiaris*	Dog	-
5	*Capra hircus*	Goat	-
6	*Felis rubiginosa*	Rusty-spotted Cat	IV
7	*Funambulus palmarum*	Indian Palm squirrel	IV
8	*Herpertes edwardrii*	Indian grey mongoose	IV
9	*Mus booduga*	Indian Field Mouse	V
10	*Ovis aries*	Sheep	-
11	*Pteropus giganteus*	Bat, Indian Flying Fox	V
12	*Rattus norvegicus*	Fieldmouse	IV
13	*Rattus rattus*	House Rat	IV
14	*Sorex caerulescens*	Common mush shrew	IV

Insects: The insects in the study area are interrelated with each other and other organisms. They are in perfect balance in their existence. Some of them act as pests, while others are useful and beneficial to the environment and human beings.

Pisces: The fishes recorded in the study area include Ophiocephalus sp., Common carp, Catla sp., Rohu sp., Mrigal sp., etc.

Amphibians: Toads and frogs were the amphibians recorded in the study area. Many of them were seen along the lentic water systems and other areas.

Reptiles: The reptiles recorded in the study area include lizards and snakes. Reptilian fauna is comparatively rich and is mainly restricted to the patches with dense vegetation.

Birds: Apart from Asian pied starling, greenshank, purple moorhen, barbet, cormorant, coot, egret, kingfisher, waders and seabirds, important migratory waterfowl such as

pelicans, herons, egrets, storks, flamingos, ducks, shorebirds, gulls and terns also visits Ennore creek. The avifauna observed in the study area are basically local migrants only.

Mammals: The distribution of mammals is largely dependent upon the environment of the respective areas. The mammals present in the study area include Bonnet Macaque, Indian Palm Squirrel, etc. These mammals are spread over the study area. A balance is observed in the population of these mammals.

Among the fauna recorded, most of them are common resident population and no endangered species encountered in the study area.

National Park / Wildlife Sanctuary / Reserve Forests

On the basis of records of forest department and also from literature survey pertaining to study area reveals that there are no wildlife sanctuaries or National Parks or Biosphere within 10 km radius of the project site. There is no endangered, threatened plant and animal species present in 10 km radius.

Results

There is no damage to biodiversity due to this project site and its surroundings. The project is a vacant land. There is no threatened species found in the study area. The project will implement its greenbelt development and the surrounding areas will also get improved. Livelihood of the species will be increased.

ANNEXURE XIII

FIRE SAFETY & PROTECTION MEASURES

FIRE SAFETY & PROTECTION

The fire extinguishers will be located all over the building for immediate use. The type of hand appliances provided is such that the fire extinguishers can be directly taken and used for fire fighting purpose at any location inside the building. The ring main hydrant system consists of the hydrant valves, hose reels, heavy pipe to withstand a developing pressure of 10 Kg/Sq.cm, branch pipes, M.S. hose box, anti – corrosive treatment, pumps, priming tank, valves (Sluice valve, non- return valve, air release valve) and cables.

The fire prevention measures referred to above should minimise the risk of fire. However the possibility of a fire at any time for whatever reason cannot be totally eliminated. The greatest danger arises if a fire occurs at night, when people are asleep. The volumes of smoke produced by even a small fire can fill a room or corridor very quickly. The presence of a functioning fire alarm system is provided as an early warning of a fire. A notice of the procedures to be followed by guests in the event of a fire should be provided in all guest bedrooms, displayed on the back of each bedroom door. This concentrates on the evacuation of the premises when hearing the fire alarm or other warning and drawing attention to the means of escape. Instructions are clear and concise and are multi-lingual to cater for foreign guests. As guests are unlikely to be familiar with the internal layout of the premises, the instructions include a simple location map, indicating the escape routes relative to each room.

FIRE-FIGHTING EQUIPMENT

Every storey of the premises is provided with a minimum of one nine litres water type or one four kilograms general-purpose powder fire extinguisher (or a number and type of extinguishers with an equivalent rating).

MAINTENANCE OF FIRE PROTECTION EQUIPMENT AND BUILDING SERVICES

Non-fixed equipment would include portable fire extinguishers and fire-blankets. To ensure safety all electrical installation and the heating and hot water systems are checked periodically. Fire alarm systems are tested regularly and maintained to ensure correct operation. Mains operated self-contained alarms are tested at least monthly by the use of the test button provided on the units, to ensure operation of the sounders. All alarms are tested at least once a year to ensure that they respond to fire.

ESCAPE ROUTES

In the event of a fire, the escape routes from the premises are available for use and are not obstructed. The following precautions are taken in relation to all escape routes:
All escape routes are clearly indicated, are not obstructed, and are available for use at all times;

- The exit doors are capable of being readily and easily opened at all times;
- The external areas at or near exits are not obstructed; and
- The security arrangements for the premises do not impede or prevent the use of escape routes.
- Exit doors from the building should be capable of being opened from the inside without the use of a key.

PROTECTED ESCAPE STAIRWAYS

A protected escape stairway is constructed. The walls, doors and ceiling forming the enclosure to a protected escape stairway have a fire resistance of not less than 30 minutes. Every protected escape stairway leads directly to a place of safety outside the building at the ground floor level. Escape stairways is also provided with openable windows, and a roof-light at the top, for the purpose of providing smoke ventilation.

EMERGENCY LIGHTING

In the event of a fire, it is possible that the mains lighting system may fail and this would make evacuation of the premises difficult, if not impossible. To provide for this, it is normal a system of emergency lighting to illuminate the escape routes on failure of the mains electrical supply is provided. Emergency lighting fittings are provided in protected stairways and protected corridors/lobbies to indicate the direction of escape. The emergency lighting system are regularly inspected, tested and maintained, as recommended.

FIRE SAFETY RECORDS

A fire safety register for the premises is established and maintained. The register contains a complete record of all fire safety matters on the premises, and kept up to date and available for inspection if required.
The fire safety register includes the following information:

- ★ Details of premises, including the maximum number of guests accommodated and details of escape routes;

- ★ Emergency and evacuation procedures;
- ★ A record of evacuation/fire drills carried out;
- ★ Details of fire safety training provided;
- ★ Details of fire-fighting equipment;
- ★ Details of fire alarm system and maintenance records;
- ★ A schedule of all fire resisting doors in the premises;
- ★ Details of emergency lighting and maintenance records; and
- ★ Details and maintenance records of building services.

ANNEXURE XIV

RECENT SITE PHOTOGRAPHS

RECENT SITE PHOTOGRAPH

ANNEXURE XV
BASELINE REPORT

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TEST REPORT

Sample Ref No : SAS/AS/021/05
Sample Rep No : 022/05
NAME OF INDUSTRY

Date Of Sampling : 04.05.2020 to 05.05.2020
Reporting Date : 10.05.2020
Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division, Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101

Site Location : S.No. 2, Block No 4 of Arumbakkam Village, Egmore-Nungambakkam Taluk, Chennai District, Tamil Nadu
Sampling Location : Project Site
Sample Description : Ambient Air Quality
Sampling Method : IS 5182 (Part V) and (Part XIV)
Sampling Time : 24 Hrs
Starting Date & Time : 04.05.2020/ 9.45 am
Closing Date & Time : 05.05.2020/9.45 am
Sample Drawn By /Date : SAS/05.05.2020
Received On : 05.05.2020
Analysis Commenced On : 05.05.2020
Analysis Completed on : 10.05.2020

Sl.No	PARAMETERS	PROTOCOL	UNIT	RESULT	NAAQS*
1	Particulate Matter ($PM_{2.5}$)	EPA -40(CFR Part 50)	µg / m³	31.7	60
2	Respirable Particulate Matter (PM_{10})	IS 5182 Part 23-2012	µg / m³	57.1	100
3	Sulphur Dioxide (SO_2)	IS 5182 Part 2	µg / m³	8.9	80
4	Nitrogen Dioxide (NO_2)	IS 5182 Part 6	µg / m³	12.2	80
5	Carbon Monoxide (CO) (1 Hour)	IS 5182 Part 10	mg/m³	BDL (DL=1.15)	2
6	Lead (Pb)	IS 5182 Part 22	µg / m³	BDL (DL=0.1)	1
7	Ozone (O_3)	IS 5182 Part 9	µg / m³	13.6	100
8	Ammonia (NH_3)	Indophenol Method	µg / m³	BDL (DL=0.5)	400
9	Benzene (C_6H_6)	IS 5182 Part 11	µg / m³	BDL (DL=0.1)	5
10	Benzo (a) Pyrene	IS 5182 Part 12	µg / m³	BDL (DL=0.1)	1
11	Arsenic (As)	IS 5182 Part 22	µg / m³	BDL (DL=1.6)	6
12	Nickel (Ni)	IS 5182 Part 22	µg / m³	BDL (DL=9.1)	20

BDL – Below Detectable Limit ; DL – Detection Limit

Remarks The above results meet the *National Ambient Air Quality Standards –CPCB

End of Report

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M Maria Frank Omer - Quality Manager

NOTE:
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TEST REPORT

Sample Ref No	SAS/AS/022/05	Date Of Sampling	04.05.2020 to 05.05.2020
Sample Rep No	023/05	Reporting Date	10.05.2020

NAME OF INDUSTRY : Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division, Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101

Site Location	: S.No 2, Block No 4 of Arumbakkam Village, Egmore-Numgambakkam Taluk, Chennai District, Tamil Nadu
Sampling Location	: Koyembedu
Sample Description	: Ambient Air Quality
Sampling Method	: IS 5182 (Part V) and (Part XIV)
Sampling Time	: 24 Hrs
Starting Date & Time	: 04.05.2020/ 9.45 am
Closing Date & Time	: 05.05.2020/9.45 am
Sample Drawn By /Date	: SAS/05.05.2020
Received On	: 05.05.2020
Analysis Commenced On	: 05.05.2020
Analysis Completed on	: 10.05.2020

Sl.No	PARAMETERS	PROTOCOL	UNIT	RESULT	NAAQS*
1	Particulate Matter ($PM_{2.5}$)	EPA -40CFR Part 50)	µg / m^3	31.8	60
2	Respirable Particulate Matter (PM_{10})	IS 5182 Part 23-2012	µg / m^3	57.4	100
3	Sulphur Dioxide (SO_2)	IS 5182 Part 2	µg / m^3	8.3	80
4	Nitrogen Dioxide (NO_2)	IS 5182 Part 6	µg / m^3	11.9	80
5	Carbon Monoxide (CO) (1 Hour)	IS 5182 Part 10	mg/m^3	BDL (DL=1.15)	2
6	Lead (Pb)	IS 5182 Part 22	µg / m^3	BDL	1
7	Ozone (O_3)	IS 5182 Part 9	µg / m^3	10.7	100
8	Ammonia (NH_3)	Indophenol Method	µg / m^3	BDL (DL=8.5)	400
9	Benzene (C_6H_6)	IS 5182 Part 11	µg / m^3	BDL	5
10	Benzo (a) Pyrene	IS 5182 Part 12	µg / m^3	BDL	1
11	Arsenic (As)	IS 5182 Part 22	µg / m^3	BDL (DL=1.0)	6
12	Nickel (Ni)	IS 5182 Part 22	µg / m^3	BDL (DL=0.1)	20

BDL – Below Detectable Limit , DL – Detection Limit

Remarks: The above results meet the *National Ambient Air Quality Standards –CPCB

End of Report

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Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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TEST REPORT

Sample Ref No	SAS/AS/023/05	Date Of Sampling	04.05.2020 to 05.05.2020
Sample Rep No	024/05	Reporting Date	10.05.2020
NAME OF INDUSTRY	Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101		
Site Location	S.No. 2, Block No 4 of Arumbakkam Village, Egmore-Nungambakkam Taluk, Chennai District, Tamil Nadu		
Sampling Location	Anna Nagar West		
Sample Description	Ambient Air Quality		
Sampling Method	IS 5182 (Part V) and (Part XIV)		
Sampling Time	24 Hrs		
Starting Date & Time	04.05.2020/ 9.45 am		
Closing Date & Time	05.05.2020/9.45 am		
Sample Drawn By /Date	SAS/05.05.2020		
Received On	05.05.2020		
Analysis Commenced On	05.05.2020		
Analysis Completed on	10.05.2020		

Sl.No	PARAMETERS	PROTOCOL	UNIT	RESULT	NAAQS*
1	Particulate Matter ($PM_{2.5}$)	EPA -40(CFR Part 50)	µg / m^3	30.1	60
2	Respirable Particulate Matter (PM_{10})	IS 5182 Part 23-2012	µg / m^3	59.6	100
3	Sulphur Dioxide (SO_2)	IS 5182 Part 2	µg / m^3	6.7	80
4	Nitrogen Dioxide (NO_2)	IS 5182 Part 6	µg / m^3	19.5	80
5	Carbon Monoxide (CO) (1 Hour)	IS 5182 Part 10	mg/m^3	BDL (DL=1.16)	2
6	Lead (Pb)	IS 5182 Part 22	µg / m^3	BDL (DL=0.1)	1
7	Ozone (O_3)	IS 5182 Part 9	µg / m^3	12.6	100
8	Ammonia (NH_3)	Indophenol Method	µg / m^3	BDL (DL=0.5)	400
9	Benzene (C_6H_6)	IS 5182 Part 11	µg / m^3	BDL	5
10	Benzo (a) Pyrene	IS 5182 Part 12	µg / m^3	BDL	1
11	Arsenic (As)	IS 5182 Part 22	µg / m^3	BDL (DL=1.0)	6
12	Nickel (Ni)	IS 5182 Part 22	µg / m^3	BDL (DL=0.1)	20

BDL – Below Detectable Limit ; DL – Detection Limit

Remarks: The above results meet the *National Ambient Air Quality Standards –CPCB

End of Report

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TEST REPORT

Sample Ref No : SAS/AS/024/05
Sample Rep No : 025/05
NAME OF INDUSTRY : Proposed construction of mixed use development by M/s Tamil Nadu Housing Board, Anna Nagar Division, Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101

Date Of Sampling : 04.05.2020 to 05.05.2020
Reporting Date : 10.05.2020

Site Location : S No. 2, Block No 4 of Arumbakkam Village, Egmore-Nungambakkam Taluk, Chennai District, Tamil Nadu

Sampling Location : Mogappair
Sample Description : Ambient Air Quality
Sampling Method : IS 5182 (Part V) and (Part XIV)
Sampling Time : 24 Hrs
Starting Date & Time : 04.05.2020/ 9.45 am
Closing Date & Time : 05.05.2020/9.45 am
Sample Drawn By /Date : SAS/05.05.2020
Received On : 05.05.2020
Analysis Commenced On : 05.05.2020
Analysis Completed on : 10.05.2020

Sl.No	PARAMETERS	PROTOCOL	UNIT	RESULT	NAAQS*
1	Particulate Matter ($PM_{2.5}$)	EPA -40(CFR Part 50)	µg / m^3	28.10	60
2	Respirable Particulate Matter (PM_{10})	IS 5182 Part 23-2012	µg / m^3	57.3	100
3	Sulphur Dioxide (SO_2)	IS 5182 Part 2	µg / m^3	7.2	80
4	Nitrogen Dioxide (NO_2)	IS 5182 Part 6	µg / m^3	16.0	80
5	Carbon Monoxide (CO) (1 Hour)	IS 5182 Part 10	mg/m^3	BDL (DL=1.15)	2
6	Lead (Pb)	IS 5182 Part 22	µg / m^3	BDL(DL=0.1)	1
7	Ozone (O_3)	IS 5182 Part 9	µg / m^3	12.3	100
8	Ammonia (NH_3)	Indophenol Method	µg / m^3	BDL (DL=0.5)	400
9	Benzene (C_6H_6)	IS 5182 Part 11	µg / m^3	BDL(DL=0.1)	5
10	Benzo (a) Pyrene	IS 5182 Part 12	µg / m^3	BDL(DL=0.1)	1
11	Arsenic (As)	IS 5182 Part 22	µg / m^3	BDL (DL=1.0)	6
12	Nickel (Ni)	IS 5182 Part 22	µg / m^3	BDL (DL=5.1)	20

BDL – Below Detectable Limit ; DL – Detection Limit

Remarks: The above results meet the *National Ambient Air Quality Standards –CPCB

End of Report

for SANTHOME ENVIRO SERVICES

SANTHOME ENVIRO SERVICES CHENNAI

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M.Maria Frank Omer - Quality Manager

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TEST REPORT

Sample Ref No	SAS/AS/025/05
Sample Rep No	026/05
NAME OF INDUSTRY	Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division, Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101
Site Location	S.No. 2, Block No 4 of Arumbakkam Village, Egmore-Numgambakkam Taluk, Chennai District, Tamil Nadu
Sampling Location	Padi
Sample Description	Ambient Air Quality
Sampling Method	IS 5182 (Part V) and (Part XIV)
Sampling Time	24 Hrs
Starting Date & Time	04.05.2020/ 9.45 am
Closing Date & Time	05.05.2020/9.45 am
Sample Drawn By /Date	SAS/05.05.2020
Received On	05.05.2020
Analysis Commenced On	05.05.2020
Analysis Completed on	10.05.2020
Date Of Sampling	04.05.2020 to 05.05.2020
Reporting Date	10.05.2020

Sl.No	PARAMETERS	PROTOCOL	UNIT	RESULT	NAAQS*
1	Particulate Matter ($PM_{2.5}$)	EPA -40(CFR Part 50)	µg / m^3	36.1	60
2	Respirable Particulate Matter (PM_{10})	IS 5182 Part 23-2012	µg / m^3	61.7	100
3	Sulphur Dioxide (SO_2)	IS 5182 Part 2	µg / m^3	12.2	80
4	Nitrogen Dioxide (NO_2)	IS 5182 Part 6	µg / m^3	14.4	80
5	Carbon Monoxide (CO) (1 Hour)	IS 5182 Part 10	mg/m^3	BDL (DL=1.15)	2
6	Lead (Pb)	IS 5182 Part 22	µg / m^3	BDL(DL=0.1)	1
7	Ozone (O_3)	IS 5182 Part 9	µg / m^3	17.4	100
8	Ammonia (NH_3)	Indophenol Method	µg / m^3	BDL (DL=0.5)	400
9	Benzene (C_6H_6)	IS 5182 Part 11	µg / m^3	BDL(DL=0.1)	5
10	Benzo (a) Pyrene	IS 5182 Part 12	µg / m^3	BDL(DL=0.1)	1
11	Arsenic (As)	IS 5182 Part 22	µg / m^3	BDL (DL=1.0)	6
12	Nickel (Ni)	IS 5182 Part 22	µg / m^3	BDL (DL=0.1)	20

BDL – Below Detectable Limit , DL – Detection Limit

Remarks: The above results meet the *National Ambient Air Quality Standards –CPCB

End of Report

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M Mena Frank Omer - Quality Manager

NOTE
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BMQR ISO 9001:2015 CERTIFIED

TEST REPORT

Sample Ref No SAS/AS/026/05
Sample Rep No 027/05
NAME OF INDUSTRY

Date Of Sampling : 04.05.2020 to 05.05.2020
Reporting Date : 10.05.2020
Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division, Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101

Site Location	S.No. 2, Block No 4 of Arumbakkam Village, Egmore-Nungambakkam Taluk, Chennai District, Tamil Nadu
Sampling Location	Korattur
Sample Description	Ambient Air Quality
Sampling Method	IS 5182 (Part V) and (Part XIV)
Sampling Time	24 Hrs
Starting Date & Time	04.05.2020/ 9.45 am
Closing Date & Time	05.05.2020/9.45 am
Sample Drawn By /Date	SAS/05.05.2020
Received On	05.05.2020
Analysis Commenced On	05.05.2020
Analysis Completed on	10.05.2020

S.No	PARAMETERS	PROTOCOL	UNIT	RESULT	NAAQS*
1	Particulate Matter ($PM_{2.5}$)	EPA -40(CFR Part 50)	µg / m^3	37.1	60
2	Respirable Particulate Matter (PM_{10})	IS 5182 Part 23-2012	µg / m^3	71.5	100
3	Sulphur Dioxide (SO_2)	IS 5182 Part 2	µg / m^3	12.3	80
4	Nitrogen Dioxide (NO_2)	IS 5182 Part 6	µg / m^3	15.2	80
5	Carbon Monoxide (CO) (1 Hour)	IS 5182 Part 10	mg/m^3	BDL (DL=1.15)	2
6	Lead (Pb)	IS 5182 Part 22	µg / m^3	BDL(DL=0.1)	1
7	Ozone (O_3)	IS 5182 Part 9	µg / m^3	12.1	100
8	Ammonia (NH_3)	Indophenol Method	µg / m^3	BDL (DL=0.5)	400
9	Benzene (C_6H_6)	IS 5182 Part 11	µg / m^3	BDL(DL=0.1)	5
10	Benzo (a) Pyrene	IS 5182 Part 12	µg / m^3	BDL(DL=0.1)	1
11	Arsenic (As)	IS 5182 Part 22	µg / m^3	BDL (DL=1.0)	6
12	Nickel (Ni)	IS 5182 Part 22	µg / m^3	BDL (DL=0.1)	20

BDL – Below Detectable Limit , DL – Detection Limit

Remarks. The above results meet the *National Ambient Air Quality Standards –CPCB

End of Report

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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Ph : 044 - 42181625 / Mob: 9791530069, 8056231175
Email ID: santhomeenviro@gmail.com | Website : www.santhomeenvirolab.in

TEST REPORT

Sample Ref No : SAS/AS/027/05 to 032/05 — Date Of Sampling 04.05.2020 to 05.05.2020
Sample Rep No 028/05 to 033/05 — Reporting Date 10.05.2020
NAME OF INDUSTRY : Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division. Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101
Site Location : S.No. 2, Block No 4 of Arumbakkam Village, Egmore-Numgambakkam Taluk, Chennai District, Tamil Nadu
Sample Description : Noise level Monitoring

Location Code	Sample location	Lday [dB(A)]	Lnight [dB(A)]	Leq [dB(A)]
N1	Project Site	58.1	47.2	53.0
N2	Koyambedu	61.0	49.8	56.0
N3	Anna Nagar West	58.3	44.2	52.0
N4	Mogappair	56.9	42.7	50.0
N5	Padi	53.0	43.9	49.0
N6	Korattur	53.5	40.1	47.0

Method: IS: 9989-1981(Reaff: 2001)-Ambient

AMBIENT NOISE STANDARDS

AMBIENT NOISE STANDARDS	Lday dB(A)	Lnight dB(A)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

End of Report
for SANTHOME ENVIRO SERVICES

SANTHOME ENVIRO SERVICES CHENNAI

Verified & Authorized By
M Maria Frank Omer - Quality Manager

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BMQR

TEST REPORT

Sample Ref No SAS/W/033/05 to 034/05 — Date Of Sampling : 04.05.2020 to 05.05.2020
Sample Rep No 034/05 to 035/05 — Reporting Date : 10.05.2020
NAME OF INDUSTRY : Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101
Site Location : S No. 2, Block No 4 of Arumbakkam Village, Egmore-Numgambakkam Taluk, Chennai District, Tamil Nadu
Sample Description : Ground water
GW1 - Project Site, GW2 - Anna Nagar

S No	PARAMETER	UNIT	RESULTS		TEST PROCEDURE	ACCEPTABLE LIMIT AS PER IS 10500 :2012
			GW1	GW2		
1	Colour	Hazen	Nil	1	APHA 23rd EDITION 2017	5
2	Odour	-	No Odor Observed	No Odor Observed	APHA 23rd EDITION 2017	Agreeable
3	Turbidity	NTU	< 1.0	< 1.0	IS : 3025 Part 10-1984 (Reaff: 2017)	1
4	pH at 25 °C	-	7.51	7.29	IS : 3025 Part 11- 1983 (Reaff:2017)	6.5-8.5
5	Conductivity at 25 °C	µS/cm	1642	2206	IS : 3025 Part 14- 1984 (Reaff:2017)	Not Specified
6	Total dissolved solids	mg/l	972	1342	IS : 3025 Part 16-1984 (Reaff: 2017)	500
7	Total Suspended solids	mg/l	< 1.0	< 1.0	IS : 3025 Part 17-1984 (Reaff: 2014)	Not Specified
8	Alkalinity as $CaCO_3$	mg/l	464	541	IS : 3025 Part 23-1986(Reaff:2014)	200
9	Total Hardness as $CaCO_3$	mg/l	391	687	IS : 3025 Part 21-2009	200
10	Calcium as Ca	mg/l	89	119	IS : 3025 Part 40-1991 (Reaff:2014)	75
11	Magnesium as Mg	mg/l	37	82	APHA 23rd EDITION 2017	30
12	Chloride as Cl	mg/l	211	322	IS : 3025 Part 32-1988 (Reaff: 2003)	250
13	Sulphate as SO_4	mg/l	91	143	APHA 23rd EDITION 2017 4500- SO_4^{2-} E	200
14	Nitrate as NO_3	mg/l	15	11	APHA 23rd EDITION 2017-4500- NO_3 B	45
15	Iron as Fe	mg/l	0.13	0.15	IS : 3025 Part 53-2014	0.3
16	Manganese as Mn	mg/l	BDL(<0.05)	BDL(<0.05)	APHA 23rd EDITION 2017-3500-Mn D	0.1
17	Fluoride as F	mg/l	0.58	0.77	APHA 23rd EDITION 2017-4500-F B&D	1
18	Sodium as Na	mg/l	232	267	IS : 3025 Part 45-1993 (Reaff:2003)	Not Specified
19	Potassium as K	mg/l	3.1	3.7	IS : 3025 Part 45 -1993 (Reaff:2003)	Not Specified

End of Page 1

for SANTHOME ENVIRO SERVICES

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TEST REPORT – ADDITIONAL SHEET

Sample Ref No : SAS/W/033/05 to 034/05
Sample Rep No : 034/05 to 035/05
Reporting Date : 10.05.2020
GW1 - Project Site, GW2 - Anna Nagar

S. No	PARAMETER	UNIT	RESULTS		TEST PROCEDURE	ACCEPTABLE LIMIT AS PER IS 10500 :2012
			GW1	GW2		
20	Barium as Ba	mg/l	BDL(<0.1)	BDL(<0.1)	APHA 23rd EDITION 2017-3111 D	0.7
21	Residual Free Chlorine	mg/l	BDL(<0.1)	BDL(<0.1)	APHA 23rd EDITION 2017-4500-Cl B	0.2
22	Aluminium as Al	mg/l	BDL(<0.03)	BDL(<0.03)	IS:3025 Part.55 (Reaff:2014)	0.03
23	Cadmium as Cd	mg/l	BDL(<0.003)	BDL(<0.003)	APHA 23rd EDITION 2017-3113 B	0.003
24	Lead as Pb	mg/l	BDL(<0.01)	BDL(<0.01)	IS:3025 Part 47 (Reaff:2014)	0.01
25	Copper as Cu	mg/l	BDL(<0.05)	BDL(<0.05)	APHA 23rd EDITION 2017-3111 B	0.05
26	Zinc as Zn	mg/l	0.11	0.04	IS:3025 Part 49 (Reaff:2014)	5
27	Total Chromium as Cr	mg/l	BDL(<0.05)	BDL(<0.05)	APHA 22nd EDN - 3111 B	0.05
28	Arsenic as As	mg/l	BDL(<0.01)	BDL(<0.01)	IS:3025 Part 37 (Reaff:2014)	0.01
29	Cyanide as CN	mg/l	BDL(<0.05)	BDL(<0.05)	APHA 23rd EDITION 2017-4500-CN E	0.05
30	Selenium as Se	mg/l	BDL(<0.01)	BDL(<0.01)	APHA 23rd EDITION 2017-3114 B	0.01
31	Mercury as Hg	mg/l	BDL(<0.001)	BDL(<0.001)	IS:3025 Part 48 (Reaff:2014)	0.001
32	Anionic Surfactants as MBAS	mg/l	BDL(<0.025)	BDL(<0.025)	APHA 23rd EDITION 2017-5540 C	0.2
33	Phenolic compounds as C_6H_5OH	mg/l	BDL(<0.001)	BDL(<0.001)	APHA 23rd EDITION 2017-5530 B,C,D	0.001
34	Pesticides	mg/l	Absent	Absent	APHA 23rd EDITION 2017-6630 B,C	Absent
35	Total Coliforms	MPN/ 100ml	48	38	IS - 1622 - 1981 (Reaff - 2014)	Absent/100ml
36	E-coli	MPN/ 100ml	12	10	IS - 1622 - 1981 (Reaff - 2014)	Absent/100ml

End of Report

for SANTHOME ENVIRO SERVICES

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TEST REPORT

Sample Ref No SAS/WI035/05
Sample Rep No 036/05
NAME OF INDUSTRY

Date Of Sampling : 04.05.2020 to 05.05.2020
Reporting Date : 10.05.2020
Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101

Site Location : S.No. 2, Block No 4 of Arumbakkam Village, Egmore-Nungambakkam Taluk, Chennai District, Tamil Nadu

Sample Description : Surface water - Coovum River

S.No	PARAMETER	UNIT	RESULTS	TEST PROCEDURE	ACCEPTABLE LIMIT AS PER IS 10500 :2012
1	Colour	Hazen	30	APHA 23rd EDITION 2017	5
2	Odour	-	Disagreeable	APHA 23rd EDITION 2017	Agreeable
3	Turbidity	NTU	6.0	IS : 3025 Part 10-1984 (Reaff: 2017)	1
5	pH at 25 °C	-	7.69	IS : 3025 Part 11- 1983 (Reaff.2017)	6.5-8.5
4	Conductivity at 25 °C	µS/cm	1412	IS : 3025 Part 14- 1984 (Reaff:2017)	Not Specified
6	Total dissolved solids	mg/l	821	IS : 3025 Part 16-1984 (Reaff: 2017)	500
7	Total Suspended solids	mg/l	40.0	IS : 3025 Part 17-1984 (Reaff: 2014)	Not Specified
8	Alkalinity as $CaCO_3$	mg/l	94.0	IS : 3025 Part 23-1986(Reaff:2014)	200
9	Total Hardness as $CaCO_3$	mg/l	257	IS : 3025 Part 21-2009	200
10	Calcium as Ca	mg/l	55.0	IS : 3025 Part 40-1991 (Reaff:2014)	75
11	Magnesium as Mg	mg/l	29.0	APHA 23rd EDITION 2017	30
12	Chloride as Cl	mg/l	311	IS : 3025 Part 32-1988 (Reaff: 2003)	250
13	Sulphate as SO_4	mg/l	227	APHA 23rd EDITION 2017-4500- SO_4^{2-} E	200
14	Nitrate as NO_3	mg/l	2.1	APHA 23rd EDITION 2017-4500- NO_3 B	45
15	Iron as Fe	mg/l	0.45	IS : 3025 Part 53-2014	0.3
16	Manganese as Mn	mg/l	BDL(<0.05)	APHA 23rd EDITION 2017-3500-Mn D	0.1
17	Fluoride as F	mg/l	0.85	APHA 23rd EDITION 2017-4500-F B&D	1
18	Sodium as Na	mg/l	180	IS : 3025 Part 45-1993 (Reaff:2003)	Not Specified
19	Potassium as K	mg/l	16.0	IS : 3025 Part 45 -1993 (Reaff:2003)	Not Specified

End of Page 1

for SANTHOME ENVIRO SERVICES

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TEST REPORT – ADDITIONAL SHEET

Sample Ref No: SAS/WW035/05
Sample Rep No: 035/05
Reporting Date: 10.05.2020

S. No	PARAMETER	UNIT	RESULTS	TEST PROCEDURE	ACCEPTABLE LIMIT AS PER IS 10500 :2012
20	Barium as Ba	mg/l	BDL(<0.1)	APHA 23rd EDITION 2017-3111 D	0.7
21	Residual Free Chlorine	mg/l	BDL(<0.1)	APHA 23rd EDITION 2017-4500-Cl B	0.2
22	Aluminium as Al	mg/l	BDL(<0.03)	IS:3025 Part 55 (Reaff:2014)	0.03
23	Cadmium as Cd	mg/l	BDL(<0.003)	APHA 23rd EDITION 2017-3113 B	0.003
24	Lead as Pd	mg/l	BDL(<0.01)	IS:3025 Part 47 (Reaff:2014)	0.01
25	Copper as Cu	mg/l	BDL(<0.05)	APHA 23rd EDITION 2017-3111 B	0.05
26	Zinc as Zn	mg/l	0.11	IS:3025 Part 49 (Reaff:2014)	5
27	Total Chromium as Cr	mg/l	BDL(<0.05)	APHA 22nd EDN - 3111 B	0.05
28	Arsenic as As	mg/l	BDL(<0.01)	IS:3025 Part 37 (Reaff:2014)	0.01
29	Cyanide as CN	mg/l	BDL(<0.05)	APHA 23rd EDITION 2017-4500-CN E	0.05
30	Selenium as Se	mg/l	BDL(<0.01)	APHA 23rd EDITION 2017-3114 B	0.01
31	Mercury as Hg	mg/l	BDL(<0.001)	IS:3025 Part 48 (Reaff:2014)	0.001
32	Anionic Surfactants as MBAS	mg/l	BDL(<0.025)	APHA 23rd EDITION 2017-5540 C	0.2
33	Phenolic compounds as C_6H_5OH	mg/l	BDL(<0.001)	APHA 23rd EDITION 2017-5530 B,C,D	0.001
34	Pesticides	mg/l	Absent	APHA 23rd EDITION 2017-6630 B C	Absent
35	Total Coliforms	MPN/ 100ml	180	IS - 1622 - 1981 (Reaff - 2014)	Absent/100ml
36	E coli	MPN/ 100ml	50	IS - 1622 - 1981 (Reaff - 2014)	Absent/100ml

End of Report

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TEST REPORT

Sample Ref No SAS/S/036/05 to 041/05 — Date Of Sampling 04.05.2020
Sample Rep No 037/05 to 042/05 — Reporting Date 10.05.2020
NAME OF INDUSTRY — Proposed construction of mixed use development by M/s. Tamil Nadu Housing Board, Anna Nagar Division. Tamil Nadu Housing Board, Thirumangalam Shopping Complex, Chennai - 600101
Site Location : S No 2, Block No 4 of Arumbakkam Village, Egmore-Nungambakkam Taluk, Chennai District, Tamil Nadu
Sample Description : Soil Sample

S. No.	Parameters	Test Method	S1	S2	S3	S4	S5	S6
1	pH	IS :2720(Part 26) 1987(RA 2011)	8.16	7.89	8.28	8.34	8.15	8.2
2	Bulk Density, g/cc	FAO Chapter 3, ABCTL/SOIL/SOP 1	1.25	1.30	1.26	1.20	1.40	1.24
3	Electrical Conductivity, mS/cm	IS -14767:2000 (RA 2010)	0.088	0.390	0.16	0.290	0.065	0.315
4	Available Nitrogen, kg/ha	IS -14684:1999, Reaff:2008	317	541	381	478	321	285
5	Available Phosphorous, kg/ha	FAO Chapter 3, ABCTL/SOIL/SOP 2	37.4	56.2	17.2	31.8	47.5	17.2
6	Available Potassium, kg/ha	FAO Chapter 3, ABCTL/SOIL/SOP 7	215	267	371	319	211	13.8
7	Exchangeable Calcium as Ca,m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 4	11.6	12.7	16.6	12.1	12.6	8.0
8	Exchangeable Magnesium as Mg, m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 5	4.10	3.5	3.82	2.87	1.97	1.6
9	Exchangeable Sodium as Na, m.eq/100g	FAO Chapter 3, ABCTL/SOIL/SOP 6	0.91	2.1	1.12	1.91	1.81	1.8
10	Organic matter (%)	IS 2720 (Part 22):1972, Reaff:2010	1.10	1.4	1.5	1.10	0.91	0.11
11	Texture Classification	Robinson Pipette Method	Clay	Clay	Clay	Clay	Sandy clay loam	Sandy clay loam
12	Sand (%)		51.4	27.5	33.1	22.5	44.9	17.1
13	Clay (%)		26.3	66.5	47.5	60.6	37.2	47.5
13	Silt (%)		17.2	12.8	19.6	12.1	17.9	35.4

S1 - Project Site S2 - Koyembedu, S3 - Anna Nagar West, S4 - Mogappair, S5 - Padi, S6 - Koraltur

End of Report
for SANTHOME ENVIRO SERVICES

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ANNEXURE XVI
DISCLOSURE OF CONSULTANTS

Quality Council of India

National Accreditation Board for Education & Training

CERTIFICATE OF ACCREDITATION

Geo Exploration and Mining Solutions

Old No. 260-B, New No. 17, Advaitha Ashram Road, Fairlands, Salem, Tamil Nadu - 636004

Accredited as **Category - A** organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA-EMP reports in the following Sectors:

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals - opencast mining only	1	1 (a) (i)	A
2	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)	28	6 (B)	B
3	Building and Construction Projects	38	8 (a)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated January 18, 2019 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/19/0940 dated March 27, 2019. The accreditation needs to be renewed before the expiry date by Geo Exploration and Mining Solutions, Salem, following due process of assessment.

Sr. Director, NABET
Dated: March 27, 2019

Certificate No.
NABET/ EIA/1821/ RA 0123

Valid till
07.11.2021

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

Minutes of the meeting cum presentation on the alignment of Elevated Road fro Chennai Port to Maduravoyal held under the Chairmanship of Additional Chi Secretary to Government, Highways and Minor Ports Department at 11.30 A.M o 14.02.2018 at Chennai along with various stakeholders.

The Additional Chief Secretary to Government, Highways and Minor Por Department held a meeting – cum- presentation of the alignment of construction Elevated Road from Chennai Port to Maduravoyal at 11.30 A.M. on 14.02.2018 Public Works Department Conference Hall, 5th Floor, Namakkal Kavigner Maliga Secretariat, Chennai – 9 .

2. The Chief General Manager (Technical) & Regional Officer, National Highway Authority of India, Chennai, at the outset, welcomed the Additional Chief Secretary Highways and Minor Ports Department, Principal Secretary to Government, Public Works Department, Principal Secretary to Government, Housing and Urban Development, Principal Secretary to Government, Environment and Forest Department, Director, Environment, Chief Planner, Chennai Metropolitan Development Authority, Joint Commissioner of Police, Chief Engineers of Public Works Department, Highways Department (National Highways and Construction and Maintenance wing), Housing Board, Greater Corporation of Chennai, Dr.Amlan Kumar Sengupta , Professor, Indian Institute of Technology-Madras, Deputy Chairman, Chennai Port Trust and other officials from the various departments who attended the meeting.

3. Before the issues were taken up for the discussion, it was informed that the alignment report of the project was sent by the Project Director, National Highways Authority of India (NHAI), Chennai to various stakeholders in advance before the meeting. A presentation on the alignment along with the salient features of the project such as provisions of ramp, proposed cross section, enhancement of the technical committee alignment, design speed, traffic details etc., were made by the Team Leader, M/s.L&T Infrastructure Engineering Limited.

4. During the presentation, the Team Leader briefed about the cargo movement to the Chennai Port, alignment plan and cross section suggested by the Technical Committee, geometric enhancement of the Technical committee alignment at Chainage 2/100 to 2/500, Chainage 3/500 to 3/800 , Chainage 9/300 to 9/800, Chainage 10/900 to 11/200, Chainage 12/300 to 12/750, and Chainage 13/300 to 13/700 , cross section option (4 lane (20 m deck width), 6 lane (29m deck width), exit ramps proposed at Kamarajar salai, spur tank road, Koyambedu (before and after Grade Separator) and entry ramps proposed at Sivananda Salai, College Road, Koyambedu (before and after Grade Separator) , proposal of cable stayed bridge near Napier Bridge, Aminjikarai Bridge, Koyambedu Bridge, location of toll plaza at km 8/5 (near Nungambakkam Bridge), savings in vehicle operation cost due to the project , various clearances obtained so far from Ministry of Environment and Forest (MOEF), Chennai Metropolitan Development Authority (CMDA), Greater Chennai Corporation, Public Works Department , Railways, etc .

5. The Principal Secretary to Government, Housing and Urban Development Department requested to explain about the usefulness of the project for which the Team Leader replied that the time taken by the trucks to reach the Chennai Port is approximately 24 to 36 hours due to the traffic restrictions and this project will provide seamless movement of the trucks to the Chennai Port without any restriction. Further, he said that due to the provision of exit and entry ramps, the local traffic may also use the project corridor after the payment of user fee and two wheelers, three wheelers should not be allowed to use the project corridor since alternate route is available via the existing Poonamallee High road for which NHAI and State Government has to take suitable decision on this. It was requested that the Consultant has to inform the public during their public consultation about the restriction of the two/three wheeler on the usage of the project corridor.

6. The Team Leader said that in order to avoid parking of vehicle on the elevated corridor to get permission from the Customs, CISF to enter into the Chennai Port Trust, a parking yard inside the Port area has to be provided for which the Deputy Chairman, Chennai Port Trust replied that sufficient space is not available inside the Chennai Port and also since it is the secured area, without the clearance from the Customs and CISF it is not possible for the vehicle to enter into the Port directly. The Principal Secretary to Government, Housing and Urban Development Department said that parking yard near the Maduravoyal may be identified and developed by CMDA and all the formalities have to be made in that parking yard, so that the vehicle can enter into Chennai Port without parking in the project corridor. The Chief Planner, CMDA said that necessary action on the same will be taken.

7. The Team Leader said that the Technical Committee suggested to provide 4 laning for the entire project corridor with a deck width of 17m. He said that as per the detailed traffic study and analysis considering the future generated traffic, suggested to provide 6 laning with a deck width of 29m for the stretch from Napier Bridge to Maduravoyal and 4 laning within the Chennai Port premises. Further he said that due to the proposed alignment, the number of piers within the river Cooum will be approximately 685 whereas the number of piers as per the Technical Committee will be 734. So, the impact of the project on the river Cooum will be considerably reduced, due to this proposed alignment. The Professor, IIT Madras said the development of Cooum river has to be carried out immediately after the completion of work so that there should not be any hinderance to the water movement. All the stakeholders including the Technical Committee Members agreed the alignment proposed by the Consultant with 6 lane configuration (29 m deck width) from Napier Bridge to Maduravoyal and 4 laning within the Port premises with geometric enhancement of the Technical committee alignment at Chainage 2/100 to 2/500, Chainage 3/500 to 3/800 , Chainage 9/300 to 9/800, Chainage 10/900 to 11/200, Chainage 12/300 to 12/750, and Chainage 13/300 to 13/700.

8. The Director, Environment Department said that revised Coastal Regulation Zone (CRZ) clearance has to be obtained from the MOEF due to the revision of the alignment and desired to know about the extension of validation of CRZ clearance for the project. The Deputy Chairman, Chennai Port Trust said that extension of validation of the CRZ clearance was obtained from the MOEF in time which will be valid upto 2021. The Director, Environment further said that a monitoring committee under the chairmanship of Chief Secretary with other members such as Secretary, Environment, Secretary, PWD, experts and other stakeholders has to be constituted as per the direction of MOEF for monitoring the project. It was informed that a high level committee was constituted in 2008 itself for which Director, Environment said that a separate committee has to be constituted after the issuance of CRZ clearance in 2011. Further the Director, Environment requested to check whether Environmental Clearance is required for the project or not for which the Project Director, NHAI, Chennai said that the Project proponent is Chennai Port Trust and as per EIA notification, Environmental Clearance is not required for the project.

9. The Principal Secretary to Government, Housing &Urban Development Department said that Greater Corporation of Chennai proposed to provide walkway from Ega Theatre to Valluvarkottam and the proposed corridor should consider and provide sufficient clearance for that and requested the Corporation officials to share the relevant documents with NHAI immediately.

10. The Team Leader said that in Koyambedu to Maduravoyal section, bus corridor may be provided near the median as like Bus Rapid Transit System (BRTS) by providing subway in the median to the end for which all the officials said that special buses with right side doors have to be operated which is not possible and requested to provide separate service road for the movement of local public. The Joint Commissioner of Police, Traffic said that nearly 50% of the accidents in these stretches occurred in the past due to crossing of the pedestrians at various locations and requested to provide pedestrian crossing in every 100 metres of the stretch to ensure safety to the pedestrians in the Corridor so as to minimise the accidents.

11. The Team Leader said that the ramp in Kamarajar Salai is proposed inside the Island Ground, ramp in Sivananda Salai, Spur Tank road, College road are proposed in the Corporation road. Further the ramp in the Koyambedu before the Grade Separator is proposed in the Housing Board land. All these ramps are proposed in the original proposal in 2008 for which concurrence of Corporation was already obtained. The Chief Engineer, Housing Board requested to provide these ramps at the extreme end of their land. The Project Director, NHAI said that the alignment is proposed at the extreme end of the Housing Board land. In order to relieve the congestion in Koyambedu to Maduravoyal stretch due to the Mofussil buses, additional exit and entry ramps are proposed after Grade separator for which land has to be acquired along with the main corridor at the joining point with Poonamalee High road. The Chief Engineer, CMWSSB said the 42" dia pipe line is located under the proposed ramp after Koyambedu Grade Separator location and requested that the pipe should not be damaged. The Principal

Secretary, Environment & Forest requested to study the possibility of providing the exit ramp at Koyambedu(after Grade Separator) to provide connectivity to the Inner Ring for which it was informed that sufficient land is not available for that.

12. The Additional Chief Secretary to Government, Highways and Minor Ports Department desired to know about the reduction of the area of the land to be acquired for which the Project Director, NHAI said that the Land Acquisition in Maduravoyal village will be eliminated and there will be a reduction of area of about 0.5 Ha. Considering the essentiality and necessity, all the stakeholders agreed to provide ramps in all the above said locations and requested NHAI to proceed further on the alignment in completing the study.

13. Regarding the Rehabilitation & Resettlement, the Principal Secretary to Government, Housing & Urban Development Department said that Tamil Nadu Slum Clearance Board(TNSCB) constructed 9752 tenements with the State Government funds and are ready for occupation. Already shifting of the PAFs are in progress as part of Cooum River Restoration Project and requested the Chennai Port Trust to release their balance commitment made by them. The Deputy Chairman, Chennai Port Trust said that Ministry of Shipping, while according permission, made a condition that the amount has to be released on par with the State Government and further said the contribution made by the State Government has to be furnished to them so as to release the funds. The Additional Chief Secretary, Highways and Minor Ports Department clarified that the Tamil Nadu Slum Clearance Board constructed the tenements with the State Government fund only which is more than the Commitment made by the Chennai Port Trust. The Principal Secretary to Government, Housing and Urban Development Department requested the TNSCB to send a letter to Chennai Port Trust on this.

14. Regarding shifting of Commercial Establishments in Chindatripet and Pudupet area, the Principal Secretary to Government, Housing and Urban Development Department said that 458 plots were developed in Auto Nagar and the eviction has to be carried out by the land owning department i.e Public Works Department. The Chief Engineer, Water Resources Department, Chennai said that 383 nos are only eligible to get that plot. The Principal Secretary to Government, Housing & Urban Development Department requested National Highways Authority of India to issue allotment order to the list approved by the Public Works Department and requested them to co-operate with Public Works Department while carrying out eviction by them.

15. Before concluding the meeting, the Chief General Manager (Technical) & Regional Officer, National Highways Authority of India, Chennai thanked the Additional Chief Secretary, Highways and Minor Ports Department for sparing time to chair the meeting and valuable directions. He also thanked all the Officers who have come to

attend the meeting and requested for their co-operation and assistance in completing the project in time bound manner. Additional Chief Secretary to Government, Highways and Minor Ports Department said all the Department/ Agencies has to work in tandem to ensure smooth implementation of the project.

The meeting ended with a vote of thanks to the Chair and other participants.

Rajeev Ranjan,
Additional Chief Secretary to Government

// True Copy //

H. Saranoath 23.2

Section Officer

23/2/18

Flag (AM)

Highways and Minor Ports (HV2)
Department,
Secretariat, Chennai-600 009.

Letter No.1726 /HV2 /2012 - 66, dated 20.09.2019

From
Tmt.A.Lily Pushpam, M.A.,
Deputy Secretary to Government.

To
The Principal Secretary to Government,
Public Works Department, Secretariat,
Chennai – 600 009.

The Principal Secretary to Government,
Environment and Forest Department, Secretariat,
Chennai – 600 009.

The Principal Secretary to Government,
Housing and Urban Development Department, Secretariat,
Chennai – 600 009.

The District Collector,
62, Rajaji Salai, 4th Floor,
Chennai – 600 001.

The Commissioner of Police,
132, Commissioner Office Building,
EVK Sampath Salai, Vepery,
Chennai - 600 007.

The Member Secretary,
Chennai Metropolitan Development Authority,
Gandhi Irwin Road, Ansari Estate,
Egmore, Chennai – 600 008.

The Managing Director,
Chennai Metro Water Supply and Sewerage Board,
Pumping Station,
Chintadripet, Chennai – 600 002.

The Managing Director,
Chennai Metro Rail Ltd,
Administrative Building,
CMRL Depot,
Poonamalle High Road,
Opposite to Danial Thomas School,
Koyambedu, Chennai - 600 107.

F 149 (AA)

The Chairman,
Tamil Nadu Electricity Board,
800, KR Ramasamy Maaligai,
Anna Salai, Chennai – 600 002.

The Chairman,
Tamil Nadu Pollution Control Board,
76, Anna Salai,
Guindy Industrial Estate,
Race View Colony,
Guindy, Chennai – 600 032.

The Chairman,
Chennai Port Trust,
No.1, Rajaji Salai,
Chennai – 600 001.

The Commanding Officer,
Indian Navy,
Opposite Gate No.10,
Rajaji Road,
Chennai Port Trust, Chennai - 600 009.

The Additional Commissioner of Police, (Traffic)
Commissioner Office Building,
EVR Sampath Road,
Vepery, Chennai – 600 007.

The Director,
Department of Environment,
Ground Floor,
Panagal Building,
1, Jeenis Road, Chennai - 600 015.

The Chief Engineer (Construction & Maintenance),
Highways Department,
Integrated Chief Engineer Office,
HRS Campus,
76, Sardar Patel Road,
Guindy, Chennai – 600 025.

The Chief Engineer (National Highways),
Highways Department,
Chennai – 25.

The Chief Engineer,
Public Works Department,
Water Resources Department,
Chepauk, Chennai – 600 005.

The Chief Bridge Engineer,
Southern Railway,
Egmore, Chennai – 600 008.

The Special District Revenue Officer (LA-NH),
Kanchipuram.

The Head of Department, Department of Remote Sensing,

Anna University,
Guindy, Chennai.

The Project Director,
National Highways Authority of India,
Chennai – 600 032.

Team Leader,
M/s. L&T with M/s. Vax Consultants,
Mount Poonamallee Road,
Manapakkam, Chennai.

Through the Regional Officer, National Highways Authority of India, Chennai.

Sir,

Sub: Meeting - National Highways Authority of India – Construction of elevated road from Chennai Port to Maduravoyal NH-4 revised final Alignment Drawing along with Detailed Project Report – Presentation-Cum-Meeting under the Chairmanship of Chief Secretary to Government to be convened on 02.08.2019 at 3.00 PM. – Intimation – Reg.

Ref: From the General Manager (T), Tamil Nadu, National Highways Authority of India, New Delhi, Letter No.NHAI/11016/59/2017/RO Chennai/2355, dated 04.07.2019.

******

I am directed to enclose a copy of minutes of the presentation cum meeting held under the Chairmanship of Chief Secretary to Government on 02.08.2019 at 3.00 PM on the revised final Alignment Drawing along with draft Detailed Project Report for the project of Construction of elevated road from Chennai Port to Maduravoyal NH-4 for necessary action.

2. I am also to request you to send your action taken report in this regard to Government.

Yours faithfully,

for Deputy Secretary to Government

Highways and Minor Ports (HV1) Department

Minutes of meeting taken by Chief Secretary to Govt. of Tamil Nadu on 02.08.2019 for the Revised Final Alignment drawing along with Detailed Project Report for the project of Elevated Road connecting Chennai Port and Maduravoyal

1. List of participants enclosed. (Annexure)

2. Principal Secretary, Highways & Minor Ports Department, GoTN, welcomed Chief Secretary and all the participants.

3. RO-Madurai, NHAI explained the brief of the project and stated that ;
   (a) The alignment has already been approved by all the Stakeholders as recorded in the Minutes of the Meeting issued by Govt. of Tamil Nadu vide letter dated 23.02.2018.
   (b) It is now proposed to construct 6-lane elevated corridor between Chennai Port and Maduravoyal.
   (c) The Detailed Project Report (DPR) has been shared with GoTN and Chennai Port Trust (CPT)
   (d) In the meeting taken by Cabinet Secretary on 26.12.2018 it was decided to explore the feasibility of executing this project on BOT (Toll) basis. Accordingly, a Technical Committee under the Chairmanship of Member (Technical), NHAI with Chief Engineer, National Highways, GoTN and Representative of CPT as Members has been constituted on 08.01.2019. The Committee since then has met twice.

4. A presentation was made by the Consultant, M/s L&T, explaining the alignment and various features of the project. The Consultant also run a video showing the alignment of the project. The Consultant explained that on account of poor geometry, which otherwise cannot be avoided, the maximum capacity of the 6-lane highway worked out in accordance with Highway Capacity Manual would be around 41000 PCU.

5. The following traffic scenarios were presented;
   (i) Highway without the provision of any Ramp.

Year	Total Vehicles	Total PCU
2018	4,909	20,759
2043	10,133	42,847

(ii) Highway with provision of Ramps and local traffic being tolled.

Year	Total Vehicles	Total PCU
2018	11,618	27,914
2035	17,552	41,930

(iii) Highway with the provision of Ramps but local traffic not tolled.

Year	Total Vehicles	Total PCU
2018	45,635	63,957

A presentation on traffic stimulation was also made.

6. RO-Chennai explained that considering the impact of local traffic and capacity constraints, the elevated corridor will reach its maximum capacity very early and the intended purpose of serving CPT will not be fulfilled. Further, the requirement of land will reduce considerably, if the Ramps are not provided.

7. Considering the above, it was decided that no Ramps shall be provided.

8. Issues to be resolved prior to invitation of bid

(i) Transfer of Navy Land:

RO-NHAI stated that CPT is to hand over 100 meters of the Navy land for construction of this stretch. However, the same has not materialised so far. Chairman, CPT informed that the Ministry of Shipping has approved the swapping of Navy land. Naval Officer present in the meeting informed that CPT shall have to construct 64 quarters also. The Naval Officer stated that CPT should sign Memorandum of Understanding (MoU) for the construction of 64 quarters. Chairman, CPT informed that CPT may rope in CPWD for

construction of the quarters. Chief Secretary stated that plan, design, construction, etc. is a time consuming task and advised that Navy and CPT should sign an MoU. RO-NHAI informed that design, tendering, construction and completion of 64 quarters may take about 2 years time.

[Action: CPT & Navy]

(ii) **Land Acquisition:**

With the removal of Ramp, land acquisition will be only to the extent of 1217 Sqm for main carriageway for which 3A(1) Notification has been done. 3D is under preparation.

[Action: GoTN& CPT]

(iii) **Rehabilitation &Resettlement**

It was informed that as of now, Slum in 1.4 Km is required to be relocated affecting 1700 Project Affected Families (PAFs). Managing Director (MD), Tamil Nadu Slum Clearance Board (TNSCB) informed that for rehabilitation of the PAFs, 1760 tenements have to be built, out of which 900 will be completed by this month and balance will be completed within next six months. It was also informed that there was a Court case on clearance of Slum in R.K. Nagar. The people have approached the Court praying that they should be relocated near to the present location. Chief Secretary advised that the matter may be taken up with Govt. Pleader for obtaining early orders from the Court. RO-NHAI requested to ensure eviction within 6 months.

[Action: GoTN & CPT]

(iv) CRZ clearance

As regards, CRZ clearance, the same is valid till 2021 provided there is no deviation from the already procured clearance. Since there is an increase in the length of project and various features have changed, it needs revalidation. Chairman, CPT informed that CRZ application has already been made for the project including construction of quarters for

Navy. TNPCB informed that CRZ application has been received only on, i.e. 01/08/2019 and will be processed. Chief Secretary instructed to speed up the clearance.

[Action: TNPCB & CPT]

(v) **CMRL (Chennai Metro Rail Ltd.)**

L&T informed that the requisite approval from CMRL has been received on 31.07.2019.

(vi) **Railway Clearance**

RO-Chennai informed that approval for GAD in respect of 2 ROBs is yet to be received. Railway clearance is to be expedited.

[Action: NHAI & CBE, SR]

(vii) **Electrical Utilities (EB Poles)**

It was informed by TANGEDCO Official that demarcation has been done partially. L&T informed that demarcation was done earlier, however, the joint verification has not been made. Chief Secretary directed that NHAI and TANGEDCO should complete the joint inspection within 15 days.

[Action: NHAI & TANGEDCO]

The meeting ended with a thanks to the Chair.

*****

K. Shanmugam
Chief Secretary to Government

//True Copy//

20.9.19.

Section Officer

Annexure

LIST OF PARTICIPANTS

The Chief Secretary to Government.

The Principal Secretary to Government, Environment and Forest Department.

The Principal Secretary to Government, Highways and Minor Ports Department.

The Principal Secretary to Government, Housing and Urban Development Department

The Principal Secretary to Government, Energy Department.

The Special Secretary, Public Works Department.

The District Collector, Chennai.

The Deputy Secretary to Government, Highways and Minor Ports Department.

The Member Secretary, Chennai Metropolitan Development Authority,

The Managing Director, Chennai Metro Water Supply and Sewerage Board.

The Executive Director, Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB).

The Managing Director, Chennai Metro Rail Ltd, Chennai.

The Director Distribution, TANGEDCO, Chennai.

The Chairman, Chennai Port Trust, Chennai.

The Commanding Officer, Indian Navy, Chennai.

The Assistant Commissioner of Police (Traffic), Chennai.

Joint Commissioner of Police, (Traffic) (North), Greater Chennai Police.

The Director, Department of Environment, Chennai.

The Chief Engineer (Construction & Maintenance),Highways Department, Chennai.

The Chief Engineer (National Highways), Highways Department, Chennai.

The Engineer in Chief, Public Works Department / Water Resources Department, Chennai.

The Chief Engineer & Public Works Department / WRD, Chennai.

The Assistant Engineer, Public Works Department, Chennai.

The Chief Bridge Engineer, Southern Railway, Chennai.

ADRM, Southern Railway, Chennai.

The Special District Revenue Officer (LA-NH), Tiruvallur.

The Head of Department, Department of Remote Sensing, Anna University.

The Regional Officer, National Highways Authority of India, Chennai.

The Project Director, National Highways Authority of India, Chennai.

The Project Director, National Highways Authority of India, Kancheepuram.

The Manager (Tech), Regional Officer, NHAI, Chennai.

The Manager (Tech), NHAI, PIU Chennai.

Team Leader, M/s. L&T with M/s. Vax Consultants.

Senior Bridge Engineer / Senior Engineer, L&T / Traffic Engineer, L&T

L&T / EL, Chennai.

K. Shanmugam
Chief Secretary to Government

//True Copy//

Section Officer

Most Immediate

Highways and Minor Ports (HW1) Department,
Secretariat, Chennai-600 009.

Letter No. 1726/HW1/2012-1, Dated : 14.09.2020

From
Thiru. V. Sundar B.Com.,
Deputy Secretary to Government.

To
The Principal Secretary to Government,
Housing and Urban Development Department,
Secretariat, Chennai-9 (w.e)
The Managing Director,
Tamil Nadu Housing Board, Chennai-600035 (w.e)
The Chief Engineer (H), National Highways, Chennai–600025 (w.e)
The Regional Officer, National Highways Authority of India,
Chennai -600032. (w.e)
The Member Secretary, Chennai Metropolitan Development Authority,
Chennai-600008. (w.e)

Sir /Madam,

Sub: Meeting - Held by Chief Secretary to Govt. of Tamil Nadu on 08.09.2020 regarding the project of Elevated Road connecting Chennai Port and Maduravoyal - Minutes - Communicated - Regarding.

****

I am directed to enclose a copy of minutes of the meeting held under the Chairmanship of the Chief Secretary to Government on 08.09.2020 regarding the project of Construction of elevated road from Chennai Port to Maduravoyal NH-4 for necessary action.

2. I am also to request you to send your action taken report in this regard to Government.

3. This may be treated as "Most Immediate".

Yours faithfully,

V. Sundaravalli 14/9/2020

for Deputy Secretary to Government

Highways and Minor Ports (HW1) Department

Minutes of meeting taken by Chief Secretary to Govt. of Tamil Nadu on 08.09.2020 regarding the project of Elevated Road connecting Chennai Port and Maduravoyal

1. List of participants enclosed. (Annexure)

2. The Principal Secretary, Highways & Minor Ports Department, Government of Tamil Nadu welcomed Chief Secretary and all the participants.

3. The Additional Chief Secretary (FAC) Housing & Urban Development Department as stated that the scheme for implementation of Mixed Use Development was announced by Hon'ble Deputy Chief Minister in the floor of Assembly in the year 2018-19 and subsequently Administrative Approval has been obtained in G.O.(MS). No.185, Housing & Urban Development Department, dated 26.12.2018. Due to the proposed alignment of Exit & Entry Ramp in the elevated express highways, the scheme could not be commenced. In a High Level Committee meeting held on 02.08.2019 chaired by Chief Secretary, it was decided that no ramps shall be provided. As it was decided to remove the ramps, it was concluded that there will not be any acquisition of TNHB Land and the alignment will be straightened to remove the curve required for the ramp. Hence, Tenders were floated for development of Mixed Development Scheme with a buildup area of 11,68,584 sqft and the agreement was also executed with the contractors on 30.07.2020. In the meantime, drawings were submitted to CMDA for Planning Permission and the Government approval for construction of High Rise Commercial cum Residential Building was also obtained based on the recommendation of MSB Panel Committee meeting. In this advance stage of the scheme, a notice was issued in Newspaper under section 3(G) of National Highways Act 1956 for acquisition of 6008 sqm of TNHB land.

4. The Principal Secretary, Highways & Minor Ports Department has stated that the proposed ramps in Sivananda Salai and Kamarajar Salai, Spur Tank Road College Road, Arumbakkam and Koyambedu had been dropped in the previous meeting held on November 2019. However due to the demand for a elevated highway to cater to city needs of decongest city roads, Entry and Exit roads may be considered for including to the elevated road from Chennai Port to Maduravoyal.

5. Considering the above, the following decisions were made in the meeting:-

(i) Since the decision for removal of ramp was already taken in this earlier meeting, there is no requirement to put curved alignment at TNHB Land. Hence, it is decided to go with earlier straight alignment without affecting the TNHB land and also it is decided that there should not be any ramps at TNHB site, Arumbakkam.

[Action: NHAI & Housing and Urban Development Department]

(ii) It is also decided to go head for getting all necessary approval from CMDA, GCC, EIA and etc., and to commence the construction work without any hindrance. In respect of PWD (WRO) approval for straight alignment along the Coovam River, any arising issues can be sorted out by means of inter departmental coordination.

[Action: NHAI, PWD & Housing and Urban Development Department,]

(iii) The scheme is proposed in TNHB land with the extent of 3.30 hectare situated in Block 4, Survey No.2 in Arumbakkam. But the land acquisition notice under section 3(G) of National Highways Act 1956 was issued which is a non existence Survey No. Hence, it can be decided that TNHB Land is not being acquired. A legal opinion may be obtained from Advocate General about declaring the acquisition notification as null and void for the above reason or otherwise.

[Action: Housing and Urban Development Department.]

(iv) Highways Department will address National Highways Authority of India to take up the provision of Entry and Exit ramps.

a) Kamarajar Salai and Sivananda Salai (No Land Acquisition involved), Kamarajar Salai (3200Sq. Metres of land acquisition from island grounds) respectively.

b) Entry ramp in College Road and exit ramp in Spur Tank Road (both places no Land Acquisition is involved)

c) Highways Department has to discuss with National Highways Authority of India to bear the cost for the provision of these ramps.

d) These issues shall be decided by National Highways Authority of India and Highways Department after apprising Hon'ble Chief Minister.

(Action: Highways & Minor Ports Department)

(v) Entry and Exit ramp at Arumbakkam and Koyambedu is being dropped, as per the decision taken in the meeting held in November 2019.

(vi) Entry and Exit ramp at CMRL and Nerkundram may be avoided as it involves Land Acquisition to the extent of 9300 sq. meters and this site is also near to Maduravoyal flyover end point. (including 2800 sq. meters private lands)

The meeting ended with thanks to the Chair.

K. Shanmugam
Chief Secretary to Government

//True Copy//

V. Anandavalli
Section Officer 14/9/2021

Annexure

LIST OF PARTICIPANTS

1. The Chief Secretary to Government.
2. The Additional Chief Secretary to Government (FAC),
   Housing and Urban Development Department, Chennai.
3. The Principal Secretary to Government,
   Highways and Minor Ports Department, Chennai.
4. The Managing Director,
   Tamil Nadu Housing Board, Chennai – 35.
5. The Chief Engineer (National Highways),
   Highways Department, Chennai.
6. The Regional Officer, National Highways Authority of India, Chennai.
7. Member Secretary, Chennai Metropolitan Development Authority,
   Chennai.

Highways and Minor Ports (HW1)
Department,
Secretariat, Chennai-600 009.

Letter No.1726/HW1/2012- 75, dated 16.09.2020

From
Thiru V. Sundar B.Com.,
Deputy Secretary to Government

To
The Chief Engineer,
Public Works Department,
Water Resources,
Chepauk, Chennai – 600 005. (w.e)

The Chief Engineer,
National Highways,
Chennai – 600 025 (w.e)

The Project Director,
National Highways Authority of India,
Chennai – 600 032 (w.e)

The Chief Engineer,
Tamil Nadu Housing Board,
Nandanam,
Chennai - 600 035. (w.e)

The Chief Engineer,
Tamil Nadu Slum Clearance Board,
Chennai – 600 005. (w.e)

Sir/Madam,

Sub: Meeting – Construction of Elevated Road from Chennai Port to Maduravoyal NH 4 Meeting to be held on 18.09.2020 at 3.00 PM intimation – regarding.

Ref: 1. Government Letter No.1726/HW1/2012-74 dated 14.09.2020.
2. From the Regional Officer, Chennai NHAI/11016/2016/RO Chennai 2620, dated 15.09.2020.

In continuation of the Government letter cited, I am directed to enclose a copy of the reference 2nd cited, and to state that a site visit is scheduled on 18.09.2020 at

3:00 PM at TNHB site, Block No.4, Survey No.2, Arumbakkam Village regarding the issues the realignment of construction of Elevated Road connecting from Chennai Port to Maduravoyal.

2. I am therefore to request you to make it convenient to attend the site visit.

Yours faithfully,

P.D. Ramanathan

for Deputy Secretary to Government

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport & Highways)
क्षेत्रीय कार्यालय, चेन्नई / Regional Office, Chennai
[illegible] Chennai-600032

दूरभाष/Tele : 91-44-2225 2635
फैक्स/Fax : 91-44-2225 2636
ई-मेल/ E-mail: rochennai@nhai.org

NHAI/11016/59/2016/RO Chennai/ 2622 15th September 2020

Principal Secretary to Govt.
Highways and Minor Ports Dept.
8472
16 SEP 2020
Chennai-9

To

Thiru A.Karthik, I.A.S.,
Principal Secretary to Government
Highways & Minor Ports Dept.
Secretariat
Chennai-600 009

Sub: NHAI, RO Chennai – PIU Chennai – New Elevated Road from Chennai Port to Maduravoyal (NE-1) in the State of Tamil Nadu – Site Visit on 18.09.2020, 3.00 PM - Reg.

Sir,

This has reference to the meeting taken by Chief Secretary to Government of Tamil Nadu on 08.09.2020 in connection with the alignment of Elevated Road between Chennai Port and Maduravoyal and minutes issued vide No.1725/HW1/2012-74 dt.14.09.2020.

2. In this connection, as discussed with you on 14.09.2020, a site visit is scheduled on 18th September 2020 (Friday) at 3.00 PM. It is therefore, requested that concerned officials including WRD, PWD, Tamil Nadu Housing Board, Tamil Nadu Slum Clearance Board may be advised to accompany the site visit.

Yours faithfully,

(Pawan Kumar)
Regional Officer, Chennai

Copy to:

- Chairman, Chennai Port Trust, Chennai for information
- Chief Engineer, National Highways, HRS Campus, Chennai
- PD, PIU, Chennai
- Team Leader, M/s L&T &VAX JV, DPR Consultants

कार्पोरेट कार्यालय: जी-5 एवं 6, सेक्टर -10, द्वारका, नई दिल्ली-110075. वेबसाईट : http://www.nhai.gov.in, http://www.nhai.org
Corporate Office : G-5 & 6, Sector - 10, Dwarka, New Delhi - 110075. Website : http://www.nhai.gov.in, http://www.nhai.org

Highways and Minor Ports (HW1)
Department,
Secretariat, Chennai-600 009.
Off: 91-44-2567-0959
Fax: 91-44-2567-3035
E-mail: hwaysec@tn.gov.in

Letter No.1726/HW1/2012-60, dated 10.11.2020

From
Thiru A.Karthik, I.A.S ,
Principal Secretary to Government

To
The Principal Secretary to Government,
Housing and Urban Development Department,
Secretariat, Chennai-9
The Managing Director,
Tamil Nadu Housing Board, Chennai35
The Regional Officer,
National Highways Authority of India,
Chennai-32
The Chief Engineer,
National Highways, Chennai-25

Sir,

Sub: Highways and Minor Ports Department – Review of implementation of Projects discussed in PRAGATI Meeting by the Cabinet Secretary with Chief Secretary through VC on 9th November 2020 on implementation of Four Lane Elevated Road from Chennai Port to Maduravoyal – Action Points- Communicated - Regarding

Ref Government of India, Cabinet Secretariat, Letter No. 1/103/1/2020-CA.V, dated 04.11.2020

The following are the action points based on the outcome of Review Meeting on implementation of Projects discussed in PRAGATI Meeting by the Cabinet Secretary with Chief Secretary through Video Conference held on 9th November 2020 at 3.00 P.M with respect to Four Lane Elevated Road from Chennai Port to Maduravoyal (NH-4):-

1 NHAI shall change the land alienation proposal to NOC with respect to PWD – Waterways.

(Action: NHAI)

2. In respect of Government Poromboke in Nerkundram Village, NHAI shall check, if NOC will suffice else may request for land alienation

(Action: NHAI)

3 Tamil Nadu Housing Board shall address NHAI to request the re-alignment of Elevated Highways at Arumbakkam after discussion with Public Works Department on this concurrence

(Action: TNHB)

Yours faithfully

for Principal Secretary to Government

VIJAY NARAYAN
ADVOCATE GENERAL OF TAMIL NADU

Phone (Res) 2534 1737
(Office) 2534 0571

HIGH COURT BUILDING
CHENNAI - 600 104

Dated

SB OPN NO.30/AGVN/2021 DATED 29th April, 2021

To
The Chief Engineer (City),
Tamil Nadu Housing Board,
CMDA complex,
E and C Market Road,
Koyambedu,
Chennai - 600 107.

Dear sir,

Sub: Tamil Nadu Housing Board - town planning scheme - Arumbakkam village - notification under subsection (3) and (4) of Section 3G issued by the Ministry of Road Transport and Highways, Government of India - legal opinion required - rendered

Ref: Your Letter No.TP1/50366/2009 dated 23.04.2021.

With reference to your letter dated 27.04.2021, on whether the acquisition notice issued can be declared as null and void, I opine as follows:

FACTS

1. The question for consideration is whether the acquisition notice issued under Section 3(G) of the National Highways Act, 1965 can be challenged on the grounds of vagueness as the survey numbers that are sought to be acquired have not be clearly mentioned in the notices issued.
2. An extent of 8.49 Acres situated in Arumbakkam Village has been in the possession of Tamil Nadu Housing Board (TNHB)since the year 1966. The patta to the said lands is also in the name of the Tamil Nadu Housing Board.
3. On 2019, a notice under Section 3(G) was issued for acquiring 1217 square meters of land from Tamil Nadu Housing Board. TNHB objected to the said notifications. A high-level committee was formed wherein the director of the NHAI in letter dated 2.8.2019 has clearly stated that the land belonging to TNHB will not be acquired as the ramp required to be constructed was not necessary.
4. Subsequent to this, a second notice has again been issued under Sections 3 and 4 of the National Highways Act, 1965 on 26.04.2020, wherein the said lands have once again been added to the property that is sought to be acquired by NHAI.
5. In light of the above, an opinion has been sought on whether the acquisition notice can be challenged and consequently declared as null and void.

GOVERNMENT OF TAMIL NADU

Phone : (Per.) 2534 1737
(Office) 2534 0573

HIGH COURT BUILDING
CHENNAI - 600 104

Date :

OPINION

6. The notices dated 26.04.2020 does not clearly provide for the survey numbers. The sub-divided survey numbers have not been accurately mentioned and moreover there is ambiguity on the sub-survey numbers.

7. A notice which does not clearly provide for the survey numbers that are sought to be acquired is bound to bring about confusion in the acquisition process if not now, then in the future.

8. Moreover, NHAI has themselves clearly stated vide their minutes dated 2.8.2019 that the lands belonging to TNHB will not be required for the construction of the ramp. Subsequently, it is incorrect to add the same lands for acquisition as they are estopped from doing so.

9. In light of the above, I am of the considered opinion that the said show cause notice dated 26.4.2020 may be challenged on the grounds of vagueness and ambiguity.

The entire papers received are returned herewith.

Marayan

Encl: As above

ADVOCATE GENERAL OF TAMIL NADU

WATER RESOURCES DEPARTMENT

28 JUN 2021

From
Er. S. Kavitha, B.E.,
Assistant Engineer,PWD,WRD.,
Cooum River Section - III,
Chepauk, Chennai – 600 005.

To
The Assistant Engineer,
Anna Nagar Division,
Tamil Nadu Housing Board,
Thirumangalam, Chennai – 600 101.

AEE-II 28/6/21

Lr. No. AE / F- 05 / Cooum / 2021/ Dated : 15.06.2021

E(A) AEE (E) to take necessary action in this regard. 28/6/21

Sir,

Sub: Intimation of Court Direction for not undertake any construction activity

Ref :
1. O.A.Nos.91/2021(SZ) – Case filed in the National Green Tribunal at Chennai.
2. Government Letter No. 7131/K2/2021-2., dated 24.05.2021

*****

With Reference to the above cited 1& 2, the case O.A.Nos.91/2021 (SZ) – filed in the National Green Tribunal at Chennai by Thiru.G.Devarajan, requesting the Tribunal not undertake any construction activity in the Tamil Nadu Housing Board Arumbakkam Project until the application disposed.

The Hon'ble National Green Tribunal issued the notice to the Principal Secretary to Government, Public Works Department, Secretariat, and Chennai-9.Hence you are requested to stop the progress of work in Tamil Nadu Housing Board,Arumbakkam Project till the further order comes from the Nationa Green Tribunal (South Zone).

15/06/21

Assistant Engineer, PWD,WRD.,
Cooum River Section - III,
Chepauk, Chennai – 5.

Item No.3:

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

Original Application No. 91 of 2021 (SZ) &

I.A. No. 73 & 74/2021 (SZ)

(Through Video Conference)

IN THE MATTER OF:

G. Devarajan, Chennai

... Applicant(s)

Versus

State of Tamil Nadu,

Rep. by the Chief Secretary to Government,

Chennai and Others.

...Respondent(s)

Date of hearing: 08.04.2021.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE MR. SAIBAL DASGUPTA, EXPERT MEMBER

For Applicant(s): Mr. S. Manuraj

For Respondent(s): Dr. V.R. Thirunarayanan for R1 and R2

ORDER

1. The above application has been filed alleging certain irregularities in carrying out the '*mixed-use development*' project in Arumbakkam, Chennai by the respondents 1 and 3.

2. It is alleged in the application that the applicant was challenging the Environmental Clearance granted by the 4th respondent for the Proposed Project undertaken by the Tamil Nadu Housing Board, namely 3rd respondent as per the environmental clearance granted on 23.01.2021.

3. It is also alleged in the application that the proposed construction was against the No- Objection Certificate granted by the 2nd respondent and encroaching into the floodplain of Cooum River and also encroaching into the Baby Canal that has been constructed to divert the flood water to Cooum River.

4. Further, certain constructions on the banks of Cooum River were against the directions given by this Tribunal in ***Jawaharlal Shanmugam Vs Tamil Nadu State Pollution Control Board & Others in O.A. No. 558 of 2018 (SZ)*** and other connected cases, wherein this Tribunal had imposed a fine of Rs. 100 Crores which was upheld by the Hon'ble High Court of Madras in ***Government of Tamil Nadu Vs. National Green Tribunal, South Zone and Others reported in 2019 (3) LW 865.*** If the construction is allowed to continue, then it will affect the riverine ecology of Cooum River itself.

5. The environmental clearance itself was granted without considering these aspects. So the applicant filed this application seeking the following reliefs:-

A. Declare the actions of the State of Tamil Nadu in implementing the proposed project, in contravention of the applicable laws and being devoid of merit, as illegal and violative of the Environment (Protection) Act, 1986;

B. Direct Respondent Nos. 1 & 3 to not undertake any construction activities until this Application is disposed.

C. Direct the Respondents herein to restore the area where there has been any illegal construction work;

D. Direct the Respondents to assess the damage caused due to the illegal construction and use the same to restore the area;

E. *Impose exemplary costs as environmental compensation charge for the damages doe ro the land in question;*

F. *Direct Respondent No. 1 to initiate prosecution under the Environment Protection Act, 1986 against Respondent Nos. 2 & 3 and the respective officials, for permitting and commencing the project activities in violation of the law;*

6. When the matter came up for hearing today through Video Conference, Sri. S. Manuraj represented the applicant. Dr. V. R. Thirunarayanan represented respondents 1 and 2.

7. When it was pointed out, if the applicant wanted to challenge the environmental clearance granted, that will not be possible by entertaining the application under Section 14 & 15 of the National Green Tribunal Act, 2010 and the remedy is to file an appeal under Section of the National Green Tribunal Act, 2010, the learned counsel appearing for the applicant submitted that he may be given liberty to file an appeal against the environment clearance if the party wants to challenge the same independently and that liberty may be reserved for his claim. So considering the circumstances, we feel that though there are allegations made regarding the issuance of the environment clearance itself, but ultimately in the prayer portion there was no prayer to set-a-side the environment clearance granted. But they wanted to restrain the Housing Board from proceeding with the project as it will affect the riverine ecology of the Cooum River and also against the conditions imposed in the No-Objection Certificate granted by the State for this project and also encroachment into the Baby Canal that is being

constructed by the State Government to protect Cooum River as directed by this Tribunal in the case pending before this Tribunal regarding the pollution caused to Cooum, Adyar River and Buckingham Canal matter.

8. So under such circumstances, we feel that the application can be retained for considering the question of encroachment into the floodplain and construction being done and the environmental damage that is likely to be caused on account of the ongoing project that is undertaken by the 3rd respondent, leaving open the right of the applicant to challenge the environmental clearance independently if they want while appropriate proceedings. So the application is admitted to the extent mentioned above, leaving open the right of the applicant to challenge the environment clearance granted if it is permissible under law of limitation available by an independent proceedings.

9. Issue notice to respondents by Registered post with acknowledgement due, by e-mail and also by dusthi if possible and produce proof of service on them by filing proof of affidavit as per rules.

10. The applicant is also directed to serve a copy of the application along with the documents produced to the standing counsel appearing for the respondents 1 and 2 within a week and produce proof of such service by filing proper affidavit as per rules.

11. The applicant is also directed to produce necessary requisites

along with postal cover and the necessary postal stamps before this Tribunal within a week, so as to enable this Tribunal to send notice to all the respondents through Tribunal, to ensure service on them, so as to enable this Tribunal to proceed against them, if they did not appear in their absence in accordance with law.

12. In order to ascertain the genuineness of the allegations made in the application and also the violations alleged, this Tribunal feel it appropriate to appoint a joint committee comprising of (1) The District Collector, Chennai District or a Senior Officer not below the rank of Sub Divisional Magistrate or Assistant Collector as deputed by the District Collector (2) a Senior Officer from Ministry of Environment, Forests and Climate Change (MoEF & CC), Integrated Regional Office, Chennai (3) a Senior Officer from State Level Environment Impact Assessment Authority (SEIAA), (4) a Senior Officer from Chennai Rivers Restoration Trust (CRRT) and (5) The Superintending Engineer from Public Works Department (PWD) and Water Resources Organisation (WRO) who is in charge of Cooum River area to inspect the area in question and submit a factual as well as action taken report if there is any violation found.

13. The Public Works Department (PWD) and Water Resources Organisation (WRO) will be the nodal agency for co-ordination and for providing necessary logistics for this purpose.

14. The committee is directed to ascertain as to whether the proposed construction by the 3rd respondent will encroach into the floodplains of Cooum River, whether there is any encroachment into the Baby Canal that has been constructed by the 3rd respondent in proceeding with the project, and to assess the environmental compensation if there is any damage caused to the environment and also to suggest the remedial measures to restore the damage caused to environment and submit a report to this Tribunal on or before 25.05.2021 by e-filing in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF along with necessary hard copies to be produced as per rules.

15. The applicant is also directed to submit a set of papers to the members of the committee within a week, so as to avoid delay in submitting the report. If the committee is not able to submit the final report, they are directed to file at least an interim report whether there was any encroachment into the Baby Canal constructed and whether the proposed construction will go up to the floodplains as alleged by the applicant, so that if there is any violation on those aspects certain interim orders can be passed on that basis on the next hearing date.

16. The Registry is directed to communicate this order to the members of the committee as well as to the official respondents immediately through e-mail, so as to enable them to comply with the direction and for filing their independent response to the allegations made in the

application and also for filing their independent report as directed by this Tribunal.

17. I.A. No. 74 of 2021 (SZ): This is an application filed by the applicant to appoint a joint expert committee to go into the allegations made in the application. Since this Tribunal has already appointed a joint committee to go into the allegations, there is no necessity to appoint any further committee as sought for in the application.

18. With the above observations and directions, the application is disposed off.

19. For appearance of parties and for filing of independent response report and also for consideration of report, post on 25.05.2021.

Sd/-
.....J.M.
(Justice K. Ramakrishnan)

.....Sd/-.....E.M.
(Shri. Saibal Dasgupta)

O.A. No.91/2021(SZ) &
I.A. No. 73 & 74/2021 (SZ)
08.04.2021. Sr.

R.NEELAKANDAN
STATE GOVERNMENT COUNSEL

STATE GOVERNMENT PLEADER'S OFFICE,
LAW OFFICERS BLOCK,
HIGH COURT, CHENNAI-600 104.

OFF: (044) 2534 1024
FAX: (044) 2534 1165

19.05.2021
Cell No.: 9444075553

To

1. The Chief Secretary to Government,
   Secretariat, Chennai-600 009.

2. The Principal Secretary to Government,
   Public Works Department,
   Secretariat, Chennai-600 009.

3. The Member Secretary,
   State Level Environment Impact Assessment Authority,
   SEIAA 3rd Floor, Panagal Maaligai,
   No.1 Jeenis Road, Saidapet, Chennai-600 015.

Sirs,

Ref: O.A.No.91 of 2021 (SZ) on the file of National Green Tribunal at Chennai

.....

The above referred case has been filed by one G.Devarajan in respect of "mixed-use Development" Project in Arumbakkam with the following relief:-

A. *Declare the actions of the State of Tamil Nadu in implementing the Proposed Project, in contravention of the applicable laws and being devoid of merit, as illegal and violative of the Environment (Protection) Act, 1986;*

B. *Direct Respondent Nos.1 to 3 to not undertake any construction activities until this Application is disposed.*

C. *Direct the Respondents herein to restore the area where there has been any illegal construction work;*

D. *Direct the Respondents to assess the damage caused due to the illegal construction and use the same to restore the area;*

E. *Impose exemplary costs as environmental compensation charge for the damages done to the land in question;*

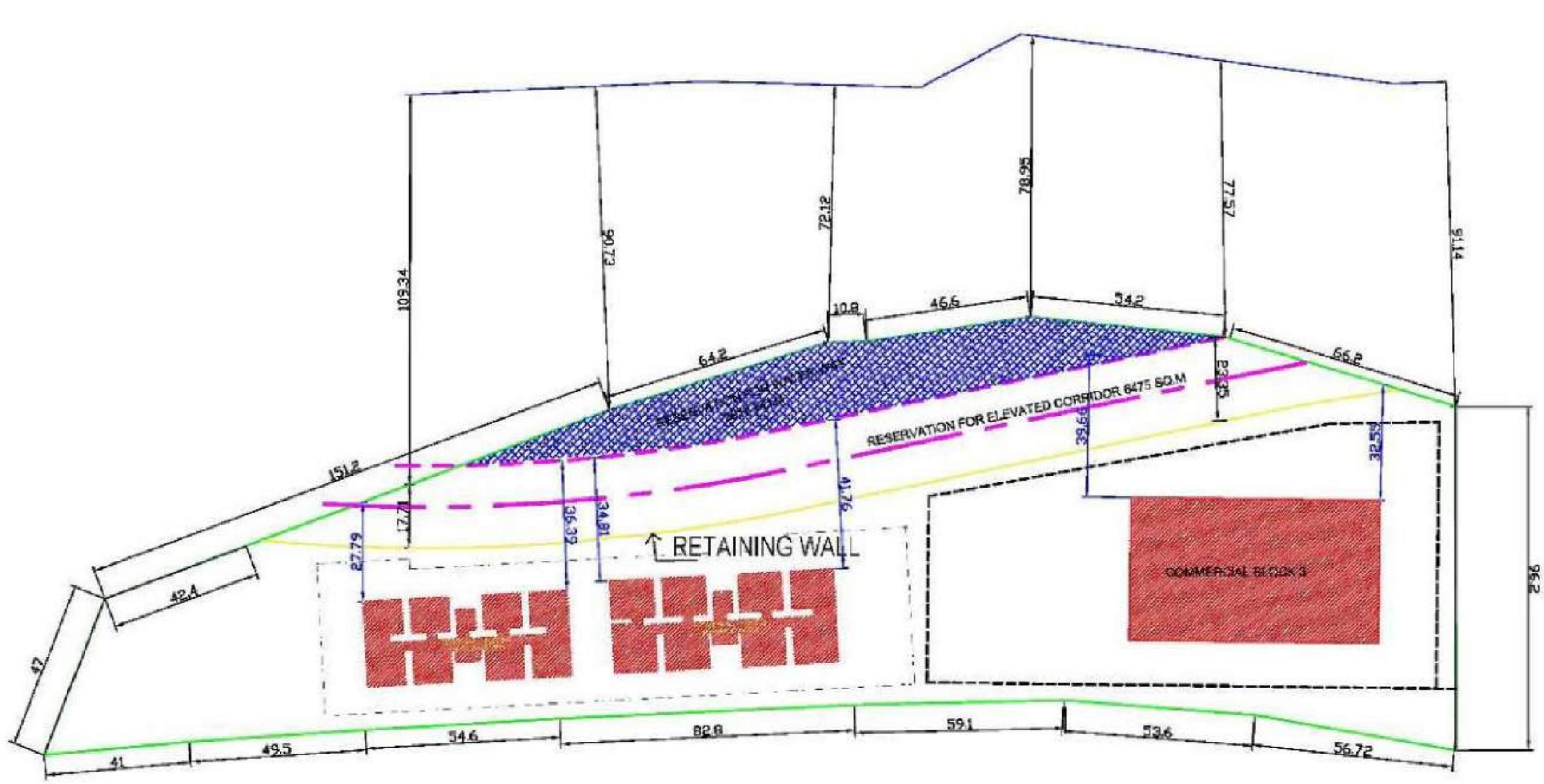
F. *Direct Respondent No.1 to initiate prosecution under the Environment Protection Act, 1986 against Respondent Nos.2 & 3 and the respective Officials, for permitting and commencing the project activities in violation of the law;*

The Hon'ble National Green Tribunal (South Zone) issued notice to you returnable by 5.05.2021. This is brought to my notice today by the letter from the Principal Secretary to he Government, Housing and Urban Development Department.

Therefore kindly go through the attached Original application along with the interim application and submit your remarks not later than 24.05.2021 to the Office of the Government Pleader, Madras High Court.

Kindly treat this matter as MOST URGENT.

STATE GOVERNMENT COUNSEL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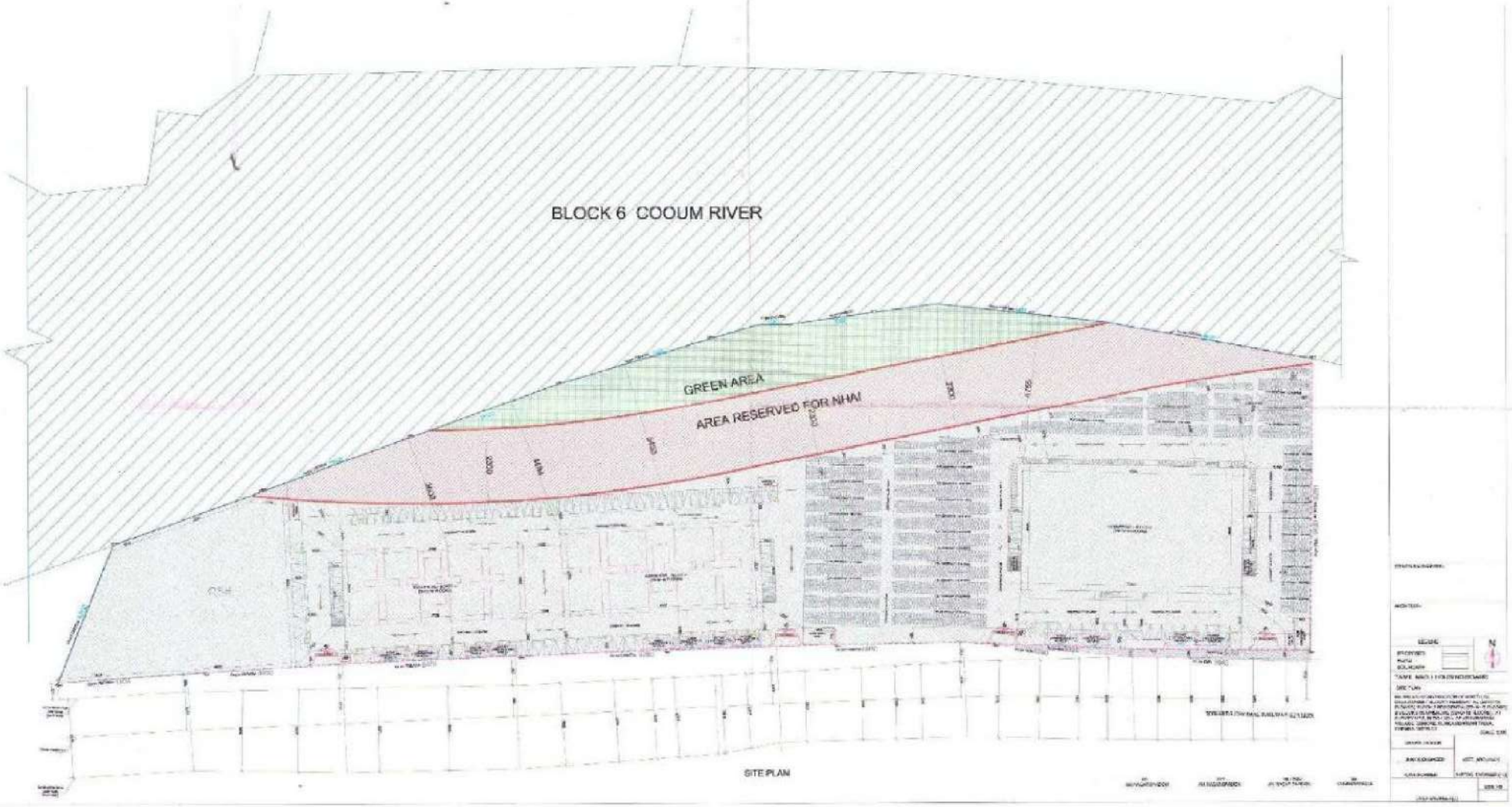
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GREEN AREA
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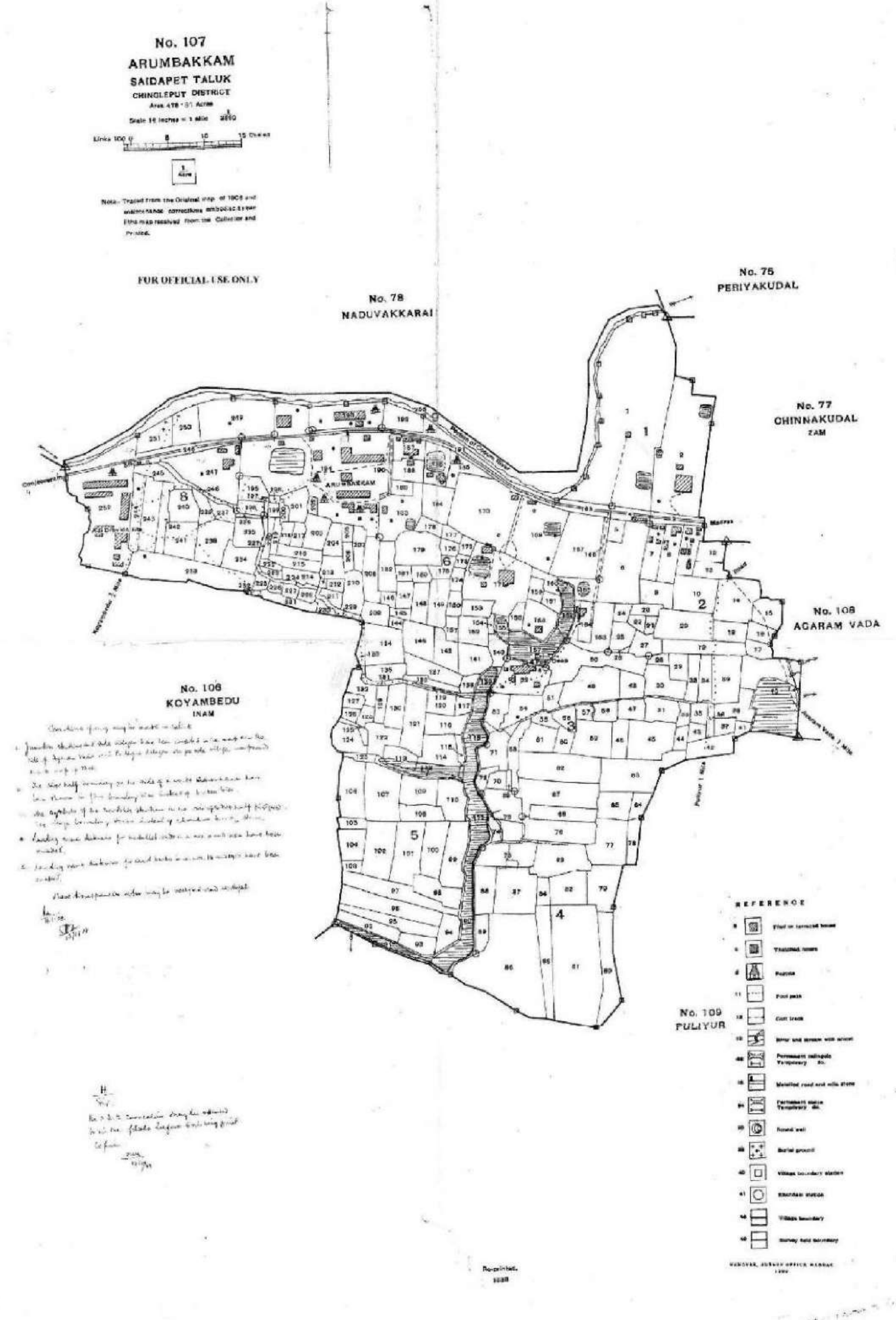
SITE PLAN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No. 77
CHINNAKUDAL
ZAM
No. 108
AGARAM VADA
No. 106
KOYAMBEDU
INAM
No. 109
PULIYUR
ARUMBAKKAM
REFERENCE
Re-printed.

No. 78
NADUVAKKARAI

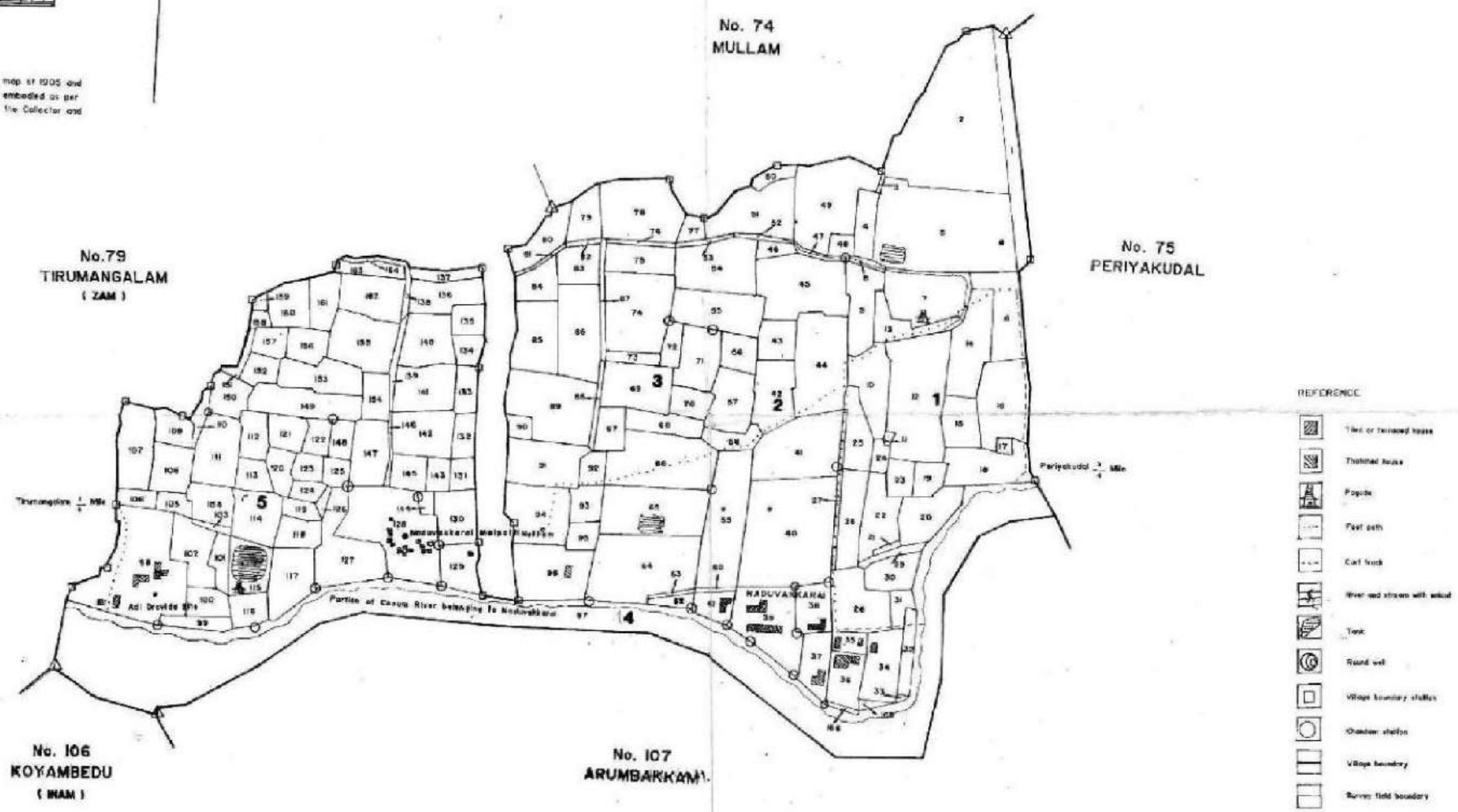
SAIDAPET TALUK

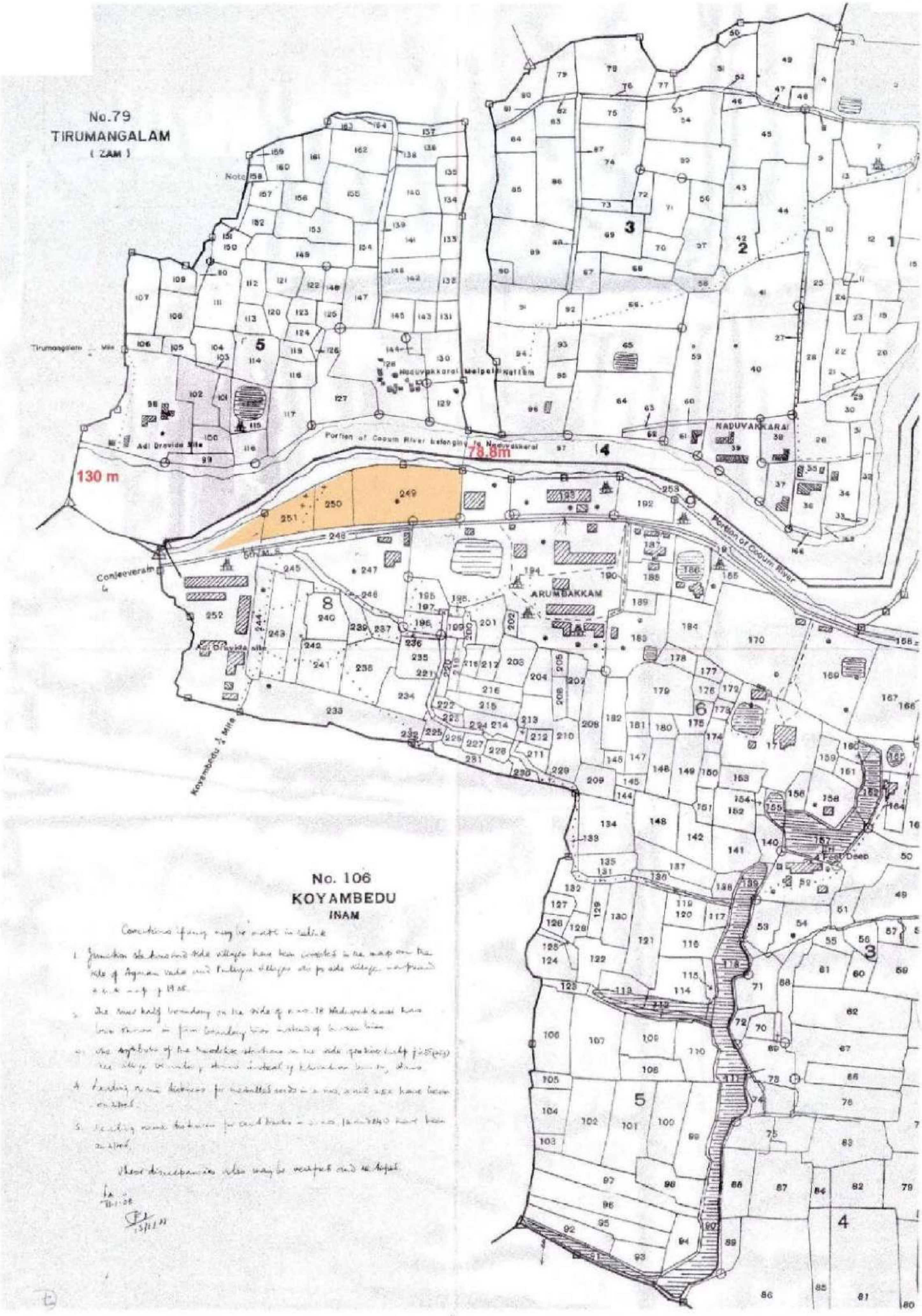
CHINGLEPUT DISTRICT

Area 324.94 Acres

Scale 16 Inches = 1 Mile $\frac{1}{3960}$

Note:- Traced from the Original map of 1905 and maintenance corrections embodied as per litho map received from the Collector and Printed.

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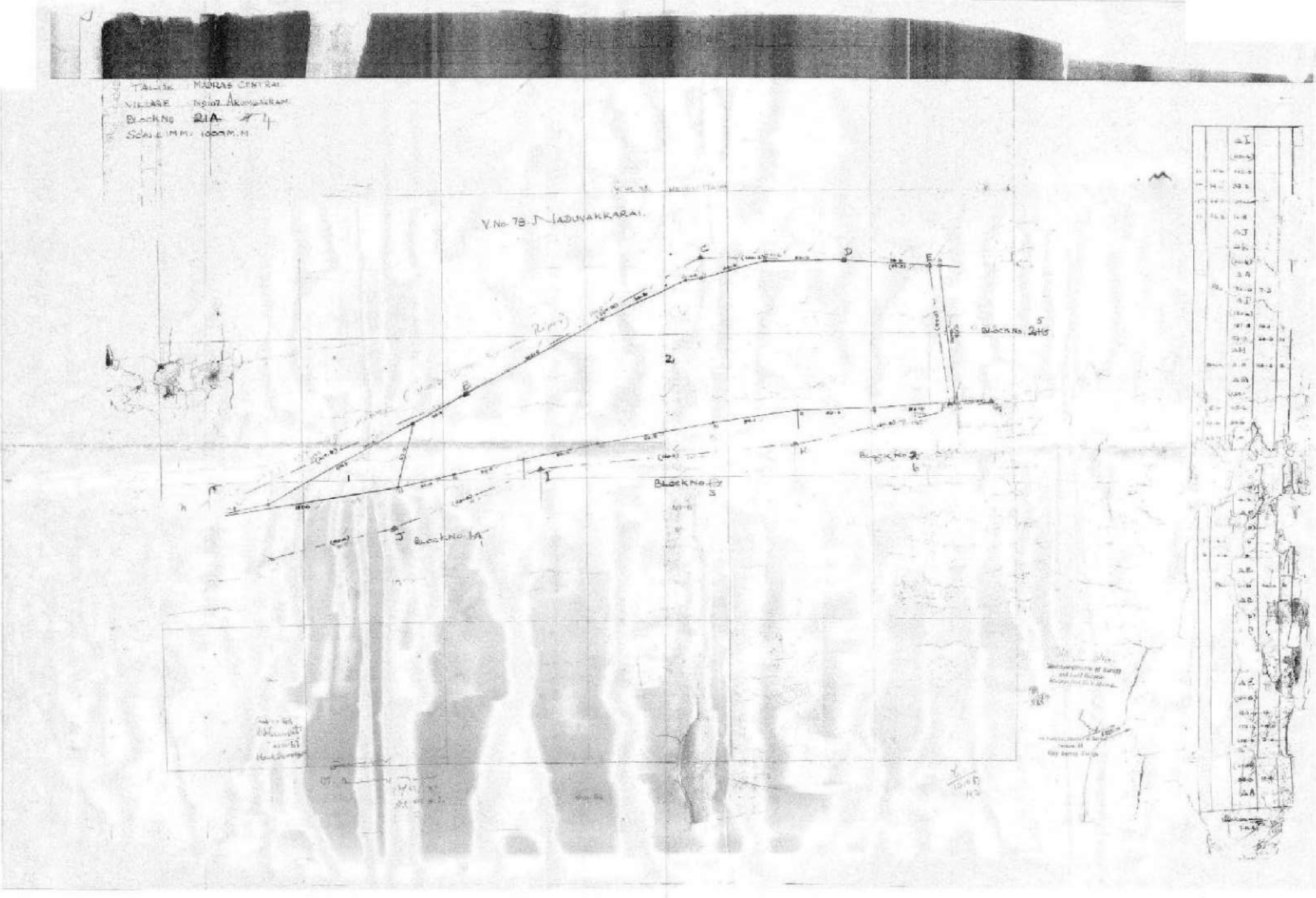
(ZAM)
No. 106
KOYAMBEDU
INAM
NADUVAKKARAI
ARUMBAKKAM
Naduvakkarai Melpakkattam
Portion of Cooum River belonging to Naduvakkarai
Portion of Cooum River
Adi Dravida Site
Conjeeveram
Koyambedu 1/2 Mile
Tirumangalam Mile
130 m
78.8m
Foot Deep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V.No 78 J NADUNAKKARAI
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E
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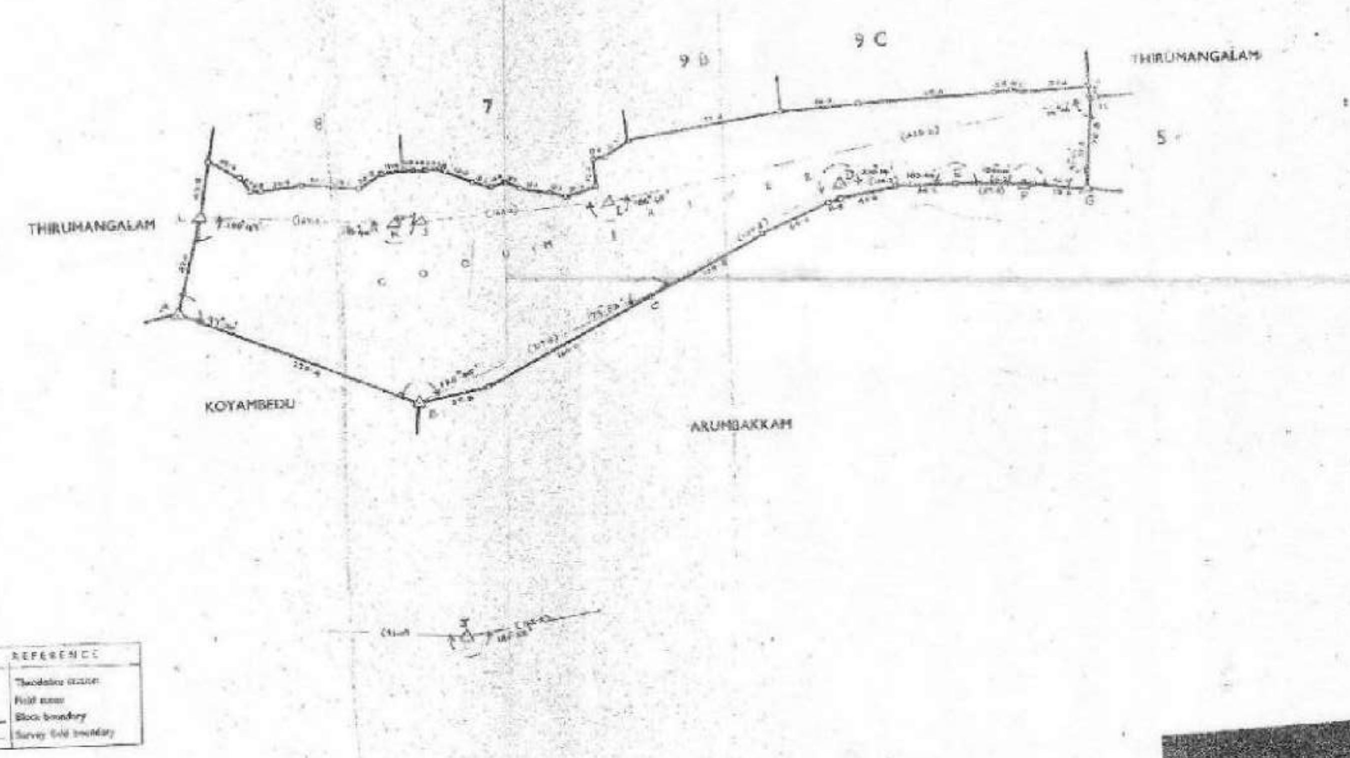
1
2
J
BLOCK No 1A
BLOCK No 3
BLOCK No 6
BLOCK No 245

MADRAS TOWN

NADUVAKKARAI

BLOCK No. 6



TOWN SURVEY

[redacted]

[illegible]

சாலை ஆய்வாளர்
தேசிய நெடுஞ்சாலை துறை
திருவள்ளூர், அலகு - IV

2020

EXTRACT FROM THE TOWN SURVEY LAND REGISTER

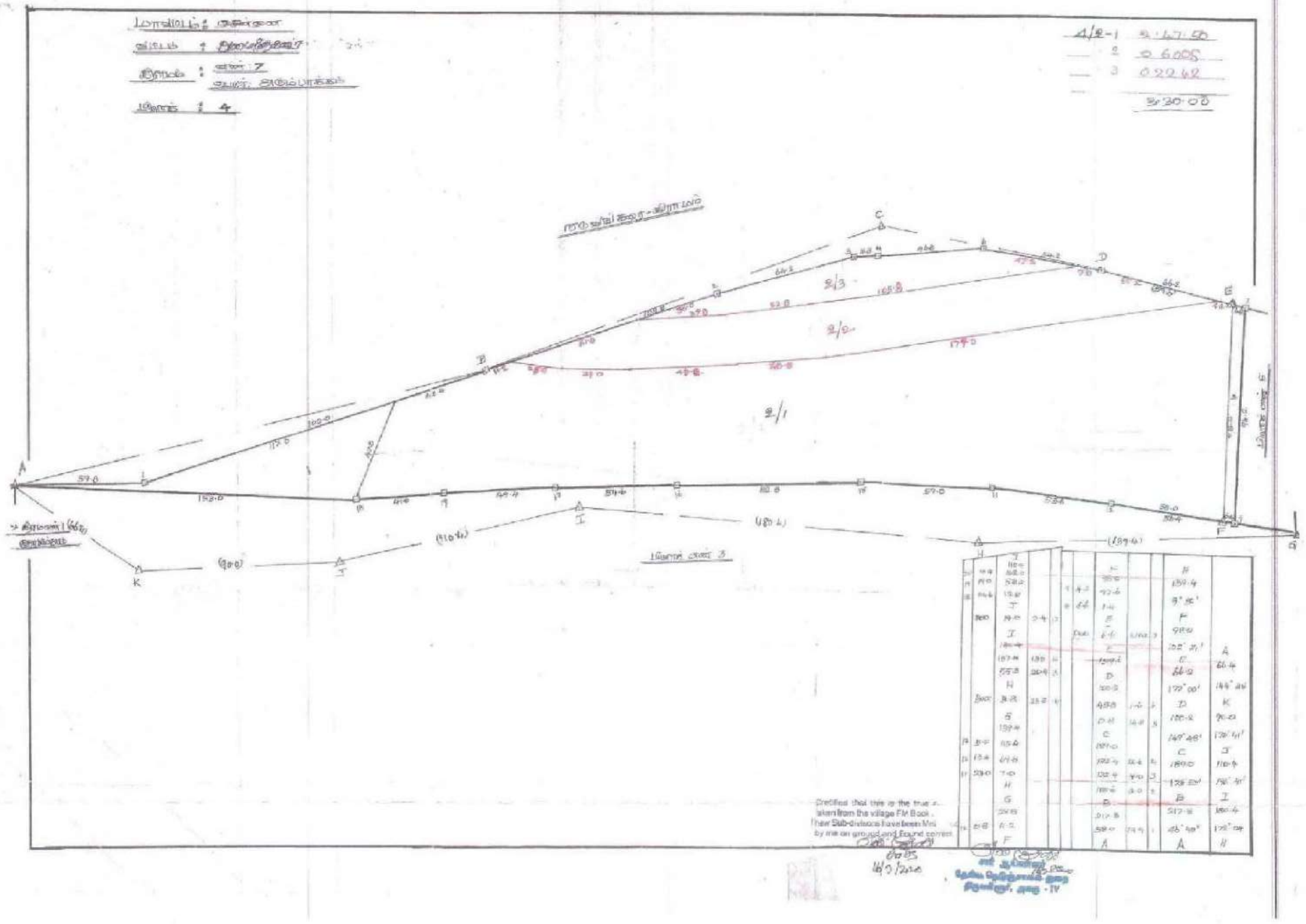
District: Chennai   Taluk: Aminjikarai   Town: Arumbakkam Ward: 002

Block	Name of Locality or Street	Number: Survey Field	Number: Sub-Division	Old Survey Number and Letter	Municipal Door Number	Govt, Patta, Zamindari, Inam	Dry, Wet, Unassessed Poramboke, House-Site	Source of Irrigation and Class	If double Crop, Rate of Composition	Class and Sort of Soil	Taram	Rate Per Acre/Hectare: Rupees	Rate Per Acre/Hectare: Paise	Extent by Town Survey: Hectare	Extent by Town Survey: Ares	Extent by Town Survey: Square Meter	Assessment: Municipal	Assessment: Government	Municipal Register	Adangal	How the Holding is Utilised	Remarks
0004		1	0	252/28B Y		[illegible]	[illegible]		-	0		0.00		0	23	71.0	-	0.0[illegible]			[illegible]	
0004		2	0	249/1,2,3,5,25 0/1,2,3,4,5,6, 251,252/2A		[illegible]	[illegible]		-	0		0.00		3	30	0.0	-	78.25		[illegible]	[illegible]	

மாவட்டம்: திருவள்ளூர் வட்டம்: அம்பத்தூர் கிராமம்: 7. அயப்பாக்கம் கிராமத்திய சப்-டிவிஷன் ஸ்டேட்மெண்ட்

இப்போதுள்ள புலத்தின் சர்வே நெம்பர் அல்லது சப்-டிவிஷன்	அதின் வகுப்பு, சர்வே விஸ்தீரணம் தீர்வை: புஞ்சை, நஞ்சை, புறம்போக்கு	சர்வே விஸ்தீரணம்	தீர்வை	இப்போதுள்ள ரிஜிஸ்தாரர்களின் பெயர்	இப்போது உத்தேசித்திருக்கும் சப்-டிவிஷன்களின் விவரம்: புஞ்சை, நஞ்சை, புறம்போக்கு	சப்-டிவிஷன் நெம்பர் தொடர்	விஸ்தீரணம் (Area Square)	(3)-வது கலத்தை அனுசரித்து சரிகட்டிய விஸ்தீரணம்	தீர்வை	ரிஜிஸ்தர் செய்ய உத்தேசித்திருக்கும் கைப்பற்றுதாரர்களுடைய பட்டா நெம்பர்களும், பெயர்களும்	சப்-டிவிஷன்களின் கெடியெடுத்து	ஷரா: பூமியின் சரியான அத்து இருக்கிறதா / தேவையான இடத்தில் கல் நடப்பட்டிருக்கிறதா	(12)-வது கலத்தில் சப்டிவிஷன்கள் கைவெறுத்து செய்யாவிட்டால் அதற்குக் காரணம்?	சப்-டிவிஷன் செய்பவர்களாம்	ஒன்று சேர்க்கக்கூடிய சப்-டிவிஷன்களாயும், அவைகளை ஒன்று சேர்ப்பதற்கு பட்டாதாரருக்கு
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4/2	8/6	3.30.00	7625	தமிழ் நாடு வீட்டு வசதி வாரியம்	8/6	8/4	2.47.50	2.47.50	[illegible]	தமிழ் நாடு வீட்டு வசதி வாரியம்					
						22	0.06.08	0.06.08	-	இந்திய அரசு சாலை வழி போக்குவரத்து மற்றும் நெடுஞ்சாலைத்துறை அமைச்சகம்					
					8/6	2-3	0.22.42	0.22.42	5.18	தமிழ் நாடு வீட்டு வசதி வாரியம்					
							3.30.00	3.30.00	[illegible]						

தனி வட்டாட்சியர்
தேசிய நெடுஞ்சாலை துறை (நி.எ)
திருவள்ளூர் அலகு - I
15/7/2020



Form No. Old 31 / New 41.

TOWN SURVEY REGISTER

Number		Extent by Town Survey	Assessment	Number of patta or bunch title-deed and name of registered holder		Remarks
1	282/2849 — 8 ve	0.23.71.0			[illegible]	[illegible]
2	249/1, 2, 3, 5 — [illegible]	02.30.94.10	76.25	State Housing Board		

[illegible] 1/10/10

சென்னை மாவட்டம், எழும்பூர் நுங்கம்பாக்கம் வட்டம், ... கிராமத்திய சப்-டிவிஷன் ஸ்டேட்மெண்ட்

இப்போதுள்ள புலத்தின் சர்வே நம்பர் அல்லது சப்டிவிஷன்	அதின் வகுப்பு, சர்வே விஸ்தீரணம் தீர்வை					இப்போதுள்ள ரிஜிஸ்தரான கைவசதாரர்களின் பெயர்	இப்போது உத்தேசித்திருக்கும் சப்டிவிஷன்களின் விவரம்									ரிஜிஸ்தர் செய்ய உத்தேசித்திருக்கும் கைவசதாரர்களுடைய பட்டா நெம்பர்களும் பெயர்களும்	கட்சிக்காரர்களின் கையெழுத்து	பூமியில் சரியான அத்து இருக்கின்றது தேவையான இடத்தில் கல் நட்டியிருக்கிறது	(12)-வது காலத்தில் கட்சிக்காரர்கள் கையெழுத்து செய்யாவிட்டால் காரணம்	சப்-டிவிஷன் செய்யக்காரணம்	ஒன்று சேர்க்கப்படும் சப்டிவிஷன்கள் ஒன்று சேர்ப்பதற்கு ஆதாரமான உத்தரவு
	புஞ்சை, நஞ்சை, புறம்போக்கு	சர்வே விஸ்தீரணம்			தீர்வை		புஞ்சை, நஞ்சை, புறம்போக்கு	சப்டிவிஷன் நெம்பர் லெட்டர்	சரியான ஸ்கேலர் விஸ்தீரணம்			3-வது காலத்தை அனுசரித்து சரிகட்டிய விஸ்தீரணம்			தீர்வை						
(1)	(2)	(3)			(4)	(5)	(6)	(7)	(8)			(9)			(10)	(11)	(12)	(13)	(14)	(15)	(16)
		ஹெ	ஏ	ச.மீ					ஹெ	ஏ	ச.மீ	ஹெ	ஏ	ச.மீ							
B14 4 "2	[illegible]	3	30	000		State Housing Board		2/1	3	12	060	3	12	060		State Housing Board					
								2/2	0	17	940	0	17	940		[illegible]					
							Total		3	30	000	3	30	000							

[signature]
Special Tahsildar (L.A.)
National Highways,
Elevated Road,
Maduravoyal.

[signature]
துணை ஆய்வாளர் (நில அளவை)
வட்டாட்சியர் அலுவலகம்
எழும்பூர் – நுங்கம்பாக்கம் வட்டம்,
சென்னை–600 031.

[signature] 3.3.2011

PICTURE SHOWING THE TAMIL NADU HOUSING BOARD LAND BEFORE EXECUTION OF PROJECT

PICTURE SHOWING THE TAMIL NADU HOUSING BOARD LAND BEFORE EXECUTION OF PROJECT

PICTURE SHOWING THE TAMIL NADU HOUSING BOARD LAND BEFORE EXECUTION OF PROJECT

PICTURE SHOWING THE TAMIL NADU HOUSING BOARD LAND BEFORE EXECUTION OF PROJECT

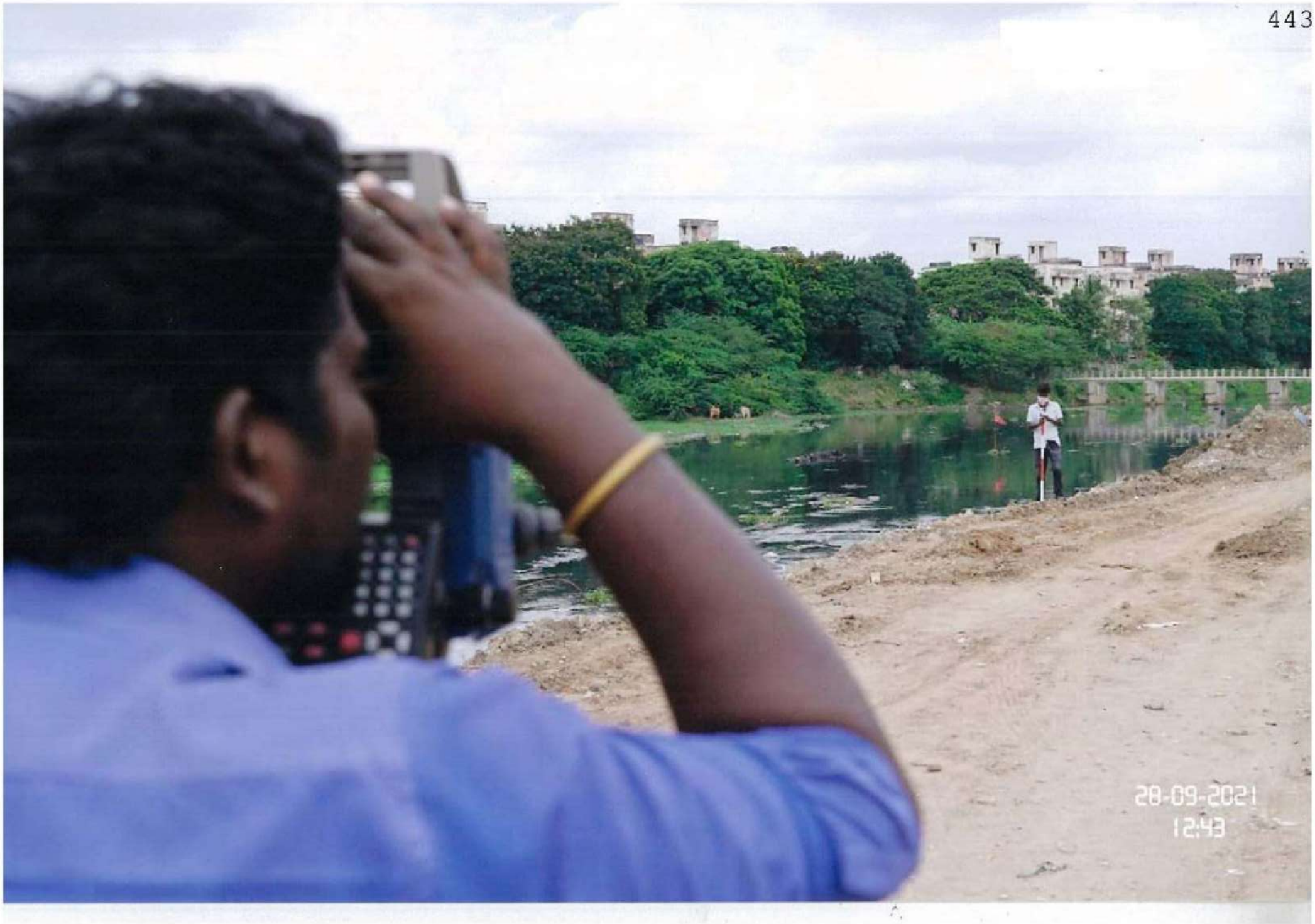
PICTURE SHOWING THE FIXING OF PEGS IN THE POINT DEMARKED BY SURVEY TEAM AS PER SURVEY AND LAND RECORDS DEPARTMENT ON 10.09.2020.

PICTURE SHOWING THE MARKING OF RIVER SIDE BOUNDARY ON NORTHERN SIDE (NADUVANKARAI VILLAGE SIDE) USING GLOBAL POSITIONING SYSTEM BY INSPECTOR OF SURVEY. IN THE PRESENCE OF EXECUTIVE ENGINEER , SUBDIVISION OFFICER OF PUBLIC WORKS DEPARTMENT. ON 25.09.20

PICTURES SHOWING THE DISTANCES OF COMBINED VIEW OF BOUNDARY POINT OF FMB . PROVIDED BY ASSISTANT DIRECTOR OF SURVEY.


28-09-2021
12:44


28-09-2021
12:42


28-09-2021
12:43


28-09-2021
12:51


28-09-2021
12:58


4467
28-09-2021
13:05


28-09-2021
13:06

PICTURE SHOWING COOUM RIVER CLEAR WATERWAY

PICTURE SHOWING THE LAND RESERVED FOR NHAI ELEVATED CORRIDOR(BUND)

PICTURE SHOWING THE WIDTH (130M) OF COOUM RIVER NEAR THE INNER RING ROAD

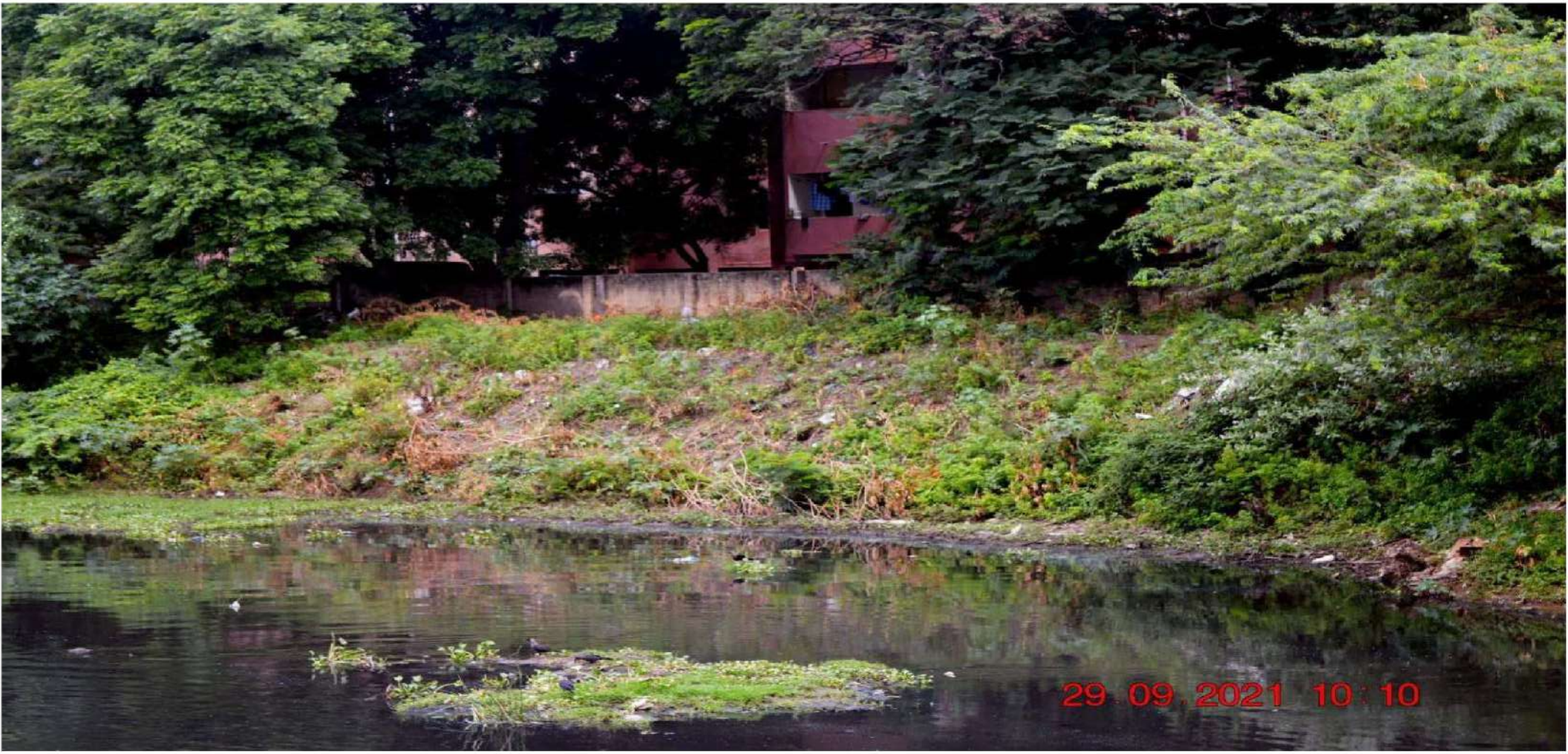
PICTURE SHOWING THE WESTERN SIDE OF THE SITE BOUNDARY AND THE WIDTH (130 M) OF COOUM RIVER FROM THE INNER RING ROAD

PICTURE SHOWING THE NORTHERN SIDE OF THE SITE AND COOUM RIVER

PICTURE SHOWING THE CLEAR WATER WAY

PICTURE SHOWING THE WIDTH (130 M) OF THE COOUM RIVER NEAR INNER RING ROAD

PICTURE SHOWING THE NORTHERN SIDE BUND BOUNDARY OF COOUM RIVER



PICTURE SHOWING THE NORTHERN SIDE BUND BOUNDARY OF COOUM RIVER

PICTURE SHOWING THE NORTHERN SIDE BUND BOUNDARY OF COOUM RIVER AT VARIOUS PLACES

PICTURE SHOWING THE NORTHERN SIDE BUND BOUNDARY OF COOUM RIVER

PICTURE SHOWING THE WIDE VIEW OF THE COOUM RIVER

COMBINED PICTURE SHOWING THE FOOT PATH, COOUM RIVER AND NHAI LAND RESERVED FOR ELEVATED CORRIDOR

PICTURE SHOWING THE FOOT PATH ADJACENT TO SITE BOUNDARY IN THE NORTH – EAST DIRECTION

PICTURE SHOWING THE COOUM RIVER CROSSING THE FOOT PATH IN THE NORTH – EAST SIDE OF THE SITE

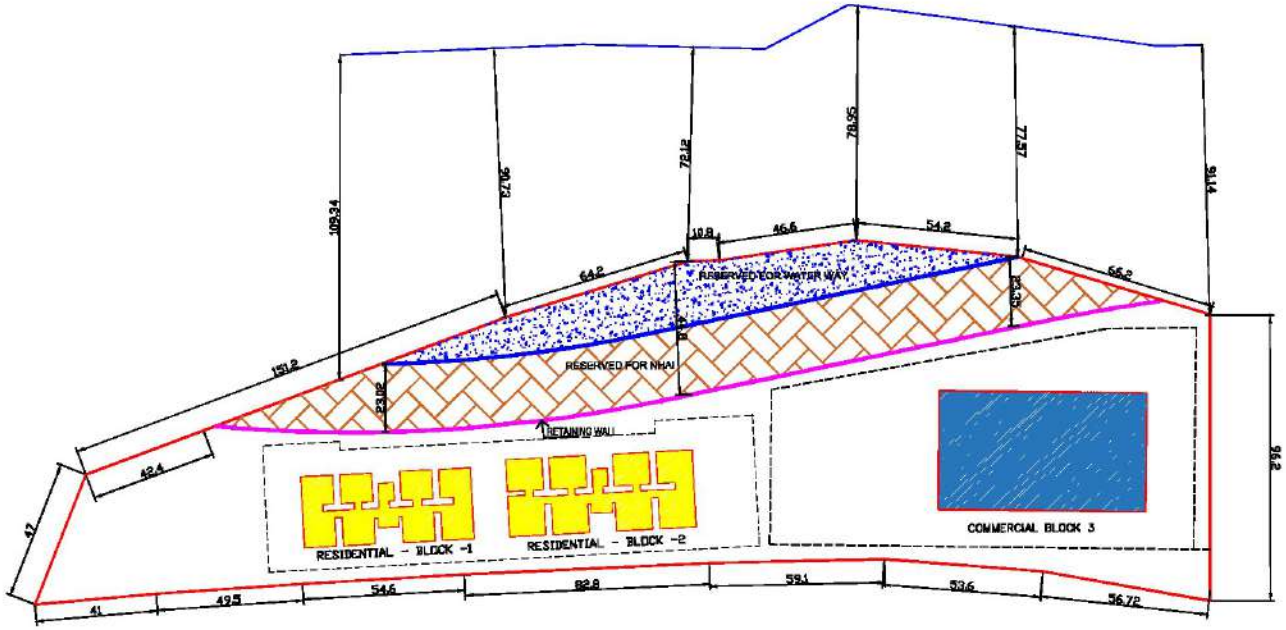
PICTURE SHOWING THE SCHEME NAME BOARD IN THE ENTRANCE OF THE SCHEME –RESIDENTIAL

PICTURE SHOWING THE SIGN BOARDS INSIDE THE CONSTRUCTION WORKS AREA

PICTURE SHOWING THE SIGN BOARDS INSIDE THE CONSTRUCTION WORKS AREA

PICTURE SHOWING THE SCHEME NAME BOARD IN THE ENTRANCE OF THE SCHEME - COMMERCIAL

PROPOSED CONSTRUCTION OF 304 MULTISTORIED RESIDENTIAL COMPLEX AND COMMERCIAL COMPLEX AT S.NO:2 BLOCK NO:4 OF ARUMBAKKAM VILLAGE, EGMORE–NUNGAMBAKKAM TALUK, CHENNAI DISTRICT



AREA DETAILS	
TOTAL SITE EXTENT AS PER FMB	33000 SQ.M
EXTENT RESERVED FOR NHAI	6008.00 SQ.M
EXTENT RESERVED FOR WATER WAY	2242.00 SQ.M
SCHEME EXTENT AREA	24750.00 SQ.M

LEGEND	
	TNHB BOUNDARY AS PER FMB
	OUTER RETAINING WALL
	WATER WAY BOUNDARY
	LAND RESERVED FOR WATER WAY
	LAND RESERVED FOR NHAI
	RESIDENTIAL BLOCK 1&2
	COMMERCIAL BLOCK 3

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

O.A.No.91 of 2021 & Appeal No.10 of 2021 (SZ)

IN THE MATTER OF

G.Devarajan, Arumbakkam, Chennai

..Appellant(s)

Versus

State of Tamilnadu, Rep. by the Chief Secretary to Government, & 3 others

..Respondent(s)

TYPED SET FILED BY THE 3RD RESPONDENT

MR.D.R.ARUN

RESPONDENT COUNSEL- 3RD