TINDIVANAM PHARMA PARK ASSOCIATION

Block – D1, Baid Metha Complex, No.16, Anna Salai, Little Mount, Saidapet, Chennai- 600 015

TENDER DOCUMENT

Tender Notice No. TPPA/CF Development/QC Lab/2025-26/01

Construction of Common Testing Laboratory and Training Centre, including Compound Wall and Internal Road Works at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District, Tamil Nadu.

Date of Release of Bid Document	08.06.2025
Pre-bid Meeting	20.06.2025
Last Date for Submission of Bid	27.06.2025
Date of Opening of Bid	27.06.2025

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TENDER NOTICE

M/s Tindivanam Pharma Park Association (TPPA)

Block – D1, Baid Metha Complex, No.16, Anna Salai, Little Mount, Saidapet, Chennai – 600 015

TENDER NOTICE

M/s Tindivanam Pharma Park Association invites bids from prospective bidders for the following common facilities development works with grant-in-aid under the Mega Cluster Development Scheme, Government of Tamil Nadu

Item No – 1 - Reference No: TPPA/CF Development/ QC Lab/2025-26/01

- Construction of Common Testing Laboratory and Training Centre, including Compound Wall and Internal Road Works

Item No – 2 - Reference No: TPPA/CF Development/ Warehouse/2025-26/01

- Design, Fabrication, Supply and Erection of a Pre-Engineered Steel Building (PEB) warehouse on Turn-Key basis

at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District, Tamil Nadu. Tender documents can be obtained at the TPPA address in Chennai from 08.06.2025 to 26.06.2025 on payment of Rs.17,700/- for each of the above item or can be downloaded free of cost from the website www.tppa.in, www.tansidco.tn.gov.in & www.itcot.com. Contact details: R.Pradeep, Ph:+91 9003030898 E-mail – officetppa@gmail.com.

Managing Director, TPPA

IMPORTANT NOTICE

The Tamil Nadu Transparency in Tenders Act, 1998 and The Tamil Nadu Transparency in Tender Rules, 2000 as amended, govern this tender procedure from time to time. In case of any conflict between the terms and conditions in the tender document and the Tamil Nadu Transparency in Tenders Act, 1998 and The Tamil Nadu Transparency in Tender Rules, 2000 the Act and Rules shall prevail.

Construction of Common Testing Laboratory and Training Centre, including Compound Wall and Internal Road Works at TANSIDCO Pharma Industrial Park in Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District, T.N.

1. PREAMBLE

Micro, Small and Medium Enterprises (MSME) Department, Government of Tamil Nadu, under the Mega Cluster Development Scheme, through Tamil Nadu Small Industries Development Corporation (TANSIDCO), has established a Pharma Park with 46 industrial plots exclusively for Orange Category pharmaceutical formulation companies at TANSIDCO Pharma Industrial Park in Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District. 36 individual companies have been allotted plots in the Pharma Park to set up their formulation units.

The allottees of the Pharma Park have set up a Special Purpose Vehicle (SPV) in the name and style of "Tindivanam Pharma Park Association (TPPA)" which has all the member units as part of the SPV that would install, manage, and administer the common facilities in the Pharma Park.

One of the important common facilities to be set up in the Pharma Park is the Common Testing Laboratory i.e. Quality Control Laboratory and Training Centre, including compound wall and internal road works, hereinafter referred to as "QC Lab" in this tender document.

The QC Lab shall be designed as a two-storey (G+1) building and shall include necessary infrastructure such as internal roads and a compound wall. The facility will serve as a centralized hub for testing and training activities for the member units of the Pharma Park.

All member units of the park will have access to the QC Lab for their testing and training requirements. The internal infrastructure related to the QC Lab, such as Interior design, Lab Furniture, Lab Equipment, Electrical item & related items, is NOT part of this tender.

The QC Lab shall be constructed within the Pharma Park in a designated area (refer Exhibit - 2) and shall be self-contained with its own utilities, including but not limited to electrical power, water supply, and necessary civil infrastructure such as buildings, internal roads, and

a compound wall.

The detailed specifications for each of the disciplines are provided in Annexure-I & IA of this document.

2. SCOPE OF WORK

The scope of work would inter – alia involve the following

The scope of work includes the construction of a Ground Plus One (G+1) floor Common Testing Laboratory and Training Centre Building, complete with sanitary and plumbing installations, as well as the construction of a compound wall and internal road works. The overall site plan, detailed building drawings, and abstract of quantities are enclosed as Exhibit - 4.

The bidder should undertake the construction of the building as per the drawings and the Abstract. All the civil works should comply with standard specifications as given in Annexure – I.

3. QUALIFICATION CRITERIA

Clause	Qualification Criteria	Documentary proof to be uploaded
3(a)	The Bidder should be a Registered Legal Entity in India and should have been in existence for the past five years as on the last date of submission of the Bid.	i. In case of Private/Public Limited Companies • Copy of Incorporation certificate issued by Registrar of Companies • Copy of Memorandum and Articles of Association ii. In case of Partnership, • Registered Partnership deed iii. In case of Proprietorship, • Copy of GST Registration certificate
3(b)	The Bidder should have undertaken	The past experience of similar nature of

	and successfully completed similar works during the last five years ending previous day of last date of submission of tenders: a) One similar completed works, each costing not less than the amount equal to 80% of the estimated cost put to tender, or b) Two similar completed works, each costing not less than the amount equal to 60% of estimated cost put to tender, or c) Three similar completed works, each costing not less than the amount equal to 40% of the estimated cost. 'Similar Works" shall refer to a project involving the construction of an RCC framed structure building, encompassing finishing works, internal water supply, sanitary installations, firefighting, and HVAC systems, all executed under a single composite agreement. Such project shall pertain to any healthcare facilities, whether undertaken for government or private entities". Note: a) Godowns / Warehouses / Factory sheds shall not be	work should be supported by: • Work completion certificate issued by concerned organisations. • The completion certificate shall be supported with copies of Letter of award, Agreement, Bill of quantities. • The past experience of similar nature of work should be in the name of the bidder and not in the name of associate company / parent company / group company / subsidiary company etc. • Past experience as part of a Joint Venture / Consortium / SPV (Special Purpose Vehicles) etc shall also not be considered. Own works / works under the same management / own certification of the bidder shall not be considered for pre-qualification.

	considered as eligible similar works. b) Mumty and Machine room shall not be considered as eligible similar works.	
3(c)	The Bidder should have an average annual turnover of at least **Rs. 2.00 Crores** (excluding GST) in the last three financial years i.e., FY2022-23, FY2023-24 & FY2024-25.	• Audited Balance Sheet/ certified copies of Balance Sheet, Profit & Loss statement along with schedules for the FY2022-23, FY2023-24 & FY2024-25 duly certified by the practicing Chartered Accountant. • Details of the Annual Turnover as per Annexure- V.
3(d)	The Bidder should have a positive net worth as on March 31, 2025.	Net worth duly certified by Chartered Accountant along with UDIN as per Annexure – VI.
3(e)	The Bidder should not have been blacklisted by SIDCO or any other Government agency / Central and State Public Sector Organizations.	i. Declaration for not having been blacklisted either by any other Govt. agencies as per Annexure-VII. ii. Further, if the Bidder is found to be blacklisted in India before award of the contract by any Government Agency, the bid will be rejected.

4.	**ESTIMATED COST PUT TO TENDER**

Rs 3,25,00,000/- (Rupees Three Crores Twenty Five Lakhs only)

5.	**PERSON SIGNING THE BID**

The person signing the Tender document should be the duly authorized representative of the firm/ company, for which a certificate of authority should be submitted. The Power of Attorney /authority to the authorized signatory must be enclosed in detail.

6.	**LANGUAGE OF THE TENDER**

The Tender preparation as well as all correspondences and documents relating to the Tender, shall be in English language only. If the supporting documents are in a language other than English/Tamil, the notarized translated English version of the documents should also be enclosed. Bids received without such translation copy will be rejected.

7.	**PURCHASE / DOWNLOADING OF TENDER DOCUMENTS**

Tender Documents can be purchased on payment of Rs.17,700/- (Rupees Seventeen Thousand Seven Hundred only) including GST by Demand Draft in favour of Tindivanam Pharma Park Association payable at Chennai at Tindivanam Pharma Park Association, Block – D1, Baid Metha Complex, No.16, Anna Salai, Little Mount, Saidapet, Chennai from 08**.06.2025 To 26.06.2025 between 10:00 AM to 05:00 PM.**

Alternatively, the Tender Documents can be downloaded from either www.tppa.in, www.tansidco.tn.gov.in or www.itcot.com free of cost. For the downloaded Tender Document, the Bidder need not enclose the Tender Document cost but should give a declaration for not having tampered the Tender Document downloaded (as per Annexure - VIII)

Purchased Tender documents are not transferable and will be accepted only by the parties who have purchased the documents from TPPA. The TENDER document submissions without duly signed documents/ drawings are considered as invalid submissions.

8.	**PREBID MEETING**

a. There will be a pre-bid meeting on 20.06.2025 at 11.00 A.M in the office of Tindivanam Pharma Park Association at Block – D1, Baid Metha Complex, No.16, Anna Salai, Little Mount, Saidapet, Chennai during which the prospective Bidders can get clarifications about the tender.
b. The Bidders interested in attending the Pre-Bid meeting may send an email, indicating their willingness along with their representative details i.e., Name, Designation,

Phone Number & Email ID to officetppa@gmail.com at least one day prior to the Pre-Bid meeting date. The link for the video conferencing will be sent to the designated representative by E-mail.

9.	**SITE VISIT**

The site of the proposed development is located at TANSIDCO Pharma Industrial Park at Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District, Tamil Nadu and may be inspected by the Bidder or his / her representative at his / her own cost, with prior intimation to the authorized representative of TPPA through an email to officetppa@gmail.com. In case of any queries related to the site inspection, Bidders may contact Mr R Pradeep, Mobile No: +91 9003030898. The Bidder should refer to the Site Plan and Location Map enclosed with the Tender document. (Exhibit - 1).

10.	**CLARIFICATION ON THE TENDER DOCUMENT**

Any discrepancies, omissions, ambiguities or conflicts in the tender document or any doubts as to their meaning and any request for clarification may be sent in writing to "The Chairman, Tindivanam Pharma Park Association, Block-D1, Baid Metha Complex, No-16, Anna Salai, Little Mount, Saidapet, Chennai" or through e-mail to officetppa@gmail.com as per Annexure-IX. The Managing Director (MD), TPPA, will review the same and where the information sought is not clearly indicated or specified in the tender documents, will issue a clarifying bulletin to all those who have purchased the tender documents and will also upload such clarification on www.tppa.in, www.tansidco.tn.gov.in & www.itcot.com. The MD, TPPA will neither make nor be responsible for any oral instructions. Request for clarification should be brought to the notice of the MD, TPPA, in mail, before 48 hours of the opening of the tender.

11.	**AMENDMENT OF TENDER DOCUMENT**

TPPA, whether on its own initiative or because of a query, suggestion or comment of an Applicant or a Respondent, may modify the tender document by issuing an addendum or a corrigendum at any time before the opening of the tender. Any such addendum or corrigendum will be communicated through mail to all the Bidders who had purchased the

tender documents and will be uploaded in www.tppa.in, www.tansidco.tn.gov.in & www.itcot.com and the same will be binding on all Applicants or Bidders, as the case may be.

12.	**EARNEST MONEY DEPOSIT**

The Tender should be accompanied by an Earnest Money Deposit (EMD) to the value of Rs.3,50,000/- (Rupees Three Lakh and Fifty Thousand only), including GST, in the form of Demand Draft (DD) in favour of Tindivanam Pharma Park Association payable at Chennai. EMD should be in the name of the Bidder/ Firm. Bidders are to provide their GST Registration details.

a. EMD in any other form will not be accepted.

b. EMD will be retained in the case of the successful Bidder and will not earn any interest. It will be dealt with, as provided in the terms and conditions of the tender. The EMD will be returned to the unsuccessful Bidders.

c. Any request of the Bidder, under any circumstances, claiming exemption from payment of EMD will be rejected and their Cover II price offer will not be opened.

The amount remitted towards EMD is liable to be forfeited in case the Bidder fails to execute the contract or after acceptance of the offer by TPPA or fails to sign the contract or to remit the Performance Security within the stipulated time.

13.	**SUBMISSION OF TENDER UNDER TWO COVER SYSTEM**

Sealed Tenders should be addressed to The Managing Director, Tindivanam Pharma Park Association, Block – D1, Baid Mehta Complex, No.16, Anna Salai, Little Mount, Saidapet, Chennai, and superscribing the **Name of the Tender** on the top left-hand corner of the cover and the name of the Bidder on the bottom left-hand corner of the cover and should be submitted in physical form till 27.06.2025, 3.00 PM. **Tenders should be submitted in person only**.

The Tender will be Two Cover System,

A. Cover – I (Technical Bid)

Should consist of the Pre-qualification criteria, conditions of contract and technical specifications along with EMD. Technical bid should be submitted in the original.

The Cover – 1 should contain the above in sub-covers as listed below.

- **Sub Cover – 1** – EMD (Demand Draft in Original)
- **Sub Cover – 2** – Signed copy of the Tender Document with all annexures and supporting documents

a. All Tender drawings obtained from TPPA should be duly signed in original and affixed with the seal of the Bidder along with the submission of the Tender Documents.
b. Bidder should submit the required EMD in separate sealed envelopes duly superscribed on the Sub Cover – 1 of the Envelope viz. "EMD" along with Cover – 1. The Tenders received without EMD will be summarily rejected.
c. If the Technical bid shows any indication of the quoted price directly or indirectly, the bid will be rejected summarily.
d. If due to any exigency, the due date for submission and opening of tender is declared a closed holiday, in such a case, the tenders will be opened on the next working day at the same time or any other day/time as intimated by TPPA.

B. Cover – II (Price Bid)

The Price Bid shall comprise **Part A and Part B**, as described below

i. **Part A** shall include the detailed Bill of Quantities (BOQ) for the project, The bidder is required to quote the total value strictly in accordance with the format provided in **PRICE BID – PART A**. The quoted amount in Part A shall be considered for price bid evaluation and determination of the lowest bidder.
ii. **Part B** shall consist of item-wise rate quotations only, without total value summation.
iii. These rates are to be provided for specific items that may be required in the event of additional or unforeseen works arising during the execution of any part of the original project. Bidders are required to fill in all the necessary columns with applicable rates. In the event any column is left blank, the lowest item-wise Quantity Rate Only (QRO) quoted by any other bidder for that specific

item in Part B shall be deemed applicable. However, if a bidder fails to provide QRO rates for more than three items, the price bid shall be summarily rejected.

iv. The rate quoted in Part B shall not be considered for price bid evaluation but will be applicable for additional or unforeseen works as and when required during execution.

v. Price bid (Both Part A & Part B) should be submitted in the original. In case of any discrepancy between the price quoted in words and in figures, lowest of the two will be considered.

vi. The rate quoted by the bidder shall be kept firm for a period specified in the tender from the date of opening of the tender. The bidder should keep the Price firm during the entire period of Contract including extension of time if any. Escalation of rate will not be permitted during the said periods whether extended or not for reasons other than increase of taxes payable to the Governments in India within the stipulated delivery period.

The Cover – I and Cover – II should be kept together in a separate sealed cover superscripted as "Tender for Construction of Common Testing Laboratory and Training Centre including Compound Wall and Internal Road Works at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Villages, Tindivanam Taluk, Villupuram District" and addressed to **The Managing Director, Tindivanam Pharma Park Association, Block – D1, Baid Mehta Complex, No.16, Anna Salai, Little Mount, Saidapet, Chennai** with the name and address of the Bidder at the left side corner of the cover. Tender submitted with unsealed cover would be summarily rejected.

14.	**VALIDITY**

The prices quoted in the Tender should be valid for acceptance by TPPA for a minimum period of 120 days from the date of opening of the Tender. Escalation in the rates will not be entertained under any circumstances.

15.	**BID DUE DATE**

a. Bid and Enclosures of Bid should be submitted on or before the Bid Due Date i.e., 27.06.2025 till 3.00 PM in the manner and form as detailed in this Tender Document.

b. TPPA may, in its sole discretion, extend the Bid Due Date by issuing and addendum in accordance with Clause 11.

c. If due to any exigency, the due date for submission and opening of tender is declared a closed holiday, in such case the tenders will be opened on the next working day at the same time or any other day / time as intimated by TPPA.

16.	LATE BIDS

Bid received physically by TPPA after the specified time on the Bid Due Date will not be opened and will be summarily rejected.

17.	MODIFICATION / SUBSTITUTION / WITHDRAWAL OF BIDS

a. No Bid should be modified, substituted or withdrawn by the Bidder on or after the Bid Due Date & Time.
b. Any alteration / modification in the Bid or additional information supplied subsequent to the Bid Due Date, unless the same has been expressly sought for by TPPA, will be disregarded.

18.	REJECTION OF BIDS

a. Notwithstanding anything contained in this Tender Document, TPPA reserves the right to reject any Bid and to annul the Bidding Process and reject all Bids at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons, therefore. In the event that TPPA rejects or annuls all the Bids, it may, in its discretion, invite all eligible Bidders to submit fresh Bids hereunder.
b. TPPA reserves the right not to proceed with the Bidding Process at any time, without notice or liability, and to reject any Bid without assigning any reasons.

19.	OPENING AND EVALUATION OF THE TECHNICAL BID

The Tenders will be opened by the Managing Director, TPPA or by the persons/ committee authorized by him on 27.06.2025 at 3:30 PM.

Evaluation of Technical Bid would involve two stages as follows.

i. First Stage:

a. The Sub Cover - 1 containing the EMD. If EMD is not submitted or is deficient, TPPA will reject the Tender.

ii. Second Stage:

a. Evaluation will be done on the Technical Bid to assess whether the bid meets the qualification criteria stipulated in Clause – 3.

b. The committee reserves the right to disqualify any of the tender in case the Committee is not satisfied with the documents furnished, including the past performances.

c. Any adverse / not satisfactory remarks on the performance from the clients of previous suppliers will entail disqualification of the tender and price bids will not be opened.

d. The Bidders declared as technically qualified will be informed the date of opening of the Price bid through E-mail.

20.	**EVALUATION OF THE PRICE BID**

a. The Bidders declared technically qualified by the committee will be intimated with the date of opening of the price bid through E-mail.

b. The price bid will be evaluated in accordance with the Tamil Nadu Transparency in Tenders Act, 1998 read with the Tamil Nadu Transparency in Tenders Rules, 2000.

c. The evaluation of the price bid will be carried out as shown below.

PART – A – Rate quoted for Construction of Common Testing Laboratory and Training Centre including Compound Wall and Internal Road Works

d. The Bidder who has quoted the lowest price as clause 19 (c) will be adjudged L1.

e. The bidder who is determined to be L1 based on the evaluation of Part A of the Price Bid shall be required to match the lowest item-wise Quantity Rate Only (QRO) quoted

by any other bidder in Part B, in cases where the L1 bidder has quoted higher rates for the same items. This requirement shall apply exclusively to those Part B items that are necessitated and executed during the actual course of the project.

21.	CLARIFICATION ON THE PRICE BID

a. Information relating to the evaluation of bids and recommendation of Contract award, will not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to the successful Bidder.

b. Any attempt by a Bidder to influence TPPA in the evaluation of the bid or contract award decisions may result in the rejection of the Bid.

c. To assist in the examination, evaluation, and comparison of the Technical and Price bid, and qualification of the Bidders, TPPA may, as its discretion, ask any Bidder for a clarification of the bid, giving a reasonable time for a response. Any clarification submitted by a Bidder that is not in response to a request by TPPA will not be considered. TPPA's request for clarification and the response should be in writing. No change in the substance of the Technical bid or prices in the Price bid, including any voluntary increase or decrease in the prices, shall be sought, offered, or permitted.

d. If the Bidder does not provide clarifications of the bid by the date and time set in the TPPA's request for clarification, the bid may be rejected.

e. If a Technical bid is not substantially responsive to the requirements of the Tender Documents, it will be rejected by TPPA and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

22.	AWARD OF CONTRACT

a. The Bidder (L1) will be invited for price negotiations for further reduction of the rate.

b. Upon finalization of the negotiated rate, TPPA will issue the Letter of Award (LoA) to the successful Bidder.

23.	**PERFORMANCE SECURITY**

a. At the time of signing of the Contract, the successful Bidder should furnish the Performance Security in accordance with the Conditions of the Contract, to ensure due performance of the contract. Performance Security is to be given in the form of Demand Draft/ Bank Guarantee from any Nationalized Bank /Scheduled Bank in favor of TPPA by the successful Bidder.

b. Performance Security shall be 5% of the work order value (inclusive of GST) minus EMD already remitted along with the Tender, in the form of a Demand Draft/ Bank Guarantee with a valid period of 18 months in favour of TPPA payable at Chennai in the name of the Bidder/ Firm from any Nationalized Bank / Scheduled Bank to be given within 15 days from the date of issue of work order before execution of the contract.

c. 100% of Performance Security will be released upon the expiry of the defect liability period as per Clause 27.

d. TPPA will en-cash the Performance Security as compensation for any loss resulting from the Contractor's failure to complete his / her obligations under the Contract

24.	**SIGNING OF CONTRACT**

a. The successful Bidder should execute the contract as may be drawn up to suit the conditions on a non-judicial stamp paper of value, as prescribed in law, and shall pay for all stamps and legal expenses incidental thereto. In the event of failure to execute the contract, within the time prescribed, the Performance Security/EMD amount remitted by the Bidder will be forfeited besides cancellation of the Tender.

b. If the contract is not executed as per the agreed terms and conditions, TPPA will hold full authority to cancel the tender or take any such action that will be deemed fit to the occasion at the risk and cost of the successful Bidder. Such cancellation will entail the forfeiture of Performance Security/EMD.

c. In the event of non-performance of the contractual provisions and if the selected Bidder

has not fulfilled the contractual obligation with TPPA in any manner during the currency of the contract or also found on a later date, TPPA reserves the right to disqualify such Bidder from participating in future tenders or blacklist the Bidder up to a maximum period of 3 years.

25.	**RETENTION MONEY**

Retention Money will be 5% against each Running Account bill. The same will be released upon completion & handing over of all the Final Running Account bill works certified by TPPA / Consultants appointed by TPPA.

26.	**ISSUE OF WORK ORDER**

After payment of the Performance Security and successful execution of the contract, the work order will be issued by TPPA. The Bidder should complete the works as per the schedule given in Clause 28.

27.	**DEFECT LIABILITY PERIOD AND ITS RECTIFICATIONS**

a. Defect Liability period will be twelve months from the date of the completion and handing over of works. Any defect arising in the work during the set period due to faulty workmanship and faulty materials should be rectified by the contractor at his / her own cost.

b. If the contractor has not corrected a Defect pertaining to the Defect Liability Period to the satisfaction of the Engineer–in-charge of TPPA, within the time specified by the Engineer-in-charge, the Engineer-in-charge will assess the cost of having the Defect corrected, and the cost of correction of the Defect shall be recovered from the Performance Security or any amount due or that may become due to the contractor and other available securities.

28.	**TIMELINE**

a. Construction of Common Testing Laboratory and Training Centre including Compound Wall and Internal Road Works should be completed and handed over to TPPA in 6 months and the schedule is given below:

S. No	Description	Timeline
1.	Commencement of work	T
2.	Completion of 30% of the Work	T + 2 months
3.	Completion of 60% of the Work	T + 4 months
4.	Completion of 100% of the Work	T + 6 months

b. If the contract is not completed within the stipulated time or extended time, TPPA will hold full authority to cancel the tender or take any such action that will be deemed fit to the occasion at the risk and cost of the successful Bidder. Such cancellation will entail forfeiture of Performance Security.

29. FORCE MAJEURE

a. The Bidder shall not be liable for penalty or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

b. For purposes of this clause, "Force Majeure" means an event beyond the control of the Bidder and not involving the Bidder/ fault or negligence, and not foreseeable. Such events may include, but are not restricted to, acts of the TPPA in its capacity as a buyer, wars or revolutions, terrorist attacks, fires, floods, epidemics, quarantine restrictions and freight embargoes.

c. If a Force Majeure situation arises, the Bidder shall promptly notify the TPPA in writing of such condition and the cause thereof. Unless otherwise directed by the TPPA in writing, the contractor shall continue to perform its obligations under the Contract as far as is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

30. MOBILIZATION ADVANCE

No Mobilization advance will be provided for this project.

31. PAYMENT TERMS

The payments will be made only after receipt of approval from TPPA / Consultant appointed by TPPA.

i. The payment will be made once in a month provided the bill value is minimum Rs

50.00 lakhs.

ii. The Running Account (RA) Bill must be certified by TPPA or their appointed Project Management Consultant (PMC) prior to payment release.

iii. Payments will be made via RTGS/NEFT/Cheque in Favor of the contractor, subject to approval from TPPA or their appointed consultant.

iv. TPPA reserves the right to recover any dues identified during audit or excess payments after final settlement, and the contractor shall repay such dues immediately upon demand without dispute or protest.

32.	**PRICE ESCALATION**

Price Escalation is not applicable.

33.	**PENALTY FOR DEFECTIVE CONSTRUCTION**

If TPPA / Consultant appointed by TPPA notice any defect in the construction of any portion of work / component, TPPA will levy penalty up to 10% of the total value of the defective work as assessed by TPPA, in addition to the rectification of works at his / her cost.

34.	**PENALTY FOR DELAY IN COMPLETION**

Failure to complete the contract within the stipulated period attracts a penalty at a rate of 0.5% of the contract value per week or part thereof subject to a maximum of 5% on the full contract value. Delay on the part of TPPA should be intimated and sorted out immediately without affecting the progress of works by all means. The penalty levied on the Contractor is however subject to modification at the discretion of TPPA for valid reasons, which are to be recorded.

35.	**TERMINATION OF CONTRACT**

TPPA reserves the right to terminate the contract at any time during the validity period on account of non-fulfillment of the contract or any of the reasons.

36.	**TENDER CONDITIONS**

a. TPPA reserves the right to relax or waive or amend any of the tender conditions.

b. Any notice regarding any problems to the Bidder should deemed to be sufficiently served, if given in writing at his / her usual or last known place of business.

c. During discussion and instruction, TPPA may disclose information of confidential and proprietary nature relating to its know-how, operations, etc. to the Bidder. Such information will be considered confidential.

d. After acceptance of the tender by TPPA, the Bidder will have no right to withdraw his / her tender.

e. The contractor, who is engaging laborers for the work, is solely responsible for any untoward occurrences to the laborer's while carrying out the work and any payment of compensation to such laborers. The contractor should abide by all Government Orders issued from time to time in respect of labour regulations.

f. The project site shall be handed over to the Contractor upon execution of the Contract Agreement. All statutory approvals related to the work, including DTCP approval and other necessary clearances, shall be the responsibility of TPPA

g. The Contractor should make its own arrangements for the labour accommodation.

h. Any notice regarding any problems, to the Bidder shall be deemed to be sufficiently served, if given in writing at his usual or last known place of business.

37.	**FRAUD AND CORRUPT PRACTICES**

The Bidders and their respective officers, employees, agents and advisers should observe the highest standard of ethics during the Bidding Process and after the issue of the LoA and during the subsistence of the Contract. Notwithstanding anything to the contrary contained herein, or in the LoA or the Contract, TPPA may reject a Bid, withdraw the LoA, or terminate the Contract, as the case may be, without being liable in any manner whatsoever to the Bidder, if it determines that the Bidder, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice in the Bidding Process. In such an event, TPPA shall be entitled to forfeit and appropriate the Performance Security, as the case may

be, as Damages, without prejudice to any other right or remedy that may be available to TPPA under the Bidding Documents and/ or the Contract, or otherwise.

Without prejudice to the rights of TPPA under Clause (37) hereinabove and the rights and remedies which TPPA may have under the LoA or the Contract, or otherwise if a Bidder or Contractor, as the case may be, is found by TPPA to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Bidding Process, or after the issue of the LoA or the execution of the Contract, such Bidder shall not be eligible to participate in any tender or RFP called for by TPPA for a period of 2 (two) years from the date such Bidder, or Contractor, as the case may be, is found by TPPA to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practices, as the case may be.

For the purposes of this Clause (37), the following terms shall have the meaning hereinafter respectively assigned to them:

a. **"corrupt practice"** means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of TPPA who is or has been associated in any manner, directly or indirectly, with the Bidding Process or the LoA or has dealt with matters concerning the Contract or arising therefore, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of TPPA, shall be deemed to constitute influencing the actions of a person connected with the Bidding Process), engaging in any manner whatsoever, whether during the Bidding Process or after the issue of the LoA or after the execution of the Contract, as the case may be, any person in respect of any matter relating to the work or the LoA or the Contract, who at any time has been or is a legal, financial or technical adviser of TPPA in relation to any matter concerning the work;
b. **"Fraudulent practice"** means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the

Bidding Process.

c. **"Coercive practice"** means impairing or harming, or threatening to impair or harm, directly or indirectly, any person or property to influence any person's participation or action in the Bidding Process.

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

e. **"Restrictive practice"** means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Bidding Process.

38.	**ARBITRATION**

a. In case of any dispute in the bid, including interpretation if any on the clauses of the bid or the contract to be executed, the matter, if not resolved through amicable settlement, shall be referred to arbitration by an arbitral tribunal constituted in accordance with Clause 38(b). Such arbitration shall be proceeded as per the provisions of the Arbitration and Conciliation Act, 1996 or under any statute in force at that point of time.

b. There shall be an arbitral tribunal comprising three arbitrators, of whom each Party shall select one, and the third arbitrator shall be appointed by the two arbitrators so selected and in the event of disagreement between the two arbitrators, the appointment shall be made in accordance with the Rules.

c. The venue of the Arbitration shall be at the registered office of TPPA in Chennai. The decision of the Arbitrator shall be final and binding on both the parties to the Arbitration.

d. The Arbitrator may with the mutual consent of the parties, extend the time for making the award. The award to be passed by the Arbitrator is enforceable in the court at Chennai city only.

39.	**JURISDICTION OF THE COURT**

Any dispute arising out of non-fulfilment of any of the terms and conditions of this Tender / Contract or any other dispute arising out of the arbitration award will be subject to the jurisdiction of the Courts in the City of Chennai only.

We agree to the above terms and conditions.

SIGNATURE OF THE BIDDER:
(WITH SEAL)
DATE:

NAME IN BLOCK LETTERS:

DESIGNATION:

ADDRESS:

Annexure - I

TECHNICAL SPECIFICATIONS

CIVIL

1 ORDER OF PRECEDENCE OF SPECIFICATIONS

The order of precedence in referring to various specifications are as follows in ascending order

a. Technical specification of the Contract
b. Indian Standard specifications
c. PWD of Tamil Nadu state /TNBP
d. CPWD
e. Manufacturers recommendations

The Contractor shall also not be paid for any extra working space beyond concrete dimensions during excavation of foundations of various proposed structures in the Project. Any damage done to the work due to the contractor's operation beyond the excavation lines shall be repaired at the expense of the contractor. Any and all excess excavation or over breaking performed by the contractor for any purpose or reason except as may be ordered in writing by the TPPA /PMC and whether or not due to the fault of the contractor shall be at the expense of the contractor. Cost of refilling for all such excavation with materials as specified by the TPPA /PMC has to be done by the contractor at his expense.

2 GENERAL

The scope of work shall comprise of (but not limited to) supply, construction, installation, testing, commissioning and approvals from TPPA /PMC statutory authorities for all works described in the tender. Complete scope of works should be read in conjunction with all documents and drawings which are the part of tender. The drawings and documents attached in the tender document are for reference only.

All materials shall conform to the latest edition of the Indian Standard Specifications. Standards issued elsewhere may be used only if approved by the TPPA /PMC and for those materials only for which appropriate Indian Standards do not exist.

If specification for any material/work is not available in these Technical Specifications, the material/work shall conform to the latest Specifications, with

up to date correction slips, amendments and additions / IS CODES / Manufacturers specifications / as per drawings / as per instructions of TPPA /PMC.

The work shall be carried out according to the design, drawings and specifications issued by TPPA /PMC as "Good for Construction" drawings from time to time during execution stage and approved by TPPA /PMC.

All equipment and components shall be accommodated within the locations, space and dimensions indicated in the Architectural drawings. Any changes required shall be suggested by the Contractor and submitted for approval of TPPA. No changes shall be done without the approval of TPPA /PMC.

All sections of Tender documents and Tender drawings shall complement each other. Any discrepancy between various documents shall be studied and implemented as best for the project and as per decision of TPPA /PMC, without any cost implication.

If there is any variation in Design and Specifications between tender documents/drawings and any of the statutory/standard's requirement, then higher standard of specifications from either of them shall be implemented in approval with TPPA /PMC. Nothing extra shall be payable on any account.

It shall be responsibility of the Contractor to ensure that all works are carried out in full compliance with the TPPA's requirements, System Requirements. This Specification gives the project specific special requirements for the Construction of Commercial Building, Chennai herein after referred to as the Works, except where otherwise modified or amended within the Contract. Reference must be made to the General Specification for general requirements and to the appropriate Technical Specification for the corresponding technical requirements of all work.

The Specifications listed below have been added for guidance of the TPPA /PMC responsible for carrying out the Works who shall however ensure that all aspects of the construction of the Works shall comply with Local Standards, Laws and Regulations and accepted good practice in India.

Contractor's Responsibility

Apart from carrying out necessary surveying and setting out of the buildings and equipment foundations wherever required collecting all materials, equipment,

plant, labour, consumables, tools and services necessary for proper execution, fabrication, ensuring quality control by conducting required tests at the appropriate time and intervals during the execution, disposal of excavated material as instructed, carrying out all associated works like removal, disposal of the debris, getting out, remove temporary facilities on completion of the works, clearance from local bodies / authorities for commissioning of all installation / equipment of the project work shall be obtained and furnished before taking over of the completed work, all within the quoted rates only. Machinery operators, drivers should have valid license.

Child labours are strictly prohibited. Top most attention shall be paid to the Health, safety of workers and Environment and the same shall be monitored on daily basis by qualified and experienced personnel in HSE

A. TECHNICAL SPECIFICATIONS – CIVIL WORK

1 EARTHWORK IN GARDING, EXCAVATION AND BACKFILLING

2 DEWATERING

3 REINFORCED CONCRETE

4 TERMITE PRE CONSTRUCTIONAL CHEMICAL TREATMENT IN BUILDINGS

5 WATERPROOFING

6 GENERAL BUILDING WORKS

7 PAINTINGS

1 EARTHWORK IN GRADING, EXCAVATION AND BACKFILLING SCOPE

This specification covers the general requirements of site grading, excavation in all type of strata (soil and rock) and mass/back filling around foundations & in plinths as per good for construction drawings. Handling surplus materials either by stacking or disposing it, to meet all the operations requirement mention within the intent and purpose of this specification and/or as per the direction of the TPPA/PMC.

1.1 APPLICABLE CODES

The following minimum codes and standards, unless otherwise specified herein, shall be applicable. In all cases, the latest revisions of the codes on the date of signing of contract agreement shall be referred to.

If any BS code mentioned below is replaced by Euro code, the CONTRACTOR shall follow corresponding Euro code with approval of TPPA/PMC. Contractor shall adopt and follow all applicable codes and standards for satisfactory completion of the work with approval of TPPA/PMC.

The codes and standards mentioned in the various specifications and requirements specified in the enquiry document shall be latest as on the day of execution of the works unless otherwise specified. The revisions in the relevant codes and standards after the date of award of contract shall be informed by the Contractor to the TPPA/PMC within 30 days of the issue of such revision of the code/ standard. TPPA/PMC may approve use of the earlier code/ standard if the revisions do not materially affect the statutory requirements of the project or does not impact safety practices. Any cost impact arising out of such revisions shall be mutually agreed.

S. No	Standard	Title
1	ASTM C40	Test Method for Organic Impurities in Fine Aggregates
2	ASTM C136	Test Method for Sieve Analysis for Fine and Coarse Aggregate
3	ASTM D422	Standard Test Method for Particle-Size Analysis of Soils
4	ASTM D698	Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)

S. No	Standard	Title
5	ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
6	ASTM D1557	Standard Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lb/ft3 (2700 kNm/m3))
7	ASTM D2487	Practice for Classification of Soils for TPPA/PMC Purposes (Unified Soil Classification System)
8	ASTM D2488	Practice for Description and Identification of Soils (Visual-Manual Procedure)
9	ASTM D3017	Test Method for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
10	ASTM D3080	Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
11	ASTM D4253	Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
12	ASTM D4254	Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
13	ASTM D4318	Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
14	ASTM D4718	Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
15	ASTM D4767	Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils.
16	ASTM D5030	Test Method for Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit
17	ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
18	BS EN 1997	Euro code 7 – Geotechnical Design
19	BS 812	Code of Practice for Testing Aggregates
20	BS 1377	Methods of Test for Soils for Civil TPPA/PMC Purposes
21	BS 1427	Guide to Field and On-Site Test Methods for the Analysis of Waters
22	BS 5930	Code of Practice for Site Investigations
23	BS 6031	Code of Practice for Earthworks
24	EN 933-1	Tests for geometrical properties of aggregates- Part 1: Determination of particle size distribution- Sieving method

S. No	Standard	Title
25	EN-ISO 17892-1	Geotechnical investigation & testing- Laboratory testing of soil-Part 1: Determination of water content
26	EN-ISO 17892-2	Geotechnical investigation & testing- Laboratory testing of soil-Part 2: Determination of bulk density
27	EN-ISO 17892-3	Geotechnical investigation & testing- Laboratory testing of soil-Part 3: Determination of particle density
28	EN-ISO 17892-4	Geotechnical investigation & testing- Laboratory testing of soil-Part 4: Determination of particle size distribution
29	EN-ISO 17892-5	Geotechnical investigation & testing- Laboratory testing of soil- Part 5: Incremental Loading Oedometer Test

1.2 DRAWINGS

The CONTRACTOR shall furnish good for construction drawings to the TPPA/PMC for review and approval as applicable. Such drawings shall indicate areas to be excavated/ filled, grade levels, areas demarcated for stacking of excavated material etc. The contractor shall follow strictly such drawings and instruction given by the TPPA/PMC.

1.3 GENERAL

- The contractor shall visit site to understand the site condition and make his own assessment about sub-soil strata and water level likely to be encountered during the execution.

- The CONTRACTOR shall obtain written approval from the TPPA/PMC on the execution method statement. Execution method statement prepared by contractor shall indicate the detailed sequential execution plan covering manpower & machinery, safety aspects, time duration etc. based on the project requirement. Contractor's execution methodology will include detailed calculation related to:

    a) Slope stability and or shoring by using parameters related to proposed site, if it is in contractor's scope otherwise the excavation

drawing shall be followed.

b) Dewatering.

- However, the approval of construction methodology shall not in any way relieve the contractor of his responsibility for any consequent loss or damage. In case the project is expected to involve blasting contractor will carry-out conditional survey of nearby properties to record it as a baseline prior to commencement of the excavation activities.
- The contractor in accordance with the specification and project requirements shall mobilize all necessary tools, plants, qualified supervisory personnel, labour, instruments, materials (consumables and non-consumable) required for any temporary/permanent works etc., or any such items not specifically stated herein for completion of the job.
- The CONTRACTOR shall carry out the detailed site survey prior to commencement of the site work and shall mark all footprints within + 10mm tolerance and record existing ground levels with respect to established reference/ grid lines at 10 m intervals or nearer or as determined by the TPPA/PMC based on ground profile. Initially ground levels, finish ground level, depth of excavation etc., at every intermediate and final stages shall be confirmed with TPPA/PMC and thereafter properly recorded.
- The excavation shall be done to correct lines and levels within + 10mm tolerance. This shall also include, where required, proper shoring to maintain excavations.
- Temporary fences, guardrails, barricades, lights, and other protective measures around the excavation area required for the safety of personnel shall be provided and maintained in good condition.
- The price quoted by CONTRACTOR shall also include for dumping of excavated materials in segregated manner within the areas demarcated, in regular heaps, bunds, riprap with regular slopes as directed by the TPPA/PMC and levelling the same so as to provide natural drainage. Rock/ soil excavated shall be stacked properly as directed by the TPPA/PMC. As a rule, all softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and the top. Expansive or organic soil, if encountered shall be stacked separately and shall not be used in any

case for site grading activities. The surplus excavated earth shall be disposed by the CONTRACTOR at a designated location by the local authorities or as directed by TPPA/PMC.

- Known contaminated soils and water if any, shall be managed in accordance with approved soil management plan.
- Soil erosion /sediment control shall be implemented in accordance with local authority regulations or approved erosion/sediment control measures.
- Drainage of cuts, excavations, fills, stockpiles, spoil areas, surcharge embankments, and borrow areas shall be maintained at all times to prevent ponding of surface water because of ground water or rainfall by providing temporary ditches, swales, or pumping systems as required in each respective site area. Contractor shall submit management plan for this water along with work method statement.
- Quality control and Quality Assurance
    1. A written Quality Control Program document that provides details of how compliance with the requirements of this specification and contract documents shall be achieved and submitted by contractor to purchaser for approval a minimum of 14 days before start of construction.
    2. Certified laboratory test data for the materials and products to be used in the work shall be submitted to purchaser for approval a minimum of 14 days before shipping of materials and products.
    3. Results of the quality control tests required during the performance of the work shall be submitted to TPPA/PMC within 2 days of completion.
    4. An independent testing/inspection firm (see Section 4.13.1), shall provide the following submittals to purchaser and contractor:
- A statement attesting that contractor's work is in accordance with the requirements of this specification and the contract documents.
- Informal daily "pass" or "fail" reports.
- Formal weekly reports including all test logs and comments. These formal reports shall include density and moisture content test logs, indicating location of tests by coordinates and elevation and all appropriate comments.

- Upon earthwork completion, all density and moisture content test logs and comments compiled and submitted for permanent project records.
- Sources and test results of all borrow materials used for fill.
- Unless otherwise specified in the contract documents, a qualified independent inspection and testing agency will be retained by purchaser to perform field and laboratory testing and/or evaluations in accordance with the criteria of ASTM D3740 to verify compliance of the work with the requirements of this specification and to ensure the achievement of the intents and purposes of the work.
- The performance or lack of performance of the tests and inspections by purchaser's inspector shall not be construed as granting relief from the requirements of this specification or the other contract documents.
- During construction, purchaser shall have access to all contractor's facilities and records for the purpose of conducting performance inspection/audits.
- During an audit by purchaser, all inspection and test reports, and/or TPPA/PMC analyses and calculations associated with the scope of work shall be provided to purchaser upon request

1.4 CLASSIFICATION

All materials to be excavated shall be classified by the TPPA/PMC, into one of the following classes. The decision of the TPPA/PMC regarding the classification of the material shall be final and binding on the CONTRACTOR and not be a subject matter of any appeal or arbitration. Earthwork will be classified under any of the following categories: Ordinary and Hard Soils

These shall include all kinds of soils containing sand, silt, shingle, gravel, clay, loam, peat, ash, shale, etc., which can be easily excavated either manually or mechanically and which is not classified under "Soft and Decomposed Rock" and "Hard Rock" defined below. This shall also include embedded rock boulders not longer than 1 metre in any one direction and not more than 200 mm in any one of the other two directions.

(a) Soft and Decomposed Rock

This shall include completely to highly weathered/fractured rock, boulders, slag, chalk, slate, hard mica schist, laterite and all other materials, which in the opinion of TPPA/PMC is soft rock, difficult to excavate manually with a pick axe or required very light mechanical excavating machines, but does not need blasting. The mere fact that the CONTRACTOR resorts to blasting without prior approval from local authorities or TPPA/PMC, shall not qualify for classification under 'Hard Rock'.

This shall also include excavation in macadam & tar roads and pavements, rock boulders not longer than 1 metre in any direction and not more than 500 mm in any one of the other two directions.

(b) Hard Rock

This shall include all rock occurring in large continuous masses, which can only be excavated by blasting or by Pneumatic hydraulic breakers. Harder varieties of rock with or without veins and secondary minerals, which in the opinion of the TPPA/PMC require blasting, shall be considered as hard rock.

Where hard rock is met with and blasting operations are not permitted, the CONTRACTOR shall use other methods such as use of chemicals or Pneumatic hydraulic breakers or any other method approved by the TPPA/PMC for loosening the rock mass, developing cracks, etc. The loosened material shall be thereafter removed mechanically. Boulders of rock occurring in such sizes and not classified under (a) and (b) above shall also be classified as hard rock. Buried concrete work both reinforced and unreinforced to be dismantled will be measured under this item, unless a separate provision is made in the tender.

1.5 EXCAVATION

- Contractor shall obtain written permission from intra departmental heads prior to commencement of work to ensure that there is no presence of underground utilities in the proposed excavation area.
- All the required work permits shall be obtained by CONRACTOR from the
- TPPA/PMC / LOCAL AUTHORITIES / GOVERNMENT AGENCY, as
- applicable.

- In case of existence of underground utilities, the same shall be diverted away from the excavation area in consultation with the TPPA/PMC. Payment of Diversion of utilities shall made as per the item specified in the tender and if there is no provision in the tender than the same shall be executed based on the mutually agreed terms with the TPPA/PMC.
- Excavation for permanent work shall be carried out as per the approved drawings. In area involving mass excavation, initially area shall be excavated up to a depth 150 mm above the final level. The balance depth shall be excavated with special care just prior (not more than 12 hours before) the laying of P.C.C. Soft pockets, if any, shall be removed even by excavating below the final level and extra excavation shall be filled up using plum concrete or plain cement concrete as directed by the TPPA/PMC.
- All excavation shall be done to the minimum dimensions as required for safety and working facility. The excavation must be carried out in the most expeditious and efficient manner. Where the nature of soil or the depth of the trench and season of the year do not permit vertical sides, the CONTRACTOR shall erect the necessary shoring, strutting and planking or cut slopes with or without steps, to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the TPPA/PMC. The scheme proposed by the CONTRACTOR shall take into consideration the presence of existing buildings/ structures/traffic movement in the vicinity, if any. All necessary precautions shall be taken to avoid slipping of loose soil / rock.
- In case of deep excavation in rocky strata the fractured excavated rock sides shall be stabilised by using rock anchors.
- The CONTRACTOR shall make all necessary pumping arrangements for dewatering the low lying area or area where excavation is required to carry out below ground water table. CONTRACTOR shall keep area under execution to be workable. The low lying areas may receive water from any source such as rains, accumulated rainwater, floods, leakages from sewer and water mains, water ingress from near-by canals / channels, subsoil water table being high or due to any other cause whatsoever.
- In case of deep excavation in the area of high water table special

precautions shall be taken to main water table level at least 500 mm below the layer of blinding concrete (Plain Cement Concrete (PCC) level to avoid uplift/damage of building basement raft/foundation due to water pressure. The water table shall not be allowed to rise above base of raft/foundation level until the structure attains adequate height required to counterbalance the uplift pressure.

- The CONTRACTOR shall take all necessary precautions for the safety of traffic during construction and provide, erect and maintain such barricades including signs, markings, flags, lights and flagman, as necessary at either end of the excavation/ embankment and at such intermediate points as directed by the TPPA/PMC for the proper identification of construction area. He shall be responsible for all damages and accidents caused due to negligence on his part.

1.6 STRIPPING IN LOOSE ROCK

- All loose boulders, semi-detached rocks (along with earthy stuff, which might move therewith) which is not directly in the excavation but so close to the area to be excavated, and in the opinion of the TPPA/PMC liable to fall or otherwise endanger the workmen, equipment, or the work, etc., shall be stripped off and removed away from the area of the excavation. The method used shall be such as not to shatter or render unstable or unsafe the portion, which is originally sound and safe.
- Any material not requiring removal as contemplated in the work, but which, in the opinion of the TPPA/PMC, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed as directed by the TPPA/PMC.

1.7 EXCAVATION IN HARD ROCK

- After removal of overburden, if any, excavation is likely to continue in rock to adequate depths and area of excavation footprint shown in the drawings and if the site condition permits to excavate rock by using blasting, then as far as possible, all blasting operations shall be completed prior to commencement of other construction activities. At all stages of

excavations, precaution shall be taken to preserve the rock below and beyond the lines specified for the excavation, in the soundest possible condition by adopting technique like pre-shearing method etc., for creating excavation boundary. The quantity and strength of explosives shall be designed in such a way that it will neither damage nor crack the rock outside the limits of excavation.

- All precautions shall be taken by the contractor during the blasting operations so that no damage is caused to adjoining buildings or structures as a result of blasting operations. In case of any damage to permanent or temporary structures, CONTRACTOR shall repair the same to the satisfaction of TPPA/PMC at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.
- Specific permission of TPPA/PMC shall be taken by CONTRACTOR for blasting rock and he shall also obtain a valid Blasting License from the authorities concerned. If permission for blasting is refused by either by TPPA/PMC or by local authority, the rock shall be removed by wedging, pick, barring, heating and quenching, pneumatic hydraulic breakers etc., or other approved methods including chemicals required if any. All loose or loosened rock in the sides shall be removed by barring, wedging, etc. and if any unstable wedges of rock mass from sides of excavated surface shall be stabilised by providing temporary rock bolts. The price quoted by contractor for excavation in hard rock shall include the cost of all these operations. Safety net shall be used to arrest the movement of fractured rocks as a safety precaution for the workers working inside the pit.
- CONTRACTOR shall obtain necessary license or permit from the authorities dealing with explosives, for storage of explosives, fuses and detonators issued to him from TPPA's stores or from supplier arranged by him. The fees, if any, required for obtaining such license, shall be borne by CONTRACTOR. CONTRACTOR shall have to make necessary storage facilities for the explosives, etc. as per rules of local statutory regulations. Explosives shall be kept dry and shall not be exposed to direct rays of sun or not to be stored in the vicinity of fire, stoves, steam pipes or heated metal, etc. No

explosives shall be brought near the work in excess of quantity required for a particular amount of firing to be done; and surplus left after filling the holes shall be removed to the magazine. TPPA/PMC's prior approval shall be taken for the location proposed for the magazine.

- In no case shall blasting be allowed closer than 30 metres from any structure or at locations where concrete has just been placed. In the latter case, the concrete must be at least 7 days old.

1.8 SPECIFIC REQUIREMENTS FOR BLASTING

- CONTRACTOR shall employ a competent, experienced supervisor and licensed blaster in-charge of each set of operation, who shall be held personally responsible to ensure that all safety regulations are followed during the blasting work.
- Before any blasting is carried out, CONTRACTOR shall intimate TPPA/PMC and obtain his approval in writing along with required permission from regulatory authorities for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
- CONTRACTOR shall ensure that all workmen and the personnel at site are vacated from an area, at least 15 minutes before firing time by sounding warning siren or PA system or whistle. The area shall also be given a warning by sounding a distinguishing siren or whistle.
- The blasting of rock near any existing buildings, equipment or any other property shall be done under cover and CONTRACTOR has to make all such necessary muffling arrangements. Covering may preferably be done with small charges only and where directed by TPPA/PMC; a trench shall have to be cut by chiselling prior to the blasting operation, separating the area under blasting from the existing structures. In no case contractor shall be allowed exceed the Peak particle velocity (PPV) near all the structures above 25mm/sec or as specified by the project/local authorities. Contractor shall put the sensor-based equipment in the vicinity of all the adjourning structures to measure PPV.
- The firing shall be supervised by a Supervisor and not more than 6 (six) holes

at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along the misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.

- A wooden tamping rod with a flat end shall be used to push cartridges inside the charge hole. A metal rod or hammer shall not be permitted to push the cartridge. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth, the balance of the hole shall be filled with stemming which may consist of sand or stone dust or similar inert material.
- CONTRACTOR shall preferably detonate the explosives electrically.
- The explosives shall be exploded by means of a primer, which shall be fired by detonating a Fuse Instantaneous Detonator (FID) or other approved cables. The detonators with FID shall be connected by special nippers.
- In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatine with detonator or equivalent and fuse wire may be used. Underwater or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
- Holes for charging explosives shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level. Any rock excavation /overcuts beyond the required level shall be filled up with concrete having cylinder strength not less than 12MPa at 28 days. The cost of filling such excess depth shall be borne by CONTRACTOR and the excavation carried out beyond the limit specified will not be paid for. Stopping in rock excavation shall be done by hand trimming.
- CONTRACTOR shall be responsible for any accident to workmen, public or TPPA's property due to blasting operations. CONTRACTOR shall also be responsible for strict observance of rules, laid by Inspector of explosives, or

any other Authority duly constituted under the local government

FILL MATERIAL FOR BACK FILLING AND SITE GRADING

All fill material will be subject to the TPPA/PMC s approval. If any material is rejected by the TPPA/PMC, the CONTRACTOR shall remove the same forth with from the site at no extra cost to the TPPA. Surplus fill material shall be deposited/ disposed as directed by the TPPA/PMC after the fill work is completed. No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with as directed by the TPPA/PMC.

EXCAVATED SOIL

To the extent available, selected surplus soils from excavated materials shall be used as backfill subject to the approval based on the below test results. Contractor shall categorise the surplus excavated material and stack separately. Fill material shall be free from clods, salts, sulphates, organic or other foreign material and non-expansive in nature. All clods of earth shall be broken or removed. The CONTACTOR shall arrange to carry out the minimum following tests on selected soil samples from excavated material in an accredited geotechnical laboratory.

a) Grain size analysis
b) Moisture content
c) In-situ density
d) Specific gravity
e) Liquid limit and plastic limit
f) Standard/Modified proctor density (based on project requirement) or relative density (in case of sandy strata)
g) Free swell Index and Swelling pressure.
h) Tri- axial test / direct shear test under undrained and unconsolidated condition.

1.9 BORROWED MATERIAL:

If any selected fill material is required to be borrowed, it shall be CONTRACTOR'S responsibility to locate suitable borrow areas for borrowing fill material, the CONTRACTOR shall make arrangements for bringing such material from outside borrow pits. The material and source shall be subject to prior approval of the TPPA/PMC The approved borrow pit area shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Topsoil containing salts/ sulphates and other foreign material shall be removed. The CONTRACTOR shall arrange to have trial pits of specified dimensions and numbers dug at locations specified, for the TPPA/PMC to examine the nature and type of material to be obtained from the borrow area. Any material rejected by the TPPA/PMC shall be removed from the site immediately. The CONTRACTOR shall make necessary access road to the borrow areas and maintain the same, if such access road does not exist. CONTRACTOR shall obtain all necessary permits from local authorities. The properties of borrow material shall meet following requirements.

SL.No	Properties	Range of Values
1	**Field Characteristics**	
1.1	Bulk Density (γbulk)	1.8 to 2.1 gm/cc
1.2	Dry density (γdry)	1.3 to 1.6 gm/cc
1.3	Moisture content	34 to 36 %
1.4	Modified Proctor Density	More than 1.8 gm/cc
2	**Physical Properties**	
2.1	Specific gravity	2.65 to 2.85
3	**Index properties**	
3.1	Liquid limit (%)	40 to 65%
3.2	Plastic Limit (%)	20 to 25 %
3.3	Shrinkage limit (%)	15 to 35 %
3.4	Free swelling index	Less than 50%
4	**Mechanical analysis**	
4.1	Gravel (above 2.0 mm)	0 to 10%
4.2	Sand (2.0 to 0.06 mm)	30 to 40%
4.3	Silt (0.06 to 0.002 mm)	0 to 45 %
4.4	Clay (Below 0.002 mm)	15 to 25 %
5	**Chemical properties**	

SL.No	Properties	Range of Values
5.1	Loss on ignition	3.5-4.5
5.2	Chloride (Cl)	Less than 500 mg/litre
5.3	Sulphate (SO3)	Less than 400 mg/litre
6	**TPPA/PMC properties**	
6.1	C (kg/cm2)	0.2-0.3
6.2	Bulk Density Φ	10 to 25 degree
6.3	Permeability K (cm/sec)	10-4 to 10-5
6.4	CBR (%)	03-Jun

Filling with excavated earth shall be done in regular horizontal layers each not exceeding 300 mm in depth and compacted. All lumps and clods exceeding 125 mm in any direction shall be broken. The CONTRACTOR shall make good all subsidence and shrinkage in earth fillings, embankments, traverses, etc. during execution and till the completion of work unless otherwise specified.

RECYCLED MATERIALS:

In addition to using selected material from approved borrow areas, fine aggregates from other than natural sources as specified in clause 5 of ASTM C33 for use in concrete may also be used. These include crushed quarry rock, crushed boulders, cobbles or gravel, or manufactured sand (crushed air cooled blast furnace slag and crushed hydraulic cement concrete). CONTRACTOR shall establish the compaction procedure for these types of materials through laboratory testing to achieve the desired degree of compaction indicated in drawing and execute under controlled conditions to achieve the compaction on field.

1.10 METHOD OF BACKFILLING

- **CRUSHED ROCK FILL**

  Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 250 mm size in any direction, the rock mass shall be broken into angular shapes pieces, flaky pieces of rock mass shall be avoided. Voids between the rock pieces shall be filled with approved finer soil material before compaction. The crushed rock fill shall be spread in uniform horizontal

layers and each layer shall be compacted with minimum ten (10) passes of 12 tonne smooth wheeled vibratory roller. In this clause and all subsequent clauses, the number of passes will mean the number of times that each point on the surface of the layer being compacted has been traversed by roller. During rolling, the roller shall uniformly overlap not less than one third of the roller track width made in the proceeding travel.

Rock Fill shall comprise material consisting predominantly of rock fragments of such a size that it cannot be placed in layers of the thickness allowed without crushing, or further breaking down. Rock Fill may be placed in the layers not exceeding twice the average size of the larger fragments. Rock fill shall be laid in layers alternate to layer of C-Φ soil layer. Voids in the stone layer shall be filled with properly graded fine material to fill up the voids prior to laying of soil layer.

- **EXCAVATED MATERIAL OR BORROWED MATERIAL (C-ϕ SOIL)**
  - ✓ Approved soil consisting of ordinary soil, soil containing gravel, shingle, etc. shall be deposited in layers. CONTRACTOR should ensure that all clods of earth are broken down to a size not larger than 100 mm.
  - ✓ Each layer of loose soil shall be compacted to minimum of 95% of standard proctor density or modified proctor density as determined by ASTM D 1557.
  - ✓ Where not specified, compaction of each layer shall be carried out by means of 12 tonnes roller smooth wheeled/ sheep-foot or wobbly wheeled rollers.
  - ✓ Field compaction test shall be carried out at different stages of filling and also after the fill to the entire height has been completed. The frequency for carrying out in-situ tests shall be one test for every 600 to 800 sq. m. of backfill area and shall be carried out for every layer of backfill. If the in-situ-tests are not satisfactory, soil shall be compacted and tested again for the conformity to the required compaction level. Till that time no further layer of fill material shall be laid.

- **SAND FILL:**
  - ✓ At places backfilling shall be carried out with local sand if directed by the TPPA/PMC. The sand used shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. Any temporary work required to contain sand under flooded condition shall be to the CONTRACTOR's account. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the TPPA/PMC has inspected and approved the fill. In this case, CONTRACTOR should ensure that the fill material is not washed away. This work should be carried out as directed by TPPA/PMC. CONTRACTOR shall make arrangement for draining away of water after consolidation of the sand mass.
  - ✓ Sandy fill shall be compacted, where so specified, by minimum 12 tonne vibratory rollers. The fill material shall be compacted to the specified relative density or compacted fill shall be compacted to 85% of relative density of sand.

UNDER VARIOUS SITE CONDITIONS:

As per the guidelines discussed above , backfilling under various site conditions shall be carried out as below:

- **FILLING IN PITS AND TRENCHES AROUND FOUNDATIONS OF STRUCTURES, WALLS, ETC:**
  - ✓ As soon as the work in foundations has been accepted (after attaining 28 days strength) and measured, the spaces around the foundations, structures, pits, trenches, etc. shall be cleared of all debris, and filled with earth in layers as specified above., each layer being watered, rammed and properly compacted, before the succeeding one is laid. Each layer shall be compacted to the satisfaction of the TPPA/PMC. The final backfill surface shall be trimmed and levelled to proper profile as directed by the TPPA/PMC or indicated on the drawings.

- **PLINTH FILLING**
  - ✓ Plinth filling shall be carried out with approved material and shall be filled in layers as specified above, watered and compacted with mechanical compaction machines. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlements at a later stage. The finished level of the filling shall be trimmed to the level/ slope specified.
  - ✓ At some locations/ areas it may not be possible to use rollers because of space restrictions, etc. The CONTRACTOR, if permitted by an TPPA/PMC, shall use pneumatic tampers, rammers, etc. to ensure proper compaction.

- **FILLING IN TRENCHES**

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipes and drains have been tested and passed. The backfilling material shall be properly compacted by watering and ramming, taking due care that no damage is caused to the pipes.

- ✓ Where the trenches are excavated in soil, the filling from the bottom of the trench to the level of the centre line of the pipe shall be done with selected approved earth in layers; backfilling above the level of the centre line of the pipe shall be done with selected earth in layers with proper compaction of each layer.
- ✓ In case of excavation of trenches in rock, the filling up to a level 300 mm above the top of the pipe shall be done with fine materials. The filling from a level 300mm above the top of the pipe to the top of the trench shall be done using broken rock filling of size not exceeding 150mm mixed with fine material as available to fill up the voids.
- ✓ Filling of the trenches shall be carried simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.
- ✓ Any marking tiles required for identification and safeguard the electrical cables /pipelines, same shall be provided and laid as per the drawings/specification.

1.11 SITE GRADING

- ✓ Site grading shall be carried out as indicated in the drawings and as directed by the TPPA/PMC. Excavation shall be carried out as specified under relevant clauses.
- ✓ To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the CONTRACTOR.
- ✓ Field compaction test shall be carried out (as per relevant ASTM standard) at different stages of filling and also after the fill to the entire height has been completed. This shall hold good for embankments as well.
- ✓ The CONTRACTOR shall protect the earth-fill from being eroded or washed away by rain or damaged in any other way. Should any slip occur, the CONTRACTOR shall remove the affected material and make good the slip at his cost.
- ✓ The fill shall be carried out to such dimensions and levels as indicated on the drawings after the stipulated compaction. The fill shall be considered as incomplete if the desired compaction has not been achieved.
- ✓ Access roads, whether of temporary or other nature, required to be constructed for access and for movement of men, materials, equipment, transport vehicles, vehicles carrying fill material, etc. to or over borrow areas and/ or to or over areas on which fill has to be deposited shall be constructed by the CONTRACTOR. Such access roads shall be maintained in good condition during all seasons to ensure completion of work according to time schedule.

2 DEWATERING

All excavations shall be kept free of water. Grading and surface water drainage scheme in the vicinity of excavation shall be properly closed to prevent surface water from draining into excavated areas. CONTRACTOR shall remove by pumping or other means approved by TPPA/PMC any water inclusive of rain water and subsoil water accumulated in excavation and keep all excavations dewatered until the foundation work is completed and backfilled. Sumps made for dewatering must be kept clear of the

excavation/ trench areas required for further work of foundation construction. Method of pumping shall be approved by TPPA/PMC; but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in or excavation wall collapse due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction.

The CONTRACTOR shall take adequate measures for bailing and/ or pumping out water from excavations and construct diversion channels, bunds, sumps, coffer dams, etc. as may be required. Pumping shall be done directly from the foundation trenches or from a sump outside the excavation in such a manner as to preclude the possibility of movement of water through any fresh concrete or masonry and washing away parts of concrete or mortar. During laying of concrete or masonry and for a period of at least 24 hours thereafter, pumping shall be done to ensure that the surface below the concrete remains dry.

Capacity and number of pumps, location at which the pumps are to be installed, pumping hours, etc. shall be reviewed by the CONTRACTOR from time to time. The TPPA/PMC may direct the CONTRACTOR to make changes in his scheme if the adopted scheme fails to achieve the desired results.

Pumping shall be done in such a way as not to cause damage to the work or adjoining property by subsidence, etc. Disposal of water shall not cause inconvenience or nuisance in the area or cause damage to the property and structures nearby or shall not be a cause for environmental pollution of natural water bodies.

When there is a continuous inflow of water and quantum of water to be handled is considered in the opinion of TPPA/PMC as large, well point system - Single stage or multi stage, shall be adopted. CONTRACTOR shall submit to TPPA/PMC his scheme of well point system including the stages, the spacing, number and diameter of well points, headers, etc. and the numbers, capacity and location of pumps of approvals. Normal dewatering using bailing arrangement, submersible pumps shall be included in the

item rate for excavation. Special dewatering system using well point system shall be considered as separate item.

In case well point dewatering is required, the Indian Standard IS 9759: 1981 (Reaffirmed 2016) - Guidelines for De-Watering During Construction shall be used for design of the dewatering system

3 REINFORCED CONCRETE

- ✓ This Specification covers the general requirements for ready mixed concrete and for concrete using on-site production facilities including requirements with regard to the quality, handling, storage of ingredients, proportioning, batching, mixing, transporting, placing, curing, protecting, repairing, finishing and testing of concrete; formwork; requirements with regard to the quality, storage, bending and fixing of reinforcement; grouting as well as mode of measurement and payment for completed works.
- ✓ It shall be very clearly understood that the specifications given herein are brief and do not cover minute details. However, all works shall have to be carried out in accordance with the relevant standards and codes of practices or in their absence in accordance with the best accepted current TPPA/PMC practices or as directed by TPPA/PMC from time to time. The decision of TPPA/PMC about the specification to be adopted and their interpretation and the mode of execution of work shall be final and binding on CONTRACTOR and no claim whatsoever will be entertained on this account.

3.1 CODES AND SPECIFICATIONS

- ✓ The pertinent clauses of the following Indian Codes, Standards and Specification shall apply to the material and workmanship covered by this specification. In the event of the conflict of certain requirements between this specification and the codes referred herein, this specification shall govern.
- ✓ The codes and standards mentioned herein shall be latest as on the day of award of contract of the works unless otherwise specified. Contractor

shall be responsible to inform to the Consultant/ TPPA in case of any revisions/re-affirm/amendment in the relevant codes and standards after the date of award of contract within 30 days of the issue of such revision/re-affirm/amendment of the code/ standard. PMC/ TPPA may approve use of the earlier code/ standard if the revisions do not materially affect the statutory requirements of the project or does not impact safety practices. Any cost impact arising out of such revisions shall be mutually agreed.

- ✓ It is not the intent to specify herein all the codes and standards required for the satisfactory completion of work. The list of codes and standards indicates certain primary codes and standards and not all the codes required for the work under the contract. It is understood that all the pertinent codes and standards shall form the part of this specification whether explicitly indicated or not. Indian Standards shall be supplemented by International Standards for clarity and coverage wherever felt so.

3.2 MATERIALS

IS 455	Specification for Portland Slag Cement.
IS 1489: PART 1	Portland pozzolana cement - specification part 1 fly ash based
IS 1489: PART 2	Portland pozzolana cement - specification part 2 calcined clay based (fourth revision)
IS 12330	Specification for Sulphate Resisting Portland Cement
IS 383	Coarse and fine aggregate for concrete - specification (third revision)
IS 432	Specification for Mild Steel and Medium Tensile Steel Bars and Hand Drawn Steel Wire for Concrete Reinforcement - Part 1 and 2
IS 1786	High strength deformed steel bars and wires for concrete reinforcement - specification
IS 1566	Specification for hard-drawn steel wire fabric for

	concrete reinforcement
IS 9103	Concrete admixtures - specification
IS 2645	Integral waterproofing compounds for cement mortar and concrete - specification
IS 4990	Plywood for concrete shuttering work - specification
IS 4926	Ready-mixed concrete - code of practice
IS 8041	Specification for rapid hardening cement.
IS 12600	-Specification for Low Heat Portland Cement
IS 6909	Specification for super-sulphated cement
IS 12089	Specification for granulated slag for manufacture of portland slag cement

3.3 MATERIAL TESTING

IS 4031 (Part 1 to 15)	Methods of physical tests for hydraulic cement
IS 4032	Method of chemical analysis of hydraulic cement.
IS 650	Specification for standard sand for testing of cement.
IS 2430	Methods for sampling of aggregates for concrete.
DIN EN 12620	Aggregates for concrete (Refer Note).
IS 2386	Methods of test for aggregates for concrete (Parts 1 to 8)
IS 3025 (Part 1 to 51)	Methods of sampling and test (physical and chemical) for water and wastewater
Is 6925	METHODS OF TEST FOR DETERMINATION OF WATER-SOLUBLE CHLORIDES IN CONCRETE ADMIXTURES

MATERIAL STORAGE

IS 4082	Recommendations on stacking and storage of construction materials and components at site.

CONCRETE MIX DESIGN

IS 10262	Concrete mix proportioning-guidelines

CONCRETE TESTING

IS 1199	Method of sampling and analysis of concrete.
IS 516	Method of test for strength of concrete.
IS 9013	Method of making, curing and determining compressive strength of accelerated cured concrete test specimens.
IS 8142	Method of test for determining setting time of concrete by penetration resistance.
IS 9284	Method of test for abrasion resistance of concrete.
IS 2770 (Part 1)	Methods of testing bond in reinforced concrete: Part 1 Pull

IPMENT

IS 4925	Specification for concrete batching and mixing plant.
IS 7251	Specification for concrete finishers.
IS 2750	Specifications for steel scaffoldings.

CODES OF PRACTICE

IS: 456	Plain and reinforced concrete - code of practice.
IS: 457	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
IS 3370 (Part 1)	Concrete structures for storage of liquids - code of practice - part 1 : general requirements
IS 3370 (Part 2)	Concrete structures for storage of liquids - code of practice - part 2 : reinforced concrete structures
IS 3370 (Part 3)	Code of practice for concrete structures for the storage of liquids: part 3 prestressed concrete structures

IS 3370 (Part 4)	Code of practice for concrete structures for the storage of liquids: part 4 design tables
IS 3935	Code of practice for composite construction.
IS 2204	Code of practice for construction of reinforced concrete shell roof.
IS 2210	Criteria for the design of reinforced concrete shell structures and folded plates.
IS 2502	Code of practice for bending and fixing of bars for concrete reinforcement.
IS 5525	Recommendation for detailing of reinforcement in reinforced concrete works.
IS 2751	Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction.
IS 9417	Welding of high strength steel bars for reinforced concrete construction-recommendations
IS 3558	Code of practice for use of immersion vibrators for consolidating concrete.
IS 3414	Code of practice for design and installation of joints in buildings.
IS 4326	Earthquake resistant design and construction of buildings - code of practice
IS 4014 (Part 1)	Code of practice for steel tubular scaffolding Part 1 Definitions and materials
IS 4014 (Part 2)	Code of practice for steel tubular scaffolding: Part 2 Safety regulations for scaffolding (first revision)
IS 2571	Code of practice for laying in situ cement concrete flooring
IS 7861 (Part 1)	Code of practice for extreme weather concreting: Part 1Recommended practice for hot weather concreting
IS 7861 (Part 2)	Code of practice for extreme weather concreting: Part 2Recommended practice for cold weather concreting

IS 3812 (Part 1)	Pulverized fuel ash – Part 1 – For use as pozzolana in cement, cement mortar and concrete
IS 15388: 2003	Specification for Silica Fume

CONSTRUCTION SAFETY

IS 3696 (Part 1)	Safety code of scaffolds and ladders: Part 1 Scaffolds (first revision)
IS 3696 (Part 2)	Safety code of scaffolds and ladders: Part 2 Ladders (first revision)
IS 7969	Safety code for handling and storage of building materials.
IS 8989	Safety code for erection of concrete framed structures.

MEASUREMENT

IS 1200 (Part 2)	Method of measurement of building and TPPA/PMC works (Part 2 and 5) Methods of measurement of building and civil TPPA/PMC works: Part 2 Concrete works (third revision)
IS 1200 (Part 5)	Methods of measurement of building and civil TPPA/PMC works: part 5 Form work (fourth revision)

3.4 GENERAL

- TPPA/PMC shall always have the right to inspect all operations including the sources of materials, procurement, layout and storage of materials, the concrete batching and mixing equipment, and the quality control system. Such an inspection shall be arranged, and TPPA/PMC's approval obtained, prior to starting of concrete work. This shall, however, not relieve CONTRACTOR of any of his responsibilities. All materials, which do not conform to this specification, shall be rejected.
- Materials should be selected so that they can satisfy the design requirements of strength, serviceability, safety, durability and finish with due regards to the functional requirements and the environmental conditions to which the structure will be subjected. Materials complying

with codes/ standards shall only be used. Other materials may be used after approval of the TPPA/PMC and after establishing their performance suitability based on previous data, experience or tests.

3.5 MATERIALS

CEMENT

- Unless otherwise specified or called for by TPPA/PMC, cement shall be Ordinary Portland Cement conforming to IS: 269.
- The Portland Pozzolana Cement shall conform to IS: 1489 & Portland Slag Cement conforming to IS: 455 shall be used as directed by TPPA/PMC.
- Sulphate Resisting Portland Cement conforming to IS: 12330 may be used for mass concrete construction and generally complying with IS: 12330, but with Tricalcium Aluminate (C3A) content not more than 5% by mass (as manufactured by an approved manufacturer) may be used for reinforced concrete construction.
- Only one type of cement shall be used in any one mix unless specifically approved by TPPA/PMC. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without prior approval from TPPA/PMC.
- Cement, which is not used within 90 days from its date of manufacture, shall be tested at a laboratory approved by TPPA/PMC and until the results of such tests are found satisfactory, it shall not be used in any work.
- Fly Ash Blended Cements conforming to IS: 1489 (Part I) may be used in RCC structures as per the guidelines given below:
  - ✓ IS: 456 - Code of Practice for Plain and Reinforced Concrete shall be followed about Concrete Mix Proportion and its production as under: The concrete mix design shall be done as “Design Mix Concrete” as prescribed in clause 9 of IS: 456. Concrete shall be manufactured in accordance with clause 10 of IS 456 covering Quality Assurance measures.
  - ✓ Minimum M25 grade of concrete shall be used in all structural elements made with RCC both in load bearing and framed structure.

Use of Fly Ash Admixed Cement Concrete (FACC) in RCC Structures

There shall be no bar on use of FACC in RCC structures subject to following additional conditions.

- Fly ash shall have its chemical characteristics and physical requirements, etc. conforming to IS: 3812 (Parts I) and shall be duly certified.
- To ensure uniform blending of fly ash with cement in conformity with IS: 456, a specific facility needs to be created at site with complete computerised automated process control to achieve design quality or with similar facility from Ready Mix Concrete (RMC) plants.
- As per IS: 1489 (Part-I) maximum 35% of mass of total cementitious material is permitted to be substituted with fly ash conforming to IS: 3812 (Part-I).
- Separate storage for dry fly ash shall be provided. Storage bins or silos shall be weather proof and permit a free flow and efficient discharge of fly ash. The filter or dust control system provided in the bins or silos shall be of sufficient size to allow delivery of fly ash maintained at specified pressure to prevent undue emission of fly ash dust, which may interfere with weighing accuracy.
- Use of Silica Fume Admixed Cement Concrete in RCC Structures
- Silica fume conforming to IS 15388 may be used to the extent of 5 – 10% of the cement content as stipulated in IS 456 as a part replacement of cement.
- Use of Fly Ash Blended Cements in Cement Concrete (PPCC) in RCC Structures
- Subject to General Guidelines detailed out as above, PPC manufactured conforming to IS: 1489 (Part-I) shall be treated at par with OPC for manufacture of Design Mix concrete for structural use in RCC.
- Till the time, Bureau of Indian Standards (BIS) makes it mandatory to print the percentage of fly ash on each bag of cement, the certificate from the PPC manufacture indicating the same shall be insisted upon

before allowing use of such cements in works.

- While using PPC for structural concrete work, no further admixing of fly ash shall be permitted.

AGGREGATES

- Aggregates shall consist of naturally occurring stones and gravel (crushed or uncrushed) and sand. They shall be chemically inert, strong, hard, clean, durable against weathering, of limited porosity, free from dust/ silt/ organic impurities/ deleterious materials and conform to IS: 383. Aggregates such as slag, crushed over burnt bricks, bloated clay ash, sintered fly ash and tiles shall not be used.
- Aggregates shall be washed and screened before use where necessary or if directed by the TPPA/PMC.
- Aggregates containing reactive materials shall be used only after tests conclusively prove that there will be no adverse effect on strength, durability and finish, including long term effects, on the concrete.
- The fineness modulus of sand shall neither be less than 2.2 nor more than 3.2. If use of sand having fineness modulus more than 3.2 is unavoidable then it shall be suitable blended with crusher stone dust.
- The maximum size of coarse aggregate shall be as stated on the drawings, but in no case greater than 1/4 of the minimum thickness of the member, provided that the concrete can be placed without difficulty to surround all reinforcement thoroughly and fill the corners of the form.
- For concrete elements less than 100 mm thick, consideration should be given to the use of 10 mm nominal maximum size aggregates. Where 10 mm maximum size aggregate is required, 10 mm single-size grading shall be used.
- Plums 160 mm and above of a reasonable size may be used where directed. Plums shall not constitute more than 20% by volume of concrete unless specified by TPPA/PMC.

WATER

- Water used for both mixing and curing shall conform to IS: 456. Potable water is generally satisfactory. Water containing any excess of acid, alkali, sugar or salt shall not be used.
- The pH value of water shall not be less than 6.
- Seawater shall not be used for concrete mixing and curing.

REINFORCEMENT

- Reinforcement bars shall conform to IS: 432 and/ or IS: 1786 and welded wire fabric to IS: 1566 as shown on the drawing.
- All reinforcement shall be clean, free from pitting, oil, grease, paint, loose mill scales, rust, dirt, dust or any other substance that will destroy or reduce bond.
- Special precaution like coating of reinforcement may be provided with the prior approval of TPPA/PMC.
- Reinforcement bars produced by rerolling may be used subject to the approval of the TPPA/PMC. CONTRACTOR shall furnish the manufacturer's certificate stating the process of manufacture to the satisfaction of the TPPA/PMC and the test sheet signed by the manufacturer giving the result of each mechanical test applicable for each lot of the material supplied including result of chemical composition. At-least one Sample from each lot received at site shall be tested in the laboratory approved by the TPPA/PMC and the cost of testing shall be borne by the CONTRACTOR. It shall be ensured that all the test results conform to IS: 432 or IS: 1786 as applicable.

ADMIXTURES AND ADDITIVES

- Approval of Admixtures - Admixture from approved manufacturer shall be used in concrete mix along with aggregates, cement and water without the written instruction or approval of the TPPA/PMC in each case. If more than one admixture is proposed for use in the same concrete mix, their interaction shall be checked by trial mixes to ensure their compatibility.
- The CONTRACTOR shall note that the description of any proposed

admixture by trade or brand name will not be sufficient for the approval of the TPPA/PMC.

- The CONTRACTOR shall submit manufacturer's test certificates and technical literature of the admixture proposed to be used. If directed by the TPPA/PMC, the admixture shall be got tested at an approved laboratory at no extra cost.
- The TPPA/PMC will, wherever appropriate, call for trial batches of concrete to be prepared to demonstrate the effect of the proposed admixtures both on the fresh concrete and on the hardened concrete before giving his approval. He may also lay down additional requirements for the control of the use of such admixtures.
- Notwithstanding any previously given approval, the TPPA/PMC may withdraw such approval at any time with respect to any mix containing admixtures if, in his opinion, the performance of the admixture under actual Site conditions is not completely satisfactory.
- Supply and Storage of Admixtures - Accelerating, retarding, water-reducing, super plasticizing and air entraining admixtures shall conform to IS: 9103, integral cement water proofing admixture to IS: 2645, any other admixture to BS: 5075, if it is applicable, unless otherwise specified or agreed. Admixtures shall be stored strictly in accordance with manufacturers' recommendations and precautions shall be taken during delivery and storage to prevent damage to or adulteration of admixtures.
- Use of Admixtures - Any admixture used in any concrete mix shall only be used at the rate of dosage or in the proportions previously approved by the TPPA/PMC, method of mixing, etc. all in accordance with the manufacturer's instructions and within the manufacturer's recommended ambient temperature range.

SAMPLES AND TESTS

- All materials used for the works shall be tested before use. The frequency of such confirmatory tests shall be decided by TPPA/PMC.
- Manufacturer's test certificate shall be furnished for each batch of

cement/ reinforcing steel and when directed by TPPA/PMC samples shall also be got tested by the CONTRACTOR in a laboratory approved by TPPA/PMC at no extra cost to TPPA. However, where material is supplied by TPPA, all testing charges shall be borne by TPPA, but transportation and preparation of material samples for the laboratory shall be done by CONTRACTOR at no extra cost.

- Sampling and testing of aggregates shall be as per IS: 2386 under the supervision of TPPA/PMC. The cost of all tests, sampling, etc. shall be borne by CONTRACTOR.
- Water to be used shall be tested to comply with clause 5.4 of IS: 456.
- CONTRACTOR shall furnish manufacturer's test certificates and technical literature for the admixture proposed to be used. If directed, the admixture shall be got tested at an approved laboratory at no extra cost.

STORING OF MATERIALS

- All material shall be stored in a manner to prevent its deterioration and contamination, which would preclude its use in the works. Requirements of IS: 4082 shall be complied with.
- CONTRACTOR shall make his own arrangements for the storage of adequate quantity of cement even if cement is supplied by TPPA. If such cement is not stored properly and has deteriorated, the material shall be rejected. Cost of such rejected cement, where cement is supplied by TPPA, shall be recovered at issue rate or open market rate whichever is higher. Cement bags shall be stored in dry weatherproof shed with a raised floor, well away from the outer walls and insulated from the floor to avoid moisture from ground. Not more than 15 bags shall be stacked in any tier. Storage arrangement shall be approved by TPPA/PMC. Storage under tarpaulins shall not be permitted. Each consignment of cement shall be stored separately and consumed in its order of receipt. CONTRACTOR shall maintain record of receipt and consumption of cement.
- Each size of coarse and fine aggregates shall be stacked separately and

shall be protected from dropping leaves and contamination with foreign material. The stacks shall be on hard, clean, free draining bases, draining away from the concrete mixing area.

- CONTRACTOR shall make his own arrangements for storing water at site in tanks of approved capacity. The tanks shall be cleaned at least once a week to prevent contamination.
- The reinforcement shall be stacked on top of timber sleepers to avoid contact with ground/ water. Each type and size shall be stacked separately.

CONCRETE

Concrete grade shall be as designated on drawings. Concrete in the works shall be “DESIGN MIX CONCRETE” or “NOMINAL MIX CONCRETE”. All concrete works of up to grade M15 shall be NOMINAL MIX CONCRETE whereas all other grades, M20 and above, shall be DESIGN MIX CONCRETE.

DESIGN MIX CONCRETE

For this specification, Design Mix Concrete is classified as "Normal Concrete". It shall be identified by a prefix and two numbers. Prefix "M" would denote Normal Concrete. The two numbers e.g. 25 - 40 would denote the crushing strength of cube at 28 days in N/mm^2 and maximum size of the coarse aggregates in millimetres respectively. Normal concrete shall have a net dry unit weight of not less than 25 kN/m^3, for the finished structure after curing.

MIX DESIGN AND TESTING

- For Design Mix Concrete, the mix shall be designed as per IS 10262 to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The design mix shall in addition be such that it is cohesive and does not segregate during placement and should result in a dense and durable concrete capable of giving the specified finish. For liquid retaining structures, the mix shall also result in watertight concrete. The

CONTRACTOR shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

- The minimum grade of concrete shall be as per Table 5 of IS: 456 for various exposure conditions of concrete. For various environmental conditions, refer to Table 3 of IS: 456.
- The minimum cement content for Design Mix Concrete shall be as mentioned in the Schedule of Quantities.
- The quantity of maximum mixing water per unit volume of concrete may be determined from Table 2 of IS 10262.The water content in Table 2 is for angular coarse aggregate and for 25 to 50 mm slump range. The water estimate in Table 2 can be reduced by approximately 10 kg for sub- angular aggregates,20 kg for gravel with some crushed particles and 25 kg for rounded gravel to produce same workability. For the desired workability (other than 25 to 50 mm slump range),the required water content may be established by trial or an increase by about 3 percent for every additional 25 mm slump or alternatively by use of chemical admixtures conforming to IS 9103.Water reducing admixtures or super plasticizing admixtures usually decrease water content by 5 to 10 percent and 20 percent and above respectively at appropriate dosages.
- It shall be CONTRACTOR's sole responsibility to carry out the mix designs at his own cost. He shall furnish to TPPA/PMC for approval at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of Table – 2 of IS: 456.
- A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e., the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with the cl. 15.2 of IS 456.:
- 3 test specimens (cubes) shall be made for each sample for testing at 28 days. The test results of the sample shall be the average of the strength

of 3 specimens.

- In the 'very low' category of workability where strict control is necessary, for example pavement quality concrete, measurement of workability by determination of compacting factor will be more appropriate than slump (refer to IS: 1199) and a value of compacting factor of 0.75 to 0.80 is suggested.
- In the 'very high' category of workability, measurement of workability by determination of flow will be appropriate (refer to IS: 9103).
- Where single size graded coarse aggregate are not available, aggregates of different sizes shall be properly combined. The CONTRACTOR's mix design shall show that combined grading of coarse aggregate meets the requirements of Table 2 of IS: 383 for graded aggregates.

BATCHING AND MIXING OF CONCRETE

- Proportions of aggregates and cement, as per approved concrete mix design, shall be by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within ±2% for cement and ±3% for aggregate. The batching equipment shall be calibrated at the frequency decided by TPPA/PMC.
- Amount of water added shall be such as to produce dense concrete of required consistency, specified strength and satisfactory workability and shall be so adjusted to account for moisture content in the aggregates. Water- cement ratio specified for use by TPPA/PMC shall be maintained. Each time the work stops, the mixer shall be cleaned out, and while recommencing, the first batch shall have 10% additional sand and cement to allow for sticking in the drum.
- Arrangement should be made by CONTRACTOR to have the cubes tested at his own expense in an approved laboratory or in field with prior consent of TPPA/PMC. Sampling and testing of strength and workability of concrete shall be as per IS: 1199, IS: 516 and IS: 456. It is preferable to cast additional cubes (minimum 3 specimens) for testing at 7 days and 14 days.

NOMINAL MIX CONCRETE

- MIX DESIGN AND TESTING - Mix Design and preliminary tests are not necessary for Nominal Mix Concrete. However, works tests shall be carried out as per IS: 456. Proportions for Nominal Mix Concrete and water- cement ratio may be adopted as per Table 9 of IS: 456. However, it will be CONTRACTOR's sole responsibility to adopt appropriate nominal mix proportions to achieve the specified characteristic strength, if required or directed by the TPPA/PMC..
- BATCHING AND MIXING OF CONCRETE - Based on the adopted nominal mixes, aggregates shall be measured by volume. However, cement shall be by weight only. Appropriate correction shall be made for bulking of sand after testing.
- READY MIXED CONCRETE - All specification as per IS: 4926 – "Specification for Ready Mixed Concrete" shall be applicable. The design mix prepared by the RMC supplier shall be the responsibility of the CONTRACTOR. The testing of concrete as per Codal provisions and the specifications shall be done by the CONTRACTOR same as the normal concreting works.

FORMWORK

- The formwork shall be either steel or lined with steel, waterproof/ laminated board or such other material as directed and approved by the TPPA/PMC. Forms shall be strongly constructed, closely jointed and smooth and shall be such as to ensure true sharp arises and a perfect surface. Forms shall be so designed that they can be taken apart and reassembled readily.
- Surface Finish of precast units shall comply with requirements of this specification. The class of Finish shall generally be of F2 type unless detailed differently on the drawings or as directed by the TPPA/PMC. No construction joints will be permitted within any precast work.

CASTING TOLERANCE

- The casting tolerance, unless otherwise ordered or directed, shall be within +3 mm of true dimensions.

CURING

- The top and sides of all precast units shall be kept covered constantly and in a damp condition with clean, potable fresh water for at least seven days after casting or for such further period as the TPPA/PMC may direct. It is preferable to have a curing pond for this purpose.

REINFORCEMENT FABRICATION AND PLACEMENT

- Reinforcing bars shall be bent and fixed in accordance with the procedure specified in IS 2502.
- All bars shall be bent by Bar bending machines.
- Re-bending or straightening incorrectly bent bars shall not be done without approval of TPPA/PMC.
- Reinforcement shall be accurately fixed and maintained firmly in the correct position using blocks, spacers, chairs, binding wire, etc. to prevent displacement during placing and compaction of concrete in accordance with clause 12.3 to 12.6 of IS 456. The tied in-place reinforcement shall be approved by TPPA/PMC prior to concrete placement. PVC or concrete spacers of appropriate size shall be used with the approval of TPPA/PMC.
- Binding wire shall be 18-gauge soft annealed wire. Ends of the binding wire shall be bent away from the concrete surface and in no case encroach into the concrete cover.
- Substitution of reinforcement, laps/ splices not shown on drawing shall be proposed by CONTRACTOR and approved by TPPA/PMC.
- If permitted by TPPA/PMC, welding of reinforcement shall be done in accordance with IS: 2751, IS: 9417 and SP: 34 as applicable.
- Tolerance on placement of reinforcement shall be as per Cl. 12.3 of IS: 456.

TOLERANCES

- Tolerance for formed and concrete dimensions shall be as per IS: 456 unless specified otherwise.
- Tolerance is a specified permissible variation from lines, grade or dimensions given in drawings. No tolerance specified for horizontal or vertical building lines or footings shall be construed to permit encroachment beyond the legal boundaries. Unless otherwise specified, the following tolerances will be permitted.

TOLERANCES FOR RC BUILDINGS

(a) Variation from the Plumb

i.	In the lines and surfaces of columns, piers, walls and in arises 5 mm per 2.5 m or 25 mm, whichever is less.		
ii.	For exposed corner columns and other conspicuous lines.		
	In any bay or 5 m maximum	-	5 mm
	In 10 m or more	-	10 mm

(b) Variation from the level or from the grades indicated on the drawings

i.	In slab soffits, ceilings, beam soffits and in arises		
	In 2.5 m	-	5 mm
	In any bay or 5 m maximum	-	10 mm
	In 10 m or more	-	15 mm
ii.	For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines		
	In any bay or 5 m maximum	-	5 mm
	In 10 m or more	-	15 mm

(c) Variation of the linear building lines from established position in plan and related position of columns, wall and partitions

In any bay or 5 m maximum	-	10 mm
In 10 m or more	-	20 mm

(d) Variation in the sizes and locations of sleeves, openings in walls and floors - 5 mm except in the case of and for anchor bolts.

(e) Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls

Minus	-	5 mm
Plus	-	10 mm

(f) Footings

i.	Variation in dimension in plan		
	Minus	-	5 mm
	Plus	-	50 mm
ii.	Misplacement or eccentricity		
	2% of footing width in the direction of misplacement but not more than 50 mm		
iii.	Reduction in thickness		
	Minus	-	5% of specified thickness subject to a maximum of 50 mm

(g) Variation in steps

i.	In a flight of stairs		
	Rise	-	3 mm
	Tread	-	5 mm
ii.	In consecutive steps		
	Rise	-	1.5 mm

	Tread	-	3 mm

TOLERANCES IN OTHER STRUCTURES

(h) All structures

i.	Variation of the construction linear outline from established position in plan.		
	In 5 m	-	10 mm
	In 10 m or more	-	15 mm
ii.	Variation of dimensions to individual structure features from established positions.		
	In 20 m or more	-	25 mm
	In buried construction	-	50 mm
iii.	Variations from plumb, from specified batter or from curved surfaces of all structures.		
	In 2.5 m	-	10 mm
	In 5 m	-	15 mm
	In 10 m or more	-	25 mm
	In buried construction	-	Twice the above values
iv.	Variations from level or grade indicated on drawings in slabs, beams, soffits, horizontal grooves and visible arises.		
	In 2.5 m	-	5 mm
	In 7.5 m or more	-	10 mm
	In buried construction	-	Twice the above values
v.	Variation in cross-sectional dimensions of columns, beams, buttresses, piers and similar members.		
	Minus	-	5 mm
	Plus	-	10 mm
vi.	Variation in the thickness of slabs, walls, arch sections and similar members.		

	Minus	-	5 mm
	Plus	-	50 mm

FOOTING FOR COLUMNS, PIERS, WALLS, BUTTRESSES AND SIMILAR MEMBERS

i.	Variation of dimension in Plan		
	Minus	-	10 mm
	Plus	-	50 mm
ii.	Misplacement or eccentricity		
	2% footing width in the direction of misplacement but not more than 50 mm		
iii.	Reduction in thickness		
	5% of specified thickness subject to a maximum of 50 mm		

TOLERANCE IN FIXING ANCHOR BOLTS SHALL BE AS FOLLOWS:

i.	Anchor bolts without sleeves	1.5 mm in plan
ii.	Anchor bolts with sleeves	5.0 mm in elevation
	- for bolts up to and including 28 mm dia.	5 mm in all directions
	- for bolts up to 32 mm dia.	3 mm in all directions
iii.	Embedded parts	5 mm in all directions

TOLERANCES IN FORMWORK

The formwork shall be designed and constructed to the shapes, lines and dimensions shown on the drawings within the tolerances given below

1.	Deviation from specified dimensions of cross section of columns and beams	-6 mm

2.	Deviations from dimensions of footings (tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel or dowels)	+12 mm
(a)	Dimension in Plan	-12 mm +50 mm
(b)	Eccentricity	0.02 times the width of the footing in the direction of deviation, but not more than 50 mm
(c)	Thickness	± 0.05 times the specified thickness

- Tolerance for top of concrete of equipment and structural steel foundations shall be as under unless more stringent requirements are specified by equipment manufacturer:
    (a) Where grout thickness is less than or equal to 25 mm: ±5 mm.
    (b) Where grout thickness is more than 25 mm: ±5 mm.

EXECUTION AND REMOVAL OF FORMS

- Before placing concrete, the surface of all forms shall be coated with suitable non- staining form releasing agents such as raw linseed oil to prevent adhesion of concrete and to facilitate removal of forms.
- The form releasing agent shall cover the forms fully and evenly without excess over drip. Care shall be taken to prevent form releasing agents from getting on the surface of the construction joints and on reinforcement bars. Special care shall be taken to thoroughly cover form strips for narrow grooves, to prevent swelling of the forms and the consequent damage to concrete prior to or during removal of forms.
- Immediately before concrete is placed care shall be taken to see that all forms are in proper alignment and the supports and fixtures are properly secured and tightened.
- Where forms for continuous surfaces are placed in successive units, the

forms shall lap and fit tightly over the completed surface to prevent leakage of cement slurry from the fresh concrete and to maintain accurate alignment of the surface.

- Forms shall be left in place until their removal is authorised and shall then be removed with care to avoid injury to concrete.
- Removal of forms shall be started when the concrete has achieved strength of at least twice the stress to which the concrete may be subjected at the time of removal of formwork.
- In normal circumstances and where ordinary Portland cement is used forms can be allowed to be struck asper the guideline given in clause 11.3 of IS 456.

SETTLEMENT OF FORMWORK AND CAMBER

- Due to various reasons such as closure of form joints, shrinkage of timber, dead load deflections, elastic shortening of form members or formwork, deflections, settlement may occur. The CONTRACTOR shall take precautions, including using adequately rigid formwork, to prevent excessive settlement/ deflection; the usual acceptable limit being 1/500 of the spans of the formwork.
- In the absence of any specified camber on the drawings, soffit of all beams more than 5 m in span and other than pre-stressed concrete beams shall be laid to a camber, the amount of which at mid span shall not be less than 1/500 of the span of the structure. The profile of soffit shall be parabolic.

PREPARATION PRIOR TO CONCRETE PLACEMENT

- The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. All rubbish, particularly chippings, shavings, sawdust, wire pieces, dust, etc. shall be removed from the interior of the forms before the concrete is placed. Where directed, cleaning of forms shall be done by blasting with a jet of compressed air at no extra cost.
- All arrangements - formwork, equipment and proposed procedure, shall

be approved by TPPA/PMC. CONTRACTOR shall maintain separate Pour Card for each pour as per the format enclosed.

TRANSPORTING, PLACING AND COMPACTING CONCRETE

- Concrete shall be transported from the mixing plant to the formwork with minimum time lapse by methods that shall maintain the required workability and will prevent segregation, loss of any ingredients or ingress of foreign matter or water.
- In all cases concrete shall be deposited as nearly as practicable directly in its final position. For locations where, direct placement is not possible and in narrow forms, CONTRACTOR shall provide suitable drops and "Elephant Trunks". Concrete shall not be dropped from a height of more than 1.5 m.
- Concrete shall not be placed in flowing water. Under water concrete shall be placed in position by tremie or by pipeline from the mixer and shall never be allowed to fall freely through the water.
- While placing concrete the CONTRACTOR shall proceed as specified below and ensure the following:

    (a) Continuously between construction joints and predetermined abutments.

    (b) Without disturbance to forms or reinforcement.

    (c) Without disturbance to embedment.

    (d) Without dropping in a manner that could cause segregation or shock.

    (e) In deep pours only when the concrete and formwork is designed for this purpose and by using suitable chutes or pipes.

    (f) Do not place if the workability is such that full compaction cannot be achieved.

    (g) Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting, if necessary. In supported excavations, withdraw the linings progressively as concrete is placed.

    (h) If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.

    (i) Ensure that there is no damage or displacement to sheet membranes.

(j) Record the time and location of placing structural concrete.

(k) When concrete is brought from batching plant to site in millers, the time of mixing and the time of pour shall be checked to ensure that setting has not started.

- Concrete shall normally be poured & compacted in its final position within initial setting time. Concrete shall be compacted during placing with approved vibrating equipment without causing segregation until it forms a solid mass free from voids, thoroughly worked around reinforcement and embedded fixtures and into all corners of the formwork. When placing concrete in layers advancing horizontally, care shall be taken to ensure adequate vibration, blending and melding of the concrete between successive layers. Vibrators shall not be allowed to come in contact with reinforcement, formwork and finished surfaces after start of initial set. Over-vibration leads to segregation and shall be avoided.
- Concrete may be conveyed and placed by mechanically operated equipment after getting the complete procedure approved by TPPA/PMC. The slump shall be held to the minimum necessary for conveying concrete by this method. When concrete is to be pumped, the concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.
- CONTRACTOR shall submit a method statement to TPPA/PMC for approval, furnishing details of pour sequence, thickness of each layer, mixing and conveying equipment proposed, etc. preferably with a sketch.
- Except when placing with slip forms, each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete before the start of subsequent placement. Placing shall stop when concrete reaches the top of the opening in walls or bottom surface of slab, in slab and beam construction, and it shall be resumed before concrete takes initial set but not until it has had time to settle as determined by TPPA/PMC. Concrete shall be protected against damage until final acceptance.

PLACING OF CONCRETE BY PUMPING METHODS

- Placing of concrete by pumping will be as specified or authorised by TPPA/PMC to achieve the required speediness of construction and maintain targeted schedules.
- Pumping of concrete shall be done only after conducting pumpability trials to ascertain the performance of fresh concrete on pumping in presence of the TPPA/PMC as per approved procedure. During pumping, concrete shall be conveyed either through rigid pipe or through flexible hose and discharged directly into the desired area. A steady supply of pumpable concrete is necessary for satisfactory pumping. Pumpable concrete requires properly graded aggregates, material uniformity, consistent batching and thorough mixing. They shall be used for concreting densely reinforced structures, internal structural elements of buildings and for large pours of concrete. Concrete pumps used shall be able to deliver concrete over a horizontal and vertical distance as per the directives of the TPPA/PMC.
- Placement of normal concrete by pumping will be permitted as specified or authorised by the TPPA/PMC. The decision, whether to pump any mix shall rest entirely with the TPPA/PMC and no extra claims for payment on this account will be entertained. The pumping equipment, pipe lines and accessories as well as proportioning of pumpable concrete shall generally conform to the recommendations of ACI-304.2R (latest revision) – Placing of concrete by pumping method - Proportioning of pumpable mixes gives certain guide lines on concrete mix. However, final selection of mix shall be as instructed by the TPPA/PMC.

PUMPING EQUIPMENT

- Requisite number of modern dependable concrete pumps capable of pumping concrete of specified quality at a rate required to meet the construction schedules, together with a balanced complement of pipelines, accessories, spare parts, power-controlled placing booms, and experienced pump operators and maintenance staff shall be provided at locations and in a manner approved by the TPPA/PMC.

- The pumping plant shall be completely installed on each occasion, with preliminary mock operation for a sufficient length of time prior to scheduled placement of a concrete pour, to enable the TPPA/PMC to conduct pumpability tests and necessary adjustments for the concrete mix, prior to use of the pumping for placement of concrete.

PROPORTIONING PUMPABLE CONCRETE

- Although the ingredients of concrete to be placed both by pumping and by other means are the same, more emphasis shall be laid on the quality control and proportioning of a dependable pumpable mix. Dependability is ensured by the equipment and the operator, with the control of all the ingredients in the mixture, the batching and mixing operations, and the knowledge and experience of all the personnel from beginning to end.
- Concrete mixes for pumping shall be "plastic" at all times. Stiff mixes shall not be used for pumping as they do not pump well. Attention shall be given to the mortar (cement, sand and water) and the amounts and sizes of coarse aggregates.

3.6 NORMAL WEIGHT AGGREGATES

3.6.1 COARSE NORMAL WEIGHT AGGREGATES

The maximum size of angular coarse aggregate shall be limited to one-third of the smallest inside diameter of the hose or pipe based on simple geometry of cubical shape aggregates. For well-rounded aggregates, the maximum size shall be limited to 40% of the pipe or hose diameter. Adequate provisions shall be made to eliminate over size particles in the concrete by screening or by careful selection of aggregate. Gradation of sizes of coarse aggregates shall correspond to Grades A and B of Table-1 and shall meet IS: 2386 requirements. If required, certain fractional sizes shall be combined and blended to produce the required gradation. Greater emphasis shall be laid on uniformity of gradation throughout the entire job.

The maximum size of the coarse aggregate has a significant effect on the volume or amount of coarse aggregate that may be effectively used in a mix. As will be seen from Table-2 the quantity of coarse aggregate must be substantially reduced as the maximum size becomes smaller. Mixes consisting of too large a portion of coarse aggregate with less cement shall be avoided.

Grading Requirement of Coarse Aggregates for Pumped Concrete

Grade – A (Maximum Size 40 mm)		Grade – B (Maximum Size 20 mm)	
Sieve Size	Percent Passing by Weight	Sieve Size	Percent Passing by Weight
50 mm	100	25 mm	100
40 mm	95 to 100	20 mm	90 to 100
20 mm	35 to 70	12.50 mm	20 to 55
10 mm	10 to 30	10 mm	0 to 15
4.75 mm	0 to 5	4.75 mm	0 to 5

Volume of Coarse Aggregate per unit of Volume of Concrete

Grade – A (Maximum Size 40 mm) & Grade – B (Maximum Size 20 mm)				
Maximum Size	Volume of Dry-rodded Coarse Aggregate per Unit Volume of Aggregates of Concrete for different Fineness Moduli of sand			
	FMS = 2.40	FMS = 2.60	FMS = 2.80	FMS = 3.00
10	0.50	0.48	0.46	0.44
12.50	0.59	0.57	0.55	0.53
20	0.66	0.64	0.62	0.60
25	0.71	0.69	0.67	0.65
40	0.76	0.74	0.72	0.70
50	0.78	0.76	0.74	0.72

Fine Normal Weight Aggregate

Fine aggregate shall consist of natural sand, manufactured sand or a combination thereof and shall be graded within the following limits.

Sieve Size	Percent passing by Weight
9.50 mm	100
4.75 mm	95 to 100
2.36 mm	80 to 100
1.18 mm	50 to 85
600 microns	25 to 60
300 microns	10 to 30
150 microns	2 to 10

3.7 WATER AND SLUMP

- Water requirements and slump control for pumpable normal weight concrete are interrelated and extremely important considerations. The mixing water requirements for a mix shall be determined by the TPPA/PMC and modified to suit the fineness of sands, quality of admixtures, additives, cement replacements or other special materials being used in the concrete.
- The CONTRACTOR shall establish the optimum slump jointly with the TPPA/PMC for a pumpable mix at the discharge hose end and shall maintain control of that slump throughout the course of a job. Excess water shall not be added in the receiving hopper to make the concrete mix pumpable, instead attempt shall be made to obtain 'truly plastic mix' by proper proportioning.
- Slump of concrete may undergo change between initial mixing and final placement. If the slump at the discharge hose end are to be maintained within specified limits, it will be necessary for the concrete to enter the pump at a higher slump to give the required mobility during transport. Slump adjustments by re-proportioning of the constituents as may be

required shall be carried out by the CONTRACTOR jointly in consultation with the TPPA/PMC for every type of mix and for every new placement and set up of pump and pipelines.

3.8 CEMENT CONTENT

- The determination of the cement content for a normal weight pump mix shall follow the same basic principles used for conventionally placed concrete. The water cement ratio shall be established by the TPPA/PMC based on exposure conditions, strength requirements or minimum cement consumption, whichever governs. However, because of slightly higher ranges of slump and ratios of fine to coarse aggregates, the pump mix may require an increase in the amount of cement above those pumpable concrete mass. The total quantity of fines passing through the 300-micron sieve including cement, fine sand, stone dust, etc. shall be in the range of 380 to 450 kg/cum of concrete.
- Cement content in case of M50 shall be maximum of 425 kg/cum, and shall be a mix with high range of workability i.e. 175 mm +/- 25 mm. All the contents shall be mixed based on the mix design and trial studies.
- While establishing the cement content for normal weight trial mixes, it will be necessary to consider the capabilities of the pump and its operator for over strength proportioning in the laboratory to provide for field variations.
- In case of pumping difficulties, it is desirable and economical to correct any deficiencies in the aggregates, especially in the sand instead of using extra quantities of sand. With well graded coarse and fine aggregates properly combined, the cement requirement for pumpable mixes shall closely resemble to those used in conventionally placed concrete.

3.9 ADMIXTURES

- The use of poor aggregate grading or aggregate with continuous change in overall grading of the ‘combinations’ during concreting operation will make special admixtures quite useful in overcoming the main difficulty

like blockage in pumping. These admixtures shall be incorporated in pumpable concrete to achieve the following.

(a) Increase in the range of mix designs, which may be successfully pumped using water reducing admixtures/ super plasticizers with the approval of the TPPA/PMC.

(b) Reducing the risk of pipeline blockages by preventing segregation of concrete mix.

(c) To have satisfactory/ specified performance both in fresh and hardened state.

- Any admixture that increases workability in normal weight concrete may usually improve pumpability. The choice of type of admixture and the advantage gained from its use in concrete to be pumped will depend on the characteristics of the pump mix and will be finally decided by the TPPA/PMC in consultation with the admixture manufacturer.
- For improvement of pumpability the following admixtures are generally recommended. Such admixtures used shall conform to ASTM C-494/ IS: 9103:

(a) **Water Reducing Admixtures/ Super Plasticizers**

These cause reduction in water requirements at constant slump or an increase in slump at constant water-cement ratio. They can be designed to have no apparent effect on setting time, or alternately to achieve varying degrees of acceleration or retardation in rate of hardening of the mixture. Most water reducing admixtures increase the palpability of the concrete mix through plasticizing action.

(b) **Air Entraining Admixtures**

Air entrained concrete is considerably plastic and more workable than non-air entrained concrete. It can be pumped with less coarse aggregate segregation and has less tendency for concrete to bleed. Start-up after shutting down is also generally easier due to reduced bleeding. For pumped concrete these limits shall be obtained at the

point of placement in the structure. To compensate for air content loss in the air entrained concrete higher entrainment of air may be required at the batching plant. The required adjustment of admixture dose shall be carried out by the TPPA/PMC after carrying out necessary air loss tests. An air content in the range of 3 to 5% shall be preferred as higher ranges reduces the delivery capacity of pump systems due to increased compressibility of the concrete and reduces strength of concrete.

If air-entraining plasticizer is used, typically 13% minimum water reduction is possible. Therefore, strength loss due to air entrainment will be compensated by using such air- entraining plasticizer.

Finely Divided Mineral Admixtures

- CONTRACTOR, if specifically approved by the TPPA/PMC, can use mineral admixture. In concrete mixtures, deficient in fines, the addition of a finely divided inert mineral admixture generally improves workability, pumpability, reduces the amount of bleeding and increases the strength.
- The effect on strength depends on the type of mineral admixture used, conditions under which the concrete is cured, and the amount of admixture used. Water soluble polymers obtained from cellulose derivations may also be used as an admixture with a small dose of 60 to 150 gms/cum to increase viscosity of the mixing water and reduce the frictional resistance to flow and bleeding in the pipe system.

TRIAL MIXES

- The trial mixes for pumping shall be prepared and tested in the Site laboratory by CONTRACTOR in accordance with clause 14.9 of this specification. The ingredients, particularly the coarse and fine aggregates shall also be checked for the conformance to the desired properties described, by the CONTRACTOR. Table-2 may be used to select the volume of coarse aggregate per cum of concrete.

- In using this Table, it is recommended that the highest probable fineness modulus of sand be used rather than the average fineness modulus to ensure consistent performance during pumping. For additional plasticity, 10% reduction in coarse aggregate quantities shall be considered. Experience with the use of local aggregate and their uniformity shall also be considered in the proportioning concepts.

MIX DESIGN FOR PUMPABLE CONCRETE

- Taking the above factors into account, the concrete shall first be designed for normal placement conditions and then modified as necessary to suit pumping. The following procedure shall be adopted:

(a) Design the mix for specified characteristic strength and workability.

(b) Check and ensure combined grading of aggregates i.e. as uniform grading as possible. This requirement is vital as gaps or partial gaps are the basic reasons for poor water retention property and segregation under pressure.

(c) Determine the optimum sand content for the required workability and increase sand content by reducing volume of coarse aggregate per unit volume of concrete by about 10% as a degree of protection against under sanding due to batch variations.

(d) Recheck the minimum cement content for durability.

(e) Examine the total fines content i.e. cement and fine aggregates passing through 300- micron sieve and readjust the mix, if necessary. A very rich mix with fine sand will be as problematic as a coarse sand with lean mix.

Re-appraise the grading if the particle shape of any fraction is such as may cause excessive voids. Re-adjust as required, if necessary, examining the void ratio of various combinations, using void meter to achieve minimum voids at the expense of 'sufficient fines' content.

(f) If dissatisfied with (a) to (f) as above, consider what remedial

action may be taken to overcome the troublesome factor. For example, the following two situations may occur:

If the sand has coarser fraction it is worth considering the addition of a proportion of finer sand, or alternately if the sand has finer fraction, the addition of coarse fraction may be considered. Addition or reduction of cement may help, but the correct solution is to overcome the gap in overall grading as stated above.

(g) In a 20 mm aggregate maximum size, if there is an excess of 10 to 4.75 mm fraction, and this fraction is flaky with unduly large surface area, either increase the sand content to reduce the possibility of segregation and to reduce the inter-practical stresses, or (better) re-grade using single sized aggregates.

(h) At the trial mix stage small variations can be made preferably in the light of the pressures registered and observed performances through the pump. In certain cases, admixtures may be economically and beneficially used to improve or eliminate circumstances that cannot readily be overcome by other means.

TESTING FOR PUMPABILITY

No mix shall be accepted for use on a pumping job until an actual test under field condition has been completed. Testing a mix for pumpability involves duplication of the anticipated job condition from beginning to end. The batching and conveying by truck mixers shall be the same as will be used, the same pump and operator shall be present. The pipe and hose layouts shall simulate the actual condition as far as practicable. Prior use of a mix on another job may furnish evidence of pumpability, but only if conditions are duplicated. Before commencing a new concreting job, the CONTRACTOR shall carry out pumpability tests in consultation with the TPPA/PMC. Concrete used in such tests shall not be used in the actual construction, unless specifically permitted by the TPPA/PMC. Following parameters shall be established by pumpability trials:

(a) In-situ compressive and split tensile strength of concrete.

(b) Curing the sample at Site by sprinkling water.

(c) Curing the sample at Laboratory in curing tanks.

(d) Wet sieve analysis of concrete to ensure that proportions of ingredients before and after pumping are same.

CURING

Curing and protection shall start immediately after the compaction of the concrete to protect it from:

(a) Premature drying out, particularly by solar radiation and wind;

(b) Leaching out by rain and flowing water;

(c) Rapid cooling during the first few days after placing;

(d) High internal thermal gradients;

(e) Low temperature or frost;

(f) Vibration and impact, which may disrupt the concrete and interfere with its bond to the reinforcement.

4 TERMITE PRE-CONSTRUCTIONAL CHEMICAL TREATMENT IN STRUCTURES

This specification covers the general requirements for Anti-termite Constructional Measures, chemical treatment of soils for the protection of buildings from attack by subterranean termites, chemicals to be used with their minimum rates of application and procedure to be followed while the building is under construction.

4.1 APPLICABLE CODES AND SPECIFICATIONS

The following codes, standards and specifications are made a part of this specification. In case of discrepancy between this specification and those referred to herein, this specification shall govern.

The codes and standards mentioned below shall be latest as on the day of award of contract of the works unless otherwise specified. Contractor shall be responsible to inform to the TPPA/PMC in case of any revisions/re-affirm/amendment in the relevant codes and standards after the date of award of contract within 30 days of the issue of such revision/re- affirm/amendment of the code/ standard. TPPA/PMC

may approve use of the earlier code/ standard if the revisions do not materially affect the statutory requirements of the project or does not impact safety practices. Any cost impact arising out of such revisions shall be mutually agreed.

IS 6313 Part 1: 1981 (R2015)	Code of practice for anti-termite measures in buildings: Part 1 Constructional measures
IS 6313 Part 2: 2013 (R2018)	Code of Practice for Anti-Termite Measures in Buildings - Part 2: Pre-Constructional Chemical Treatment Measures
IS 6313 Part 3: 2013 (R2018)	Code of Practice for Anti-termite Measures in Buildings - Part 3: Treatment for Existing Buildings
IS:8944-2005	Specification for Chloropyrifos Emusifiable Concentrates
IS:16131-2015	Specification for inidacloprid suspension concentrate
IS:4015-1998	Guide for Handling cases of Pesticide Poisoning

TERMS

- ✓ Contractor shall furnish all tools, plants, instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables, any and everything necessary whether such items are specifically stated herein for completion of the job in accordance with specification requirements or not.
- ✓ All work shall be done in the order of progress required by TPPA's construction programme. Contractor shall take all necessary precautions to prevent any accident in connection with the performance of the work.
- ✓ On completion of all work, Contractor shall leave the entire premises within the site of his operation clean and free from all rubbish resulting from his operation.
- ✓ TPPA reserves the right to inspect, check and direct any or all operations at any stage of the work and to require unsatisfactory work to be remedied at Contractor's expense.
- ✓ No work shall be carried out under unsuitable weather conditions viz. when raining or when the soil is wet due to rain or sub-soil water.
- ✓ Chemicals shall be brought to site of work in sealed original containers. The materials shall be brought in, at a time, in adequate quantity to suffice for

the work. The material shall be kept in cool and locked stores. The empties shall not be removed from the work site till the relevant item of work has been completed and permission granted by TPPA/ TPPA/PMC.

- ✓ Chemicals available in concentrated forms with concentration indicated on the sealed containers only shall be used. Chemicals shall be diluted with water in required quantity before use, using graduated containers to achieve the desired percentage of concentration.

4.2 PRE-CONSTRUCTIONAL CHEMICAL TREATMENT

- ✓ Hand operated pressure pump with graduated containers shall be used to ensure uniform spraying of the chemical. Continuous check shall be kept ensuring that the specified quantity of chemical is used for the required area during the operation. On large projects, a power sprayer may be used to save time and labour.
- ✓ The treated soil barrier shall be complete and continuous under the whole of the structure to be protected. All foundations shall be fully surrounded by and in close contact with the barrier of treated soil. Each part of the area treated shall receive the specified dosage of chemical.
- ✓ Soil treatment shall start when the foundation trenches and pits are ready to receive mass concrete in foundations. Laying of mass concrete shall start when the chemical emulsion has been absorbed by the soil and the surface is quite dry. Treatment shall not be carried out when it is raining, or soil is wet with rain or sub-soil water. The foregoing also applies in the case of treatment to the filled earth surface within the plinth before laying the subgrade for the floor.
- ✓ The treated soil barriers shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system

5 WATERPROOFING WORKS

5.1 TERRACE WATERPROOFING

- ✓ The specified waterproofing system is meant for the water tightness and protection of roof/podium slab from water penetration. Waterproofing shall be seamless waterproofing membrane. The waterproofing membrane has high elasticity having elongation > 500%, excellent, tensile strength of >4 MPa, Shore A hardness of 60-65 (±5).
- ✓ The cleaning and preparation of the substrate on which the waterproofing coating is applied as follow.
- ✓ Cleaning the surface, removing laitance ensuring substrate shall be free from dust by mechanical
- ✓ Grinding of the substrate, ensuring substrate shall be free from any coating, oil or other contaminants that interferes to the bond or membrane with concrete.
- ✓ Treatment of Honey combing/ loose concrete, cracks, termination points in wall to slab joints using geotextile fabric.
- ✓ Providing and applying 100 x 100mm thick fillet using cement concrete M15 grade mixed with polymer @ 10kgs per 50 kg bag of cement.
- ✓ Directly above prepared mother concrete, parapet walls, upstands pedestals etc. apply moisture insensitive epoxy primer followed by sand broadcasting. Consumption of primer shall be between 0.2-0.25kgs per sqm
- ✓ Apply PU membrane in two coats. Check the application shall reach to every corner, covering pipe penetrations, up stands, pedestals seamlessly.
- ✓ Waterproofing is to be terminated at parapet walls by taking waterproofing vertically upto 300mm above finished floor level. Vertical to horizontal joints shall be treated using geotextile mat to be sandwiched using PU waterproofing.
- ✓ 48 Hours water ponding to check leakage (if any).
- ✓ All areas where waterproofing is exposed to sun such as parapet walls, upstands, terminations etc. shall be protected using UV top coat

6 GENERAL BUILDING WORKS

6.1 BLOCK WORKS

Light Weight Block Masonry (AAC Block)

The lightweight block shall be of approved manufacturer. The blocks shall have thickness of 200 mm, 150 mm, 100 mm for walls, partitions, and cladding work, etc. The blocks shall have a maximum density of 640 kg / cum or less.

Structural Strength requirement:

a) Compressive Strength: The lightweight concrete block shall have a minimum compressive strength of 35 kg / sq.cm.

b) Bending Compression: 15 kg / sq.cm.

The mortar used for light weight concrete block shall be as specified in the Schedule of Items; Cement and water used in mortar shall conform to the quality as described in 'Concrete', whereas sand used for mortar shall be fine screened only. The lightweight concrete block masonry should not be used below ground or in plinth. The block masonry work shall be built in stretcher course only.

The lightweight concrete block (Siporex or equivalent) wall or required thickness as described in Schedule of Items, shall be constructed with R.C.C. vertical and horizontal stiffeners, of required size at suitable intervals, as directed by the TPPA/PMC, or as per drawing. R.C.C. and steel reinforcement shall be included in the rate and will not be paid separately. The masonry work shall be raised truly in plumb. All courses shall be laid truly horizontal, and all vertical joints shall be truly vertical. The vertical joints should be not more than 12mm thick and shall be fully filled from the top with cement mortar without any void in masonry.

All face joints shall be raked out to a minimum depth of 15 mm. by raking tool, during the progress of the work, when the mortar is still green, so as to provide proper key for the plaster or pointing. All fixtures, pipes, outlets of water, holdfasts, of doors, windows, which are required to be built into the block masonry,

shall be embedded in mortar or cement concrete, as specified, in correct position, as the work proceeds and as directed by the TPPA/PMC. After masonry work is over, the masonry shall be marked with date of construction, visible for inspection and curing.

6.2 CURING

All joints of block masonry shall be kept constantly moist by sprinkling water on all joints for a minimum period of seven days.

6.3 SCAFFOLDING

Scaffolding shall be double and shall be erected with steel sections or pipes of adequate strength so as to be safe for construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the TPPA/PMC in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to properly or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed. Block work shall be carried out with double scaffolding only. Making holes of any kind for the purpose of supporting the scaffolding shall not be permitted.

6.4 STEEL AND ALUMINUM WORKS

- Fire rated door shall be as per item description and shall be of approved make
  and shade as per drawing.
- Hollow metal 2 hr fire rated doors as per IS 3614 part-1 & part-2 for stability and integrity. Pressed Galvanized steel shall confirm to IS 277.
- Sample shall be approved by TPPA/PMC before installation. Door shutter - Door leaf shall be 46mm thick fully flush double skin door with or without vision lite. Door leaf shall be manufactured from 1.2mm (minimum) thick galvanised steel sheet. The internal construction of the door shall be rigid reinforcement pads for receiving appropriate hardware. The infill material

shall be resin bonded rockwool slab. All doors shall be factory prepped for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges shall be interlocked with a bending radius of 1.4mm. For pair of doors astragals has to be provided on the meeting stile for both active and inactive leaf.

- Door shutter shall be fixed with SS 304 grade fire rated hinges (min 4 no of hinge per shutter) of approved make.
- EPDM open cell sponge seal of size 7x9 mm of approved make shall be provided around the door for single or double shutter for fire and smoke protection, self-adhesive type etc complete
- Door frame - Door frame shall be double rebate profile of size 143 x 57 mm made from 1.60mm (16gauge) minimum thick galvanized steel sheet. The edges shall be interlocked with a bending radius of 1.4mm. Frames shall be mitred and field assembled with self-tabs. All provision shall be mortised, drilled and tapped for receiving appropriate hardware. Rubber door silencers shall be provided on the striking jamb. Frames shall be provided with back plate bracket and anchor fasteners for installation on a finished plastered masonry wall opening. Once frame installed shall be grouted with cement & sand slurry necessary for fire doors on the clear masonry opening.

Vision Panel:

Vision lite wherever applicable shall be provided as per manufacturer's recommendation with fire rated ceramic gasket of approved make as beading and screws from inside. The glass shall be 6mm clear borosilicate fire rated glass of relevant rating of the door.

Finish:

All the doors and Frames shall be finished with approved shade powder coated paints with an average DFT of 70 microns and tested for salt spray test of 500hrs.

Test:

Recommended fire door shall have doors tested at CBRI or ARAI for maximum rating of 2hrs with vision panel. Test certificates shall be available for vision lites/panels

as part of the fire door assembly. Independent glass test certificates shall not be accepted. Manufacturer test certificate shall cover doors both single and double leaf and all doors supplied shall be within the tested specimen, deviation in specification and sheet thickness other than what is mentioned in the test certificates are not allowed. Proper label confirming the type of door and the hourly rating is mandatory.

Door frame:

The rate shall be for unit of one meter and paid in relevant item. Rates shall be inclusive of frame, back plate, rubber silencer, smoke seal, anchor fastener, installation of frame with grout filling, testing etc.

Door shutter:

The rate shall be for unit of one Sqm and paid in relevant item. Rate shall be inclusive of shutter with infill material, SS 304 fire rate butt hinges, smoke seal (in case of double shutter fire door, between the two shutter), finishing and installation but excluding the cost of Vision panel and fire rated hardware other than hinge.

Vision Panel:

The rate shall be for unit of one Sqm and paid in relevant item. Rate shall be inclusive of a fire rated glass with G.I. beading of finish same as shutter & special ceramic tape/ gasket. Fire rated hardware other than hinge and smoke seal shall be paid separately i.e. Door closer, panic device, lock, trim.

6.5 STAINLESS STEEL RAILING

Stainless steel tubular sections should be used for hand railing; design should be as per drawing.

Mock-up

The contractor shall install a full-scale mock-up for a length of 7.5m of typical detailing treatment at locations to be confirmed by the Architect. The visual mock-up for the assembly must be accepted and endorsed by the Architect with respect to the appearance of colour.

6.5.1 ALUMINUM FIXED LOUVER/ FINS

Providing, fixing, aluminium fixed louver/Fins made of approved type of louver/profile section of approved make having polyester powder coating of minimum 60 micron on all the surfaces of approved shade and make as per manufacturer's specifications. Aluminium frame work shall be paid separately under relevant AS PER DESIGN item. Contractor shall submit the shop drawing for louver based on concept design/ intent drawing and as per elevation. Aluminium louver section shall be fixed on aluminium framing with required SS screws, fasteners, Heavy duty angle cleat, hardware as per approved shop drawing etc complete for all floor, all height including scaffolding as directed by TPPA/PMC.

Delivery, Storage and Handling

Delivery - At the time of delivery all materials shall be visually inspected for damage. Any damaged boxes, crates, louver sections, etc. shall be noted on the receiving ticket and immediately reported to the shipping company and the material manufacturer.

Storage - Material may be stored flat, on end or on its side. Material may be stored either indoors or outdoors. If stored outdoors the material must be raised sufficiently off the ground to prevent it being flooded. If stored outdoors the material must be covered with a weather-proof flame-resistant sheeting or tarpaulin.

Handling - Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking. Louver sections may be hoisted by attaching straps to the jambs and lifting the section while it is in a vertical position. Louver sections should only be lifted and carried by the jambs. Heads, sills, and blades are not to be used for lifting or hoisting louver sections.

Fabrication - Provide louver models, blank-off panels, structural supports, and accessories as specified and/or shown on the drawings. Materials, sizes, depths, arrangements, and material thickness to be as indicated or as required for optimal performance with respect to strength; durability; and uniform appearance. Louvers

to be mechanically assembled using stainless steel or aluminium fasteners. Include supports, anchorage, and accessories required for complete assembly.

Louvers/Fins - Material: Heads, sills, jambs and mullions to be one-piece structural aluminium members with integral caulking slot and retaining beads. Mullions shall be sliding interlock. Blades to be one-piece aluminium extrusions with reinforcing bosses.

6.6 MS LADDER

It is the overall length of up-rights of the ladder measured from end to end. All ladders shall be constructed to carry their intended loads safely. Side rails of metal ladders shall be of sufficient cross-section to prevent excessive deflection in use. Ladders which are to remain as a part of the permanent structure after completion of building operations, shall conform to any local, state or municipal byelaws which may be applicable.

Safety shoes, lashing or other effective means shall be used to avoid danger of slipping. All surfaces of the ladder shall be planed, free of splinters and edge of handrails used shall be bevelled. Rung spacing shall be uniform and not over 300 mm on centres. Rungs shall be recessed at least 12 mm into rails. Top and bottom of each built-up ladder shall be securely fastened.

Inspection and Testing - Metal ladders shall be inspected at least once in three months and all parts checked for wear, corrosion, and structural failure. All ladders shall be carefully inspected, if incidentally dropped or otherwise damaged in use.

Storage and Maintenance - Metal rungs shall be cleaned to prevent accumulation of materials which may destroy non-slipping properties. All fittings shall be carefully checked.

6.7 DOORS, WINDOWS, AND VENTILATORS

This specification covers the general requirements for doors, windows and ventilators and other related works forming a part of this job, which may be required to be carried out though not specifically mentioned above. The work

under this specification shall consist of furnishing of all tools and tackles, plants, labour, materials, and everything necessary for carrying out the work.

Woodwork in doors, windows, & ventilators

Timber to be used shall be first class Teak wood as per IS: 4021. Timber shall be of the best quality and well-seasoned by a suitable process before being planned to the required sizes. The maximum permissible moisture content shall be from 10 to 16 percent for timber 50mm and above in thickness and 9 to 14 percent of timber less than 50mm in thickness for different regions of the country as stipulated in IS: 287. Timber shall be close grained, of uniform colour and free from decay, fungal growth, boxed heart, pitch pockets or streaks on the exposed edges, borer holes, splits, and cracks.

Flush door shutters of the solid core type with plywood face panels shall conform to IS: 2202 (Part 1) and with particle board/hard board face panels shall conform to IS: 2202 (Part 2). Transparent sheet glass shall conform to the requirements of IS: 2835. Wired and figured glass shall be as per IS: 5437. Builder's hardware of fittings and fixtures shall be of the best quality from approved manufacturers.

6.8 UPVC DOORS AND WINDOWS SPECIFICATION

1. Material

Type: Unplasticized Polyvinyl Chloride (uPVC)

Grade: UV stabilized, Lead-free formulation (as per RoHS standards)

Colour: White / Other (Specify RAL code if applicable)

Finish: Glossy / Matt / Wood Grain Textured

2. Profiles

Brand: [Specify brand – e.g., VEKA, Rehau, Fenesta, etc.]

Chamber System: Multi-chambered profile (minimum 3 chambers)

Wall Thickness: Minimum 2.5 mm (outer wall)

3. Glazing

Type: Single / Double / Triple Glazing

Glass Thickness: 5 mm to 24 mm (as per design requirement)

Glass Type: Clear / Tinted / Reflective / Toughened / Laminated

Sealing: Double EPDM / Silicone rubber gasket for air and water tightness

4. Hardware

Hinges: Stainless steel / Powder-coated

Locks: Multi-point locking system / Espagnolette

Handles: Powder-coated aluminium / uPVC / SS

Rollers (for sliding systems): Heavy-duty nylon or stainless steel

5. Types of Windows

Casement (Side / Top Hung)

Sliding (Horizontal / Vertical)

Fixed / Combination

Tilt & Turn

Bay Windows

Louvered (if applicable)

6. Types of Doors

Sliding Doors (2, 3, or 4-track system)

Casement Doors (Inward / Outward)

Folding Doors / Bi-fold Doors

Lift & Slide / Tilt & Slide Doors

7. Thermal & Acoustic Performance

U-value: ≤ 1.5 W/m^2K (for double glazing)

STC Rating: 30–45 dB (based on glazing configuration)

8. Water & Air Tightness

As per EN 12208 and EN 12207 standards

Proper drainage and reinforcement provisions included

9. Reinforcement

Material: Galvanized Steel Reinforcement

Thickness: Minimum 1.2 mm to 1.5 mm

Provided in frame and sash profiles as per design requirement

10. Installation

Frames fixed using anchor fasteners / screws

All joints sealed with silicone sealant

Protective tapes removed after installation

Foam / backing rod and sealant used for gaps between frame and wall

11. Quality Standards

Conforms to ISO 9001:2015

Tested for wind load, UV resistance, impact strength, etc.

6.9 KOTA STONE / GRANITE SLAB WORK

The slabs shall be of approved selected quality, hard, sound, dense and homogenous in texture, free from cracks, decay, weathering, and flaws. The percentage of water absorption shall not exceed 5 percent as per test conducted in accordance with IS:1124.

The slabs shall be hand or machine cut to the required thickness. Tolerance in thickness for dimensions of tile more than 100 mm shall be ±5mm. This shall be + 2mm on dimensions less than 100mm.

Slabs shall be supplied to the specified size with machine cut edges or fine chisel dressed to the full depth. All angles and edges of the slabs shall be true and square, free from any chipping giving a plane surface. Slabs shall have the top surface machine polished (first grinding) before being brought to site. The slabs shall be washed clean before laying.

6.10 EPOXY FLOORING PAINTING

The epoxy flooring work shall include the supply of materials, surface preparation, and application of an epoxy-based coating system on concrete floors to achieve a

durable, abrasion-resistant, and chemically-resistant finish. The flooring system shall comprise a primer coat, base coat, and optionally a top coat, using approved high-performance epoxy materials from reputed manufacturers such as Sika, Fosroc, BASF (Master Builders), Pidilite, or Asian Paints. The selected epoxy system must meet minimum performance criteria including compressive strength of not less than 60 N/mm^2, tensile strength of 10 N/mm^2, and adhesion strength exceeding 1.5 N/mm^2 as per relevant ASTM standards.

Prior to application, the surface must be prepared thoroughly by mechanical means such as grinding or shot blasting to remove laitance, oil, grease, dust, and any loosely bonded material. The prepared surface shall have a moisture content not exceeding 5% and must be free of cracks or undulations, which shall be repaired using epoxy mortar. The concrete surface shall exhibit a roughness equivalent to CSP 3–5 (as per ICRI guidelines). Application shall commence only when ambient temperatures are between 10°C and 35°C, with relative humidity below 80%, and substrate temperature at least 3°C above dew point to prevent condensation.

A penetrating epoxy primer shall be applied first, ensuring full coverage and penetration. Once cured, a high-build epoxy base coat shall be applied using a notched trowel or roller to achieve a minimum dry film thickness of 1 to 3 mm, as specified. A spike roller shall be used immediately after base coat application to eliminate air entrapment. If required, a topcoat of UV-resistant epoxy or polyurethane may be applied to enhance surface gloss and protection. An anti-skid finish may be provided by broadcasting quartz sand or approved aggregates between coats.

All work must be executed as per manufacturer's recommendations and project specifications. The completed surface shall be visually uniform, free of bubbles, cracks, or imperfections, and shall be subjected to dry film thickness (DFT) checks and adhesion testing as required. The area shall be protected from foot or vehicular traffic until full curing has occurred, typically 48 to 72 hours after final coat application. All works shall be carried out using appropriate personal protective equipment (PPE), with due attention to site safety and ventilation. Waste materials shall be disposed of in accordance with environmental guidelines.

6.11 SEALED CONCRETE FLOORING

The sealed concrete flooring system shall consist of a multi-step process involving mechanical surface preparation, grinding, honing, application of silicate-based hardeners, polishing, and final sealing. This system is designed to deliver a dust-free, highly durable floor with improved surface hardness, reduced porosity, increased abrasion resistance, and enhanced finish. The floor shall be resistant to oil and fuel spills, fungal growth, and weather-related degradation, while offering ease of maintenance and long-term performance.

The substrate must be prepared using mechanical grinding equipment to remove surface impurities and expose the desired level of aggregate. Depending on the project's aesthetic and functional requirements, one of the following aggregate exposure levels shall be achieved: Light Sand/Cream Finish, exposing only the sand particles and offering a smooth, creamy look; Salt & Pepper Finish, with light exposure of fine aggregate for an aged appearance; Medium Aggregate Finish, showing significant medium aggregate with limited large aggregate exposure; or Large Aggregate Finish, revealing deep-cut, large aggregate surfaces, often chosen for decorative or custom-seeded floors. Cutting depths shall range approximately from 1/16 inch to 1/4 inch, based on the required finish.

Following aggregate exposure, silicate hardeners shall be chemically bonded to the concrete substrate through a densification reaction. This step significantly enhances surface hardness and abrasion resistance. The floor shall then be polished to one of the following finish levels based on client preference: Matt-Plus, offering a non-reflective, dust-proof surface with reduced absorption of water, oil, and grease; Semi-Gloss, delivering a smooth, easy-to-clean surface with moderate reflectivity; or High-Gloss, creating a mirror-like surface with high reflectivity, superior hardness, and minimum maintenance costs, while also contributing to energy efficiency through enhanced light reflection.

This sealed concrete process is suitable for a wide range of applications including residential living rooms and garages, institutional spaces such as schools and universities, commercial areas like retail stores and office corridors, and high-traffic public and industrial facilities including hospitals, warehouses, airports, exhibition halls, and rail platforms. All work shall be performed by experienced

applicators in accordance with the approved method statements and manufacturer's recommendations to ensure a uniform, defect-free finish.

6.12 VITRIFIED TILES / CERAMIC TILES / GLAZED TILE FINISH

Tiles shall be of the best quality from an approved manufacturer. The tiles shall be flat, true to shape and free from flaws such as crazing, blisters, pinholes, specks or welts. Edges and underside of the tiles shall be free from glaze and shall have ribs or indentations for a better anchorage with the bedding mortar. Dimensional tolerances shall be as specified in IS: 13756.

6.13 ACID RESISTANT TILES

The ceramic unglazed vitreous acid resisting tiles shall conform to the requirements of IS: 4457. The finished tile when fractured shall appear fine grained in texture, dense and homogeneous. Tile shall be sound, true to shape, flat, free from flaws and any manufacturing defects affecting their utility. Tolerance in the dimensions shall be within the limits specified in the respective IS code.

The tiles shall be bedded and jointed using chemical resistant mortar prepared from resin type conforming to IS: 4832 (Part II) filter, accelerator and catalyst mixed in proportion as recommended by manufacturers. Method of usage shall generally be as per the requirements of IS: 4443.

Anti-skid groove

Making 3 nos. of anti-skid grooves 3mm x 3mm deep on top of staircase tread at front as shown in the drawing in Granite stone/ Kota stone or any type of stone etc complete. (Measurement shall be done in Rmt for a set of 3 no grooves together)

6.14 PLASTERING FOR WALL & CEILINGS

This specification covers the general requirements for finishing the plastered brick / concrete surfaces with Plaster of Paris and other related works forming a part of this job, which may be required to be carried out though not specifically mentioned above. The work under this specification shall consist of furnishing of all tools, plants, labour, materials and everything necessary for carrying out the work.

Putty works

Water resistant white cement-based putty ideal for use on concrete / mortar walls (internal and external) and ceiling.

Storage, handling & delivery

Material received at site shall be with original packing and labels. It shall be intact till issued for use of site. Material shall be stored at properly covered dry location and shall be safe from damage. Storage life should not exceed 6 months.

6.15 CEMENT PLASTERING WORK

The proportions of the cement mortar for plastering shall be 1:4 (one part of cement to four parts of sand) unless otherwise specified under the respective item of work. Cement and sand shall be mixed thoroughly in dry condition and then water added to obtain a workable consistency. The quality of water and cement shall be as per relevant IS. The quality and grading of sand for plastering shall conform to IS:1542. The mixing shall be done thoroughly in a mechanical mixer unless hand mixing is specifically permitted by the TPPA/PMC. If so desired by the TPPA/PMC sand shall be screened and washed to meet the specification requirements. The mortar thus mixed shall be used as soon as possible preferably within 30 minutes from the time water is added to cement. In case the mortar has stiffened due to evaporation of water this may be re-tempered by adding water as required to restore consistency, but this will be permitted only up to 30 minutes from the time of initial mixing of water to cement. Any mortar which is partially set shall be rejected and removed forthwith from the site. Droppings of plaster shall not be re-used under any circumstances.

6.16 GLASS & GLAZING

This part of the specification covers the requirement of providing fitting and fixing in position of glazing of different thickness comprising of clear float glass, wired glass, tinted glass, including curtain glass and hermetically sealed composite double glazing complete with all clips, putty, mastic, etc.

All glass and glazing shall have uniform reflective index and free form flaws, specs and bubbles.

The glass shall be brought to site in the original packing from the manufacturer and cut to size at site. The cut edges shall be straight and free from hips, spells or any other damages. Clear glass shall be float glass and shall be of thickness as specified in the schedule of items. Properties of float glass shall generally meet the requirements of IS: 14900.

Wired glass shall be thick rolled glass with centrally embedded wire mesh of Georgian type conforming to IS: 5437 Composite double glazing shall be made of two 6mm thick clear float glass on either sides and separated by 12mm air gap. The trapped air shall be kept dry by means of suitable desiccant. The glass shall be hermetically sealed. The composite double glazing shall be procured as finished product.

The curtain glazing shall consist of minimum 8mm thick heat strengthened glass fixed with framework made of aluminum sections designed as per structural requirements. The silicone sealant shall be of best quality and shall be brought to site in manufacturer's original packing.

MOCK-UP

The contractor shall prepare and install mock-up samples as per approved shop drawings.

Mock-up samples shall be of full size and shall be true representation of actual works to be carried out at site. Mock-ups may be part of completed work if undisturbed.

STORAGE, HANDLING & DELIVERY

- Material received at site shall be with original packing and labels. It shall be intact till issued for use of site.
- Material shall be stored at properly covered dry location and shall be safe from damage. All items shall be protected from dampness both during and after delivery to site.
- Partition shall not be installed in any room or space where concrete, masonry, or plaster work is not completed and dry.
- Care must be taken to ensure that the frames and panels of partition works are not damaged while transporting/erection.

6.17 FALSE CEILING WORKS

This specification covers the general requirements for fabrication and erection of aluminium / gypsum board false ceilings and other related works forming a part of this job, which may be required to be carried out though not specifically mentioned above. The work under this specification shall consist of furnishing of all tools, labour, materials and everything necessary for carrying out the work. The hard fiber board to be used in false ceiling shall be of an approved manufacture as per IS: 1658 or as approved by the TPPA.

- The fiber boards shall be made from substances compound of vegetable fibers such as wood pulp, wood chips or shavings bonded by a synthetic resin. Veneered particle boards shall have a core of particle board sandwiched or glued in between two or more veneers on outer surfaces.
- The fiber boards shall be fire resistant, termite and insect resistant, weather resistant, acoustically satisfactory, dimensionally stable, warp-free, easily workable, treated with anti-fungus chemicals, heat insulated and of adequate structural strength and should have good surface finish as approved by the TPPA.
- The size of fiber board ceiling tile shall generally be 600 x 600 x 12 mm thick. All types of boards and ceiling tiles shall be stored flat under cover at a clean dry place on firm ground. The Contractor should ensure that boards are not stacked on termite infected, wet or loose ground. The boards should be always carried on edges.
- The metal framework shall be interlocking type and made of sections of light metal, such as extruded anodized aluminium. The shape and cross section shall be such as to facilitate proper suspension and proper fixing of the ceiling boards covering them and shall be structurally sound and rigid

7 PAINTING TECHNICAL SPECIFICATION FOR BUILDING WORKS.

The scope includes the preparation of surfaces, supply of materials, and application of paint finishes on interior and exterior surfaces, including walls, ceilings, woodwork, metalwork, and other relevant areas as indicated in the drawings and BOQ.

1. Materials

- **Paint Brands:** Only approved brands shall be used (e.g., Asian Paints, Dulux, Berger, Nippon, etc.)
- **Types of Paint:**
  - **Interior Walls:** Acrylic emulsion / plastic emulsion
  - **Exterior Walls:** Weatherproof exterior emulsion / textured coatings
  - **Ceilings:** Matt emulsion
  - **Metal Surfaces:** Synthetic enamel / epoxy paint with primer
  - **Wood Surfaces:** PU / melamine polish, enamel paint, or wood stain as specified
- **Primers:**
  - Cement primer for masonry/plaster
  - Wood primer for timber
  - Zinc chromate/red oxide primer for ferrous metal surfaces

2. Surface Preparation

- **General:**
  - All surfaces shall be cleaned, dry, and free from dust, grease, oil, and loose particles.
- **Plastered Walls/Ceilings:**
  - Ensure surfaces are fully cured and free from efflorescence.
  - Apply putty/skim coat to fill undulations and smooth the surface.
  - Sanding to achieve a smooth finish.
- **Wood Surfaces:**
  - Fill nail holes and imperfections with wood filler.
  - Sand smooth with fine sandpaper.
- **Metal Surfaces:**

- Remove rust, mill scale, and grease.
- Apply rust-inhibitive primer before painting.

3. Application

- **Method:** Brush, roller, or spray as recommended by the manufacturer and suitable to the surface.
- **Coats:**
  - Minimum of one coat of primer and two coats of finish paint, unless otherwise specified.
  - Additional coats to be applied if full coverage is not achieved.
- **Drying Time:** Follow manufacturer's recommendation between coats.
- **Coverage:** As per manufacturer's data sheet and BOQ requirements.

4. Inspection and Approval

- **Mock-Up:** A sample area shall be painted and approved by the Consultant/Engineer before full-scale application.
- **Quality Checks:** Uniformity, color consistency, sheen, and surface finish will be inspected.
- **Touch-Up:** Any damaged or rejected areas shall be corrected and repainted.

5. Safety and Clean-Up

- Use personal protective equipment (PPE).
- Ensure proper ventilation during application.
- Clean tools and remove waste materials from site daily.
- Dispose of leftover materials in accordance with environmental regulations.

6. Reference Standards

- IS 2395: Painting of Buildings (Parts 1 & 2)
- IS 2074: Ready Mixed Paint, Air Drying, Red Oxide-Zinc Chrome Primer
- IS 5411: Plastic Emulsion Paint

Annexure – I A

LIST OF APPROVED MAKES

LIST OF APPROVED MAKES - CIVIL WORKS		
S. NO	**ITEM**	**APPROVED MAKES / VENDORS**
1	Chemical Admixtures	Penetron/ Fosroc/ Dr Fixit/ Hyperdesmo/ BASF/ Pidilite/ Sika/ Ecmas/ Sunanda Chemicals/ Mapei/ Hycrete/ Bal-Endura/ MC Bauchemie/ MYK Schomburg
2	Anti-Termite Pesticides - (Chloropyriphos)	DE – Nocil/ Bayer/ Biflex-TC from FMC/ Hilban from HIL
3	Cement OPC	Ultratech/ ACC/ Lafarge/ Birla/ Ramco/ Chettinadu/ Arasu/ Coramandal/ Bharathi/ Zuari/ Penna/ Maha/ Decca/ Sankar/ L&T Ultra Tech/ Dalmia
4	Cement - White	Birla white / JK
5	Reinforcement Steel	SAIL/ TATA (TISCO)/ RINL/ JSW steel/ Jindal / Kothari/ Thirumala/ Triple Power/ PMP/ Agni/ TATA/ Surya Dev/ DSRM/ Vizag/ Amman TRY/ Pulkit/ TSRM
6	Ready Mixed Concrete (RMC)	CLIENT / ENGINEER Approved RMC Suppliers
7	Waterproofing Compound	Penetron/ Fosroc/ Dr Fixit/ Hyperdesmo/ Sika/ BASF/ Ecmas/ Pidilite/ Shalimar TarProducts (STP)/ CICO/ Firestone/ Roffee
8	Blockwork-AAC Blocks	LICON/Xtralite from Ultratech/ Aerocon fromHIL/ ECOREX/ BILTECH
9	Blockwork-AAC block joining mortar	LICON/Fixoblock xtralite from Ultratech/ Smartfix from Aerocon/ MYK Laticrete/ Ardex Endura
DOOR FINISHES		
10	Teek Wood	1st quality sal or teak wood Well-seasoned wood free from knots. Moisture content report to be submittedby the vendor.
11	Flush Door Shutter (Factory pressed laminated)	Greenply/ Archidply/ Century/ Kutto duro/ Interwood
12	Laminates	Greenply/ Marino/ Century/ Sharon/ Greenlam/ Formica/ Sunmica/ Centura
13	Fire Doors	Shakti Horman/ Pacific/ Navier/iCLEAN - IHMS/ Promat/Bangalore Protech/tesco/kutty
14	Metal Doors (Non Fire rated)	Shakti Horman/Naviar/ Ahlada/
15	Rolling Shutters	INDIAN Entrance

LIST OF APPROVED MAKES - CIVIL WORKS		
S. NO	**ITEM**	**APPROVED MAKES / VENDORS**
		Automation/Indogerma/AMVEL/Swastik/ Gandhi Automation
DOORS/HARDWARE AND IRON MONGERY		
16	Door Closer	Dorma (XLC)/ Hafele/ Geze/Yale
17	Door Locks, Access Control Lock	Dorma (XLC)/Geze/ Kich/ Hafele/ Assa Abloy (Yale)
18	Door Hardware & Accessories (other than Floor spring/ Closer)	Dorma (XLC)/Kich/ Hafele/ Assa Abloy (Yale)/ Dorset/Classic/Crown/JHAL
19	Door Seal – Wool pile Weather S	Reddiplex/Osaka rubber/Enviro Sealz/ Anand
20	EPDM Gaskets	Anand/Osaka Rubber/Roop/Bohra/Hanu/Maharashtra polymer
FALSE CEILING		
21	Metal ceiling	Bumada/ Hunter Douglas/Armstrong/USG Boral.
22	Suspended ceiling system	Armstrong/Anutone Saint Gobain/USG Boral/Knauf
23	Calcium Silicate Board	Armstrong /Hilux/ Aerolite
24	Mineral Fiber board	Armstrong /Hilux/Aerolite/knauf amf/rockfon
25	Mineral Fibre Grid Ceilings	Armstrong/ Saint Gobain (Ecophon)/ Anutone/USG Boral/Knauf/AMF/ Dexune
26	Moisture Resistant Boards	Armstrong/Anutone/Saint Gobain (Ecophon)/USG Boral
27	Access panel in False ceiling	Saint Gobain/ USG Boral/ Knauf Denoline/ Anutone
FLOOR FINISHES		
28	Tiles/ Stone Adhesive	Pidilite/ MYK- Latricrete/ Ardex Endura/ KeraKoll/ Ultratech
29	Epoxy Grout/ Cementitious Grout for Flooring	Ardexl Endura/ MYK Latricrete/ Kerakoll/ Pidilite
30	Tile joint filler	Bal adhesives & grouts / roff rainbow tilemate of roff Construction Chemicals Pvt ltd. / winsil 20 m silicon sealant of ge bayer silicon m zentrival fm of mc -
31	External Paving Tiles (Cement based)	Pavit/ Basant baton/ Vyara/ Ultra/ Eurocon/ Super
32	Floor hardening compound	JBA/ Ardex endura/ Fosroc/ Basf/ Sika/ Sunanda chemicals

LIST OF APPROVED MAKES - CIVIL WORKS		
S. NO	**ITEM**	**APPROVED MAKES / VENDORS**
33	Concrete Cover Blocks	Astra/ Ramtec or approved equivalent. For exposed concrete, only pointed type shall be approved
34	Precast concrete tiles, Interlocking Paving, Brickpaver	Vyara/ Basant betons/ Super Decorative floorings/ Ultra /NITCO
35	Ceramic Tiles	Kajaria/ RAK/ Restile/ Somany/ Jhonson/ Asian/ Nitcor
36	Vitrified Tiles	Kajaria/ RAK/ Restile/ Somany/ Jhonson/ Asian/ Nitco.
37	Glazed tiles	Johnson/ Kajaria/ Nitcor
38	Acid Alkali Tiles	Arcoy/Coromandel
39	Kota Stone	Shall be from the quarry and the grains and the texture of the stone shall be the same
40	Epoxy Flooring	Primo Flooring /FOSROC /MYK/CUMI/BRIX OR Equivalent
41	Dam proof concrete	Primo Flooring/ FOSROC /MYK/CUMI/BRIX OR Equivalent
42	Glass wool	Up twigs/ Owens corning or approved equivalent.
MISCELLANEOUS		
43	Glass, Tinted Glass, High-Performance Glass	Saint Gobain/ AIS/ Modiguard (Gujarat Guardian)/Pilkington/ Asahilective Glass
44	Glass Processing	Saint Gobain/GlassTech/ FG/Fuso/ Asahi/Nishu Glass Processor/ GSC Toughened
45	Glass Doors (Motorized systems / sliding system)	Auto door Industries/DORMA/ Manusa/ Haffle/Geze
46	Mirrors	Saint Gobain/Modi Guard (Gujarat Guardian)/Asahi/HNG/Pilkington
47	Patch Fitting	Dorma (XLC)/Haffle/ Geze/ Hettich/ Kinlong
48	PVC continuous fillet for periphery Packing of Glazings/ Curtain Wall	Roop/ Anand/ Forex Plastic or approved equivalent
49	Air transfer grills	Trox/ Ruskin Titus / Systemair India

50	PVC cover block, plastering mesh, PVC tile spacer	Arpitha exports

LIST OF APPROVED MAKES - CIVIL WORKS		
S. NO	**ITEM**	**APPROVED MAKES / VENDORS**
51	Precast Concrete Landscape elements, gratings, kerb, Drain cover	Vyara, Basant betons/ Super Decorative floorings/ KK Manholes & Gratings/ Nimco
52	Plastic-coated plywood for shuttering	Evergreen Plywood Industries
53	Spacers for Wall and Floor Tiles	MM2MM/LyfWeb
PAINT FINISHES		
54	PAINT - Cement Based	ICI Dulux/ Ultratech/ Berger Paints/ Asian/ Nerolac
55	Paint - Acrylic, Acrylic emulsion-interior and exterior	Berger paints/Asian paint/ICI/ Nerolac/Akzo Nobel (Dulux)Jotun/Sherwin Williams/Kensai-Nerolac / Asian - Apex Ultima /Surfa -
56	White cement-based putty	Birla/ JK/ utsav putty/Berger
57	Red Oxide Primer Paint	Asian/Berger
58	Duco Paint	Asian brand /apex
59	Hand Drier	Euronics, Toshi , UTEC
60	Aroma Dispenser	Euronics, Toshi , UTEC
61	Tissue Dispenser with Trash	Euronics , Toshi , UTEC, Jaquar, Kohler
62	Hand Towel Dispenser	Euronics , Toshi , UTEC, Jaquar, Kohler
63	Janitor Sink	Jayna , Nirali , Franke , Prestige
PLUMBING WORKS		
64	PVC Pipes	Supreme /Prince /Ashirvad /Astral /Finolex/Kissan /Arya / Jawan
65	CPVC Pipes	Supreme /Prince /Ashirvad /Astral /Finolex
66	UPVC Pipes	Supreme/prince/Ashirad/Astral/Finolex/ Kissan
67	G.I.Fittings	Jindal /Tata/ R Brand
68	Over Head Tank	Sintex /Infra /Aquatech

LIST OF APPROVED MAKES - CIVIL WORKS		
S. NO	**ITEM**	**APPROVED MAKES / VENDORS**
69	Tap	Jaguar /Metro /Parryware /Waterman

NOTE 1: Contractor to proceed for procurement with preferred make, only upon approval from TPPA/PMC. Without written consent from TPPA/PMC, no procurement should be affected even if it is from the list of approved makes.

NOTE 2: In case during the execution of the Contract, makes mentioned in the list becomes unavailable, then it will be under an obligation of the bidder to execute the project as per the makes approvedby TPPA/PMC

Annexure – II

Covering letter for submission of Part - I

Date: _____

From,

Name:
Address:
Ph:
Fax:
E-mail:

To,

The Managing Director,
Tindivanam Pharma Park Association,
Block – D1, Baid Metha Complex,
No.16, Anna Salai, Little Mount,
Saidapet, Chennai.

Sir,

Sub: Construction of Common Testing Laboratory and Training Centre including Compound Wall and Internal Road Works at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District, Tamil Nadu Part - I - Reg.

Ref: Your Tender Notice .....

1. I/We …… having examined the details given in the Invitation to Bidders, we hereby submit the following information and relevant documents.

   a. I/We hereby certify that all the statements, information and data provided in the enclosed Annexure I to XI and accompanying statements are true and correct to the best of my / our knowledge.

   b. I/We …….. have read the instructions appended with the Prequalification documents and I/We understand that any contract made between ourselves and TPPA, on the basis of the information given by me/us is liable to be cancelled if any false information is detected at a later date.

   c. I/We …… have also no objection if enquiries are made on all the projects and works listed by me/us in the accompanying sheets or any other enquiry on the information furnished herewith in the accompanying sheets.

d. I/We have furnished all information and details as asked for and have no further pertinent information to provide.

e. I/We hereby submit the certificates in support of my / our suitability, technical know-how and capability for having successfully completed the works during the last five years.

f. I/We hereby also agree that the decision of the TPPA in the Qualification and selection of Contractors will be final and binding upon me/us.

g. I/We hereby agree TPPA reserves the right to qualify any contractor, to cancel the exercise without assigning any reason for doing so, or to incur any liability to any part whatsoever.

h. I/We hereby agree not to withdraw from the contract after issue of Letter of Award / Work Order and before signing the contract. Incase if, I/We withdraw before signing the contract, I/We hereby agree for the forfeiture of the Earnest Money Deposit as per the Tender condition.

i. The documents as requested in the Qualification Criteria are enclosed herewith.

I/We hereby agree to as a Bidder to all the terms and conditions of the Tender.

Yours faithfully,

SIGNATURE OF THE BIDDER
(With Seal and Address)

ANNEXURE – III

Structure and Organization of Bidder

Sl.No.	Details required	To be filled by the Bidder
1	Name of the Bidder	
1A	Legal Status	Sole Proprietorship / Partnership / Company
2	Nationality of Bidder	
3	Establishment of the Company	
	i) Year	
	ii) Location	
4	The Bidder is a Company	Yes / No
	(Please enclose attested copy of Registration / Incorporation under appropriate laws of the Bidder's Country	Enclosed / Not enclosed
5	Address of the Bidder	
i)	Registered Office Address	
	Telephone Number	
	Fax Number	
	E-mail Address	
	Web site	
ii)	Local office address :	
	Telephone Number	
	Fax Number	
	E-mail Address	
iii)	Office address through which this work will be handled and name of the Officer-in-charge	
	Telephone Number	
	Fax Number	
	E-mail Address	
6	Details of the Board of Directors	
	i) Name of the Director	
	ii) Qualification	
	iii) Organization	
	iv) Office Address	
	v) Telephone Number	
	vi) Fax Number	
	vii) E-mail Address	
7	Enclose Company's Organization Chart showing the	Enclosed / Not enclosed

Sl.No.	Details required	To be filled by the Bidder
	structure of the Organization including the names of the Directors / Chief Executive Officer and position of Officers	
8	Number of years of experience and other Details	
9	Area of business activities other than construction works, if any (If yes please furnish specific information)	Yes / No
10	Whether registered with any Government / Public Sector Undertaking / Local bodies like CPWD / MES / PWD or equivalent applicable in the Bidder's Country. If yes, please furnish details of Class and Type of Registration	Yes / No
11	Please give at least three references of Clients (Engineers, Engineering Consultants or top Officials of Organization) for whom you may have executed construction works of importance and similar nature from whom TPPA, can verify	1. Name : Designation: Company : 2. Name: Designation: Company: 3. Name: Designation: Company:
12	Any special information, which you may like to provide	
		Signature of the Bidder
	Place :	Common Seal of the Company
	Date :	Office Address

ANNEXURE – IV

Details of Similar Projects Carried out in last Five Years

S No	Project Name	Name of Client	Description of the Work	Project capacity in KLD	Value of Contract in Rs Crores	Completion time as stated in the work Order (Months)	Actual completion time (Months)	Extension of Time (EoT), if any, with/ without fine	Total Payment Received in Rs Crores

SIGNATURE OF THE BIDDER
(With seal and Address)

Note:

1. The Bidder should enclose a copy of the work order and completion certificates in support of the project experience for each of the projects mentioned above.
2. Project Experience without work orders and Completion Certificates will not be considered for evaluation.
3. Completion Certificates issued by the Executive Engineer and above will be considered for evaluation in case of projects executed for Government Entities
4. In the case of projects Executed for the Private Sector, Certificates signed by the Officials representing Senior Management will only be considered.
5. Similar projects will be as per the eligibility criteria mentioned in the Tender Document.

ANNEXURE – IV - A

Details of Current Work and Immediate Work

Sr. No.	Client with Address	Description of the work	Project capacity in KLD	Value of contract in Rs Crores	Completion time as stated in the Contract	Percentage completion	Remarks
A	Current works in hand						
B	Immediate commitments.						

SIGNATURE OF THE BIDDER
(With seal and Address)

Note:

1. The Bidder should enclose the copy of the work order in support of the project experience for each of the projects mentioned above.

ANNEXURE - V

Financial Capacity

A. Name of the Bidder			
B. Financial Information of the previous 3 years (in Rs Crores)	2022-23	2023-24	2024-25
C. Turnover			

Note:

1. The above details should be certified by a practicing Chartered Accountant.
2. Copies of the Financial Statement, Audited Balance Sheets should be provided for the last five financial years as above.

For (Name of Accounting Firm)

Name of Partner Chartered Accountant Membership Number

(Rubber Stamp)

ANNEXURE – VI

Networth Certificate

(on the Letterhead of Registered/ Practicing Chartered Accountant)

This is to certify that the Net worth of M/s. …… is Rupees ……. only as on _____. It is further certified that the computation of Net worth, based on my/ our scrutiny of the books of accounts, records and documents, is true and correct to the best of my / our knowledge and as per information provided to my / our satisfaction.

Place:

Date:

For (Name of Accounting Firm)
Name of Partner Chartered Accountant Membership Number
(Rubber
Stamp)

SIGNATURE OF THE BIDDER
(With seal and Address)

ANNEXURE - VII

Declaration for not Blacklisted.

CERTIFICATE

Date…….

Certified that M/s. ……/ the firm /company or its partners/shareholders had not been blacklisted by TANSIDCO / any Government Agencies.

SIGNATURE OF THE BIDDER
(With seal and Address)

ANNEXURE - VIII

Declaration Form

Date…….

a) I/We …….. having our office at …….. do declare that I/We have carefully read all the conditions of tender for the Tender floated vide tender Ref. No._____ for Construction of Common Testing Laboratory and Training Centre including Compound Wall and Internal Road Works at TANSIDCO Pharma Industrial Park in Pellakuppam, Kollar & Venmaniyathur villages, Tindivanam Taluk, Villupuram District and will complete the entire contract within schedule fixed and as per the all tender conditions.

b) I/We have downloaded the tender form from the internet site www.tppa.in/ www.tansidco.tn.gov.in/ www.itcot.com and I /We have not tampered/modified the tender forms in any manner. In case, if the same is found to be tampered/modified, I/ We understand that my/our tender will be summarily rejected, and full Earnest Money Deposit will be forfeited, and I /We am/are liable to be banned from doing business with TPPA or prosecuted.

SIGNATURE OF THE BIDDER
(With seal and Address)

ANNEXURE – IX

Clarifications on Tender Document

BIDDER'S REQUEST FOR CLARIFICATION			
Name and Address of the Organization submitting the request		**Name and position of the person submitting the request**	**Contact Details of the Organization/ Authorized Representative**
			Tel:
			Fax:
			Email:
S. No	**Reference (s) (Section, Page)**	**Content of Tender requiring clarification**	**Points of clarification required**
1			
2			
3			

SIGNATURE OF THE BIDDER
(With seal and Address)

ANNEXURE – X

CHECKLIST

S.No	Description	Submitted	Page No (see Note below)
	COVER – 1- TECHNICAL BID		
	SUB COVER – 1		
1	EMD	Yes / No	
	SUB COVER – 2		
1	Copy of Incorporation Certificate issued by Registrar of Companies / Partnership Deed	Yes / No	
2	Copy of GST Registration Certificate	Yes / No	
3	Copy of Pan Card along with IT returns for the last five preceding financial years.	Yes / No	
4	Annual Reports / Audited Financial Accounts of the Bidder for the last five financial years preceding the Bid Due Date.	Yes / No	
5	Signed copy of Technical Specifications as per Annexure – I & IA	Yes / No	
6	Covering letter as per Annexure - II	Yes / No	
7	Structure and Organization of Bidder as per Annexure – III	Yes / No	
8	Details of Similar Projects carried out in the last five years as per Annexure – IV	Yes / No	
9	Details of Current works and Immediate Works as per Annexure – IV- A	Yes / No	
10	Financial Eligibility along with all relevant documents as per Annexure – V	Yes / No	
11	Net worth Certificate as per Annexure - VI	Yes / No	
12	Letter of Undertaking for not blacklisted as per Annexure – VII	Yes / No	
13	Declaration of not tampered the Tender Document as per Annexure – VIII	Yes / No	
14	Clarification on Tender Document as per Annexure - IX	Yes / No	
15	Additional Information if any	Yes / No	
	COVER – 2 – PRICE BID		
1	Price Bid Part A		
2	Price Bid Part B		

Notes:-

1. All the statements, copies of the certificates, documents etc., should be given page numbers on the right corner of each certificate, which will be indicated in last column against each item. The statements furnished should be in the formats appended to the Tender document.

2. The information should be filled-in by the Bidder in the checklist and Annexure – I to XI, for the purposes of verification as well as evaluation of the Bidder's compliance to the qualification criteria as provided in the Tender document.

All copies of the supporting documents submitted by the Bidder should be duly attested by Notary Public/ Gazetted officer

ANNEXURE – XI

COVER – II

PRICE BID – Part A

Tender Ref No: TPPA/CF Development/QC Lab/2025-26/01

TENDER FOR UNIT RATE CONTRACT ABSTRACT

I/We hereby to execute the whole of the works as described in the scope of services indicated in called works

a) **Name of the Work**: "Construction of Common Testing Laboratory and Training Hall including Compound wall and Internal Road Works"
b) The bidder should quote rates and prices (both in figures and words) for all the items of the works described in the Bill of Quantities excluding GST along with sum of the quoted tender value excluding GST at the end (both in figures and words)

Sl No	Description of the Item	Total Rate	Total Rate (In words)
1	Construction of Common Testing Laboratory and Training Hall including Compound wall and Internal Road Works Excluding GST		
	Add: GST @ 18%		
	Total Contract Value including GST		
	Total		

The Bid will be evaluated on the basis of amount quoted against "Total" in INR

Total sum of (in Figures as in "Total Contract Value including GST" Rs. …… (Including GST) (in Words) Rupees ……

In case of any discrepancy between the price quoted in words and figures, lowest of the two shall be considered. The quoted price shall be corrected for arithmetic errors. And should this tender be accepted, I/We do hereby agree and bind ourselves to abide by and fulfill all the conditions of this Tender Document, in default thereof to forfeit and pay to the Managing Director, TPPA the penalties of sums of money mentioned in the said condition

Dated:

Bidder's Signature

Address……

Witness…….. Seal

Address…….

SCHEDULE – 'A'		
Name of Work	**Construction of Common Quality Control Laboratory and Training Hall including Compound wall and Internal Road Works**	
EMD: Rs 3,50,000/-	**Tender Date:**	
Sl No	**Description of Work**	**Amount (Rs.)**
A	Earthwork	
B	Plain & Reinforcement cement concrete	
C	Steel Reinforcements	
D	Formwork (Shuttering)	
E	Masonry	
F	Plastering & Finishing items	
G	Flooring Item	
H	Doors and Windows & Ventilation	
I	Sanitary & Plumping Work	
J	Miscellaneous	
K	Weathering Course	
L	Compound Wall	
M	General Sanitary ,water supply work & Drainage	
N	Painting	
O	Road Work	
	Grand Total	
(Rupees _____only)		

No of Corrections……..

No of over writings……

Signature of the Bidder with Seal

S.No	Description	Unit	Qty	Rate	Amount
A	**Earthwork**				
1	Clearing Light jungle including uprooting of trunk vegetation, grass, bush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared.	Sqm	687		
2	Earthwork in excavation in all types of soil/rock but excluding blasting, at all depths in foundation of Structure, Pipe Trench, tunnel sewer lines, drains etc. to required level, grades and dressing complete as per specification and directions of the Engineer, in both dry and wet conditions, including necessary pumping/bailing out of water, slush removal etc. And disposal of the surplus excavated material in spill dumps/fill areas at all heights and desents within a lead upto 1000m (500m) including levelling as directed by engineer, all tools, plant and labour complete				
	a) Upto 3m depth below ground level	Cum	864		
	b) from 3m to 5m below ground level	Cum	504		
3	Refilling with excavated earth other than crushed stone sand with an initial head lead of 100 mts. and depositing the earth as shown by the Project Officer in layers of not more than 15 cm thick well rammed using earth rammer, watered and consolidated etc. complete complying with standard specification	Cum	57		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
4	Providing Pre-constructional Anti termite treatment including cost of chemical labour as per standard specification for preparing the area for treatment by spraying chemicals and other incidental charges etc., complete the rates should be for curing anti termite treatment from the plinth beam and brick masonry with super structure in contact with the back fill earth and at the junction of the walls. The top surfaces of filled earth for flooring and the soil along with the perimeter of the building by making holes with the crowbar and poured 20% termicide 'Chloripyrifos' and spraying the same termicide solution on the wooden frames and treating the other periphery of building etc., Complete in all respects as per IS 6316 (Part II) and as directed by the Project Officer.	Sqm	75		
B	**Plain & Reinforced Cement Concrete**				
5	Supplying, laying and compacting plain cement concrete as defined by IS:456 with graded stone aggregate in all foundations as per drawings, specification and instructions of the engineer, at all height and depth above and below plinth level to required levels, slopes etc. including curing but excluding the cost of shuttering, all materials, tools, plant and labour complete				
5.1	PCC 1:3:6 (40mm Aggregate)	Cum	97		
5.1	PCC 1:4:8 (40mm aggregate)	Cum	-		
6	Supplying and laying reinforced cement concrete in all **foundations** as per drawings, specifications, directions of the engineer and as defined by IS:456 including curing but excluding cost of shuttering and steel reinforcements, all material, tools, plan and labour complete				
6.1	for M20 grade concrete 1:1.5:3	Cum	149		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
7	Supplying and laying ready mix concrete in all Sub structures in **columns** at all height and depths above and below plinth level as per drawings, specifications, directions of the engineer and as defined by IS:456 including curing but excluding cost of shuttering and steel reinforcements, all materials, tools plan and labour complete				
7.1	for M20 grade concrete 1:1.5:3	Cum	52		
8	Supplying and laying ready mix concrete in **Tie beams, Plinth Beam** depths above foundation level as per drawings, specifications, directions of the engineer and as defined by IS:456 including curing but excluding cost of shuttering and steel reinforcements, all materials, tools plan and labour complete				
8.1	for M20 grade concrete 1:1.5:3	Cum	87		
9	Supplying and laying ready mix concrete in super structures in roof slabs, beams, slabs, etc. at all height level as per drawings, specifications, directions of the engineer and as defined by IS:456 including curing but excluding cost of shuttering and steel reinforcements, all materials, tools plan and labour complete				
9.1	for M20 grade concrete 1:1.5:3	Cum	243		
10	Waterproofing				
11	Supplying and mixing in reinforced cement concrete of any grade of proportion approved water proofing compound as per drawings and manufacturer's instructions and as directed by the engineer, all materials, tools, plant and labour complete	Sqm	51		
C	**Steel Reinforcement**				
12	Note :- Reinforcement bars in item 15 will be measured in lengths in position to be laid as specified in drawings and will include bends, hooks, cranks and authorised laps, chairs, separators and dowels.(contractor shall include in his rates the cost of all above items and no separate payment will be made)				

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
13	Taking delivery, transporting within site area, placing and fixing in position steel reinforcement including angles/pins provided for the approved welded joints, at all levels above and below plinth level for reinforcement cement concrete and precast reinforced concrete works including cutting bending,cranking,binding,tack welding,as necessary as per drawings, specifications and directions of the engineer including binding wire, cover blocks electrodes, etc. and straightening and recoiling where necessary, all materials,tools,plant and labour complete	KG	13461		
D	**FORMWORK (SHUTTERING)**				
14	Supplying and erecting steel centring including necessary supports for plane surfaces for Reinforced Cement Concrete works such as column footings, column pedestals, plinth beams, grade beams, staircase steps, etc. which require only nominal strutting using mild steel sheets of size 90cm x 60cm and 10 BG stiffened with welded mild steel angles of size 25mm x 25mm x 3 mm for boarding, laid over silver oak joists of size 10cm x 6.5cm spaced at about 75cm centre to centre or at suitable intervals etc. Complete in all floors complying with standard specification. (Payment for centring shall be given after the concrete is laid).				
14.a	Footing, Plinth Beam, etc.	Sqm	405		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
15	Providing Form work and centring for reinforced cement concrete works including supports and strutting up to 3.30m height for plane surfaces as detailed below with all cross bracings using mild steel sheets of size 90cmx60cm and MS 10 gauge stiffened with welded mild steel angles of size 25mmx25mmx3mm for boarding laid over silver oak or country wood joists of size 10cmx6.5cm spaced at about 90cm centre to centre supported by carina props 10cm to 13cm dia spaced at 75cm intervals and removing the same after a specified period without damaging the RCC works etc., complete complying with standard specifications and as directed by the Project Officer.				
15.a	For plane surfaces such as RCC floor slab, roof slab, beams, lintels, bed blocks, landing slab, waist slab, portico slabs and beams, etc.	Sqm	171		
15.b	For plane surfaces such as vertical slab, side slabs of boxing, vertical drops, facia, vertical wall, etc.	Sqm	296		
15.c	For plane surfaces such as rectangular or square RCC columns, sunshades, top and bottom slab of RCC boxing, etc.	Sqm	60		
E	**Masonry**				
16	Masonry work using Autoclaved Aerated cement blocks of size 600 x 200x 200 mm in Self curing AAC Joint Mortar 2 to 3mm thick in between the blocks with a spread of 170Sqft / 50kg,cement Mortar (1:6) (one of cement and six of M Sand) along the boundaries using AAC Block 600x 200x 200mm)minimum average crushing strength of 50Kg/sq.cm for super structure in all floors including labour for fixing the doors , windows and ventilator frames in position fixing of hold fast , scaffolding ,curing etc complete in all respects complying with relevant standard specifications and drawings and as directed by the Project Officer. (The Board approved ACC Block should get approved by the competent authority before execution of work)	Sqm	3276		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
17	Masonry work using Autoclaved Aerated cement blocks of size 600mm x 200mm x 100mm in Self curing AAC Joint Mortar 2 to 3mm thick in between the blocks with a spread of 170Sqft / 50kg,cement Mortar (1:6) (one of cement and six of M Sand) along the boundaries using AAC Block 600mm x 200mm x 100mm)minimum average crushing strength of 50Kg/sq cm for super structure in all floors including labour for fixing the doors , windows and ventilator frames in position fixing of hold fast , scaffolding ,curing etc complete in all respects complying with relevant standard specifications and drawings and as directed by the Project Officer. (The Board approved Acc Block should got approved by the competent authority before execution of work)	Sqm	2520		
18	Solid Concrete blocks: Providing and constructing 200mm thick solid cement concrete block masonry work at all levels in cement mortar 1:4 using standard size of 400mm x 200mm of solid cement concrete blocks of thickness as given below, with minimum compressive strength of 3 N/Sq mm confirming to IS 2185 or equivalent BS, all scaffolding, staging, curing, and including chicken mesh, etc all complete as per standard specification.	Cum	504		
F	**Plastering & Finishing Items**				
19	Providing and laying 12/10 mm thick (I:5) plaster with (1:4) cement sand mortar at and at all heights and depths above and below plinth level to beams, lintel soffits, chajjas, projections, narrow bands and widths etc. including chipping of concrete surfaces, scaffolding, cleaning and curing as per specifications, drawings and directions of the Engineer, all materials, tools, plant and labour complete				
19.1	a) cement plaster 1:5: 20mm Tk	Sqm	1166		
19.2	b) cement plaster 1:5: 12mm Tk	Sqm	972		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
20	Providing and laying 12/10 mm thick ceiling plaster with (1:3) cement mortar at all heights and depths above or below plinth level including scaffolding, curing etc. as per the specifications, drawings and directions of the Engineer, all materials, tools plant and labour complete				
20.1	a) cement plaster 1:4: 20mm Tk	Sqm	1166		
20.2	a) cement plaster 1:4: 12mm Tk	Sqm	972		
21	Providing and laying plaster with (I:3) cement sand mortar at and at all heights and depths above and below plinth level to faces of walls, pillars, columns, lintel sides, drains, jambs, column projections narrow bands and widths etc. including chipping of concrete surfaces, raking brick joints, scaffolding, cleaning and curing, as per specifications, drawings and directions of the Engineer, all materials tools, plant and labour complete				
21.1	a) 12 mm thick (in one operation)	Sqm	778		
22	Providing drip course 30 mm wide and 15 mm deep at chajjas, sills and other outside projections at all heights above plinth level with cement sand mortar (1:4) all materials, tools, plant and labour complete	Rm	38		
23	Providing two coats of cement paint of or approved equivalent of different approved shades and as specified by the manufacturer to external plastered surface at all height and depths above and below plinth level as per drawings and directions of the engineer including scaffolding, cleaning and curing, all materials,tools,plant and labour complete	Sqm	194.4		
24	Providing one coat of approved primer and two coats of ready mixed approved Enamel paint as specified at all heights and depths including rubbing, cleaning, putty filling etc. and scaffolding, all materials, tools, plant and labour complete(Measurements will be according to IS:1200)				
24.1	rolling shutters	Sqm	150		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
25	Providing two coats of approved PU (Poly urthine) paint of approved shade and quality to internal plastered surfaces as per drawings, specifications, directions of the Engineer, all materials, tools, plant and labour complete	Sqm	1296		
G	**FLOORING**				
26	Paving the floor with best approved quality fine polished Kota stone slabs of size 600 x 600 of 18 / 20mm with machine cut edges and matching marble slab not less than 100mm width other than Adanga Marbles as border laid over a cement mortar bed of 20mm thick using cement mortar 1:3 (One cement and three crushed stone sand) fixing the slabs in true right angles with minimum possible width of joints and pointing the joints with white cement mixed with matching colouring pigments and polishing with floor polisher to a high degree of finish etc., The Kota stone slabs and other materials to be used shall be got approved by the Project Officer concerned before use on work, etc., complete as per standard specification.				
26.a	Using Fine polished Kota Stone Slab above 600 x 600 of 18 / 20mm size	Sqm	1180.98		
27	Providing and laying 50 mm thick grey (1:2:4) cement concrete(granolithic) floor finish in panels in two layers, bottom layer 25mmthick with 10 mm and down downgraded stone aggregates finished rough and 25 mm topping with 6 mm and downgraded stone aggregates, spaded, tamped, trowelled and finished smooth with a floating coat of neat cement including providing glass/ aluminium strip dividers in joints for the full depth of the floor finish to form suitable panels and curing, as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete	Sqm	480		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
28	Supplying and laying good quality ceramic tiles of approved quality in floorings, skirtings, steps etc. conforming to IS:4457 Including all necessary cement bedding materials and jointing with special mortar and treatment as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete				
28.a	a) up to 12 mm thick tiles (Size of 300X600) upto height of 7'feet	Sqm	384		
29	Suppling and laying of Stain Free Nano Polish Vitrified Tiles 600x600x8mm in CM 1:3 20mm thick including fixing in position, cutting the tiles to the required size wherever necessary, pointing the joints with grout (Tile joint filler) curing, finishing etc., all complete and as directed by the Project Officer.	Sqm	324		
H	**DOORS, WINDOWS & Ventilation**				
30	Main Door Frame: Supplying and fixing first quality teak wood frames for doors, windows, ventilators and other similar joinery works with the following sizes and sections including labour charges for wrought and put up in position and also for fixing hold fast in frames and masonry etc. complete in all floors.				
30.a	Teak Wood Scantling 2m in length	Sqm	12.6		
31	Providing and fixing UPVC door of size 900mm x 2100mm, made from UPVC frame and shutter, with the top panel in toughened/clear/frosted glass (as specified) of thickness 5mm/6mm, and the bottom panel in UPVC sheet/panel of matching color and texture. The door shall be factory-finished with necessary hardware including hinges, handles, locks, EPDM gaskets, rubber seals, and accessories, ensuring smooth operation. The installation includes proper alignment, finishing, and sealing as per manufacturer specifications and directions of the Engineer-in-charge.	Nos	42		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
32	Supply and installation of UPVC door with frame, overall size 750 mm x 2100 mm, including all necessary accessories such as hinges, handles, lockset, rubber gaskets, and fixing with appropriate fasteners. The door shall be made of UPVC profile with a minimum section thickness of __ mm (as per specification), reinforced with galvanized steel as required, and fitted with thick panel/glass as per design. Complete in all respects as per approved drawings and instructions of the Engineer-in-Charge.	Nos	10		
33	UPVC Ventilator Specification: Supplying and fixing UPVC (Un-Plasticized Polyvinyl Chloride) Louvered Ventilators of from the profile are reinforced with GI/1mm 125GSM and 100% corrosion free, the profile are multi chambered sections with wall thick of 2mm. The EPDM rubber (black colour) covered with all over the edges of frame and shutter. The ventilator should be got approved from the Project Officer before use on work	Sqm	75		
34	Supplying and erecting pull and push type rolling shutter with grills, ISI make of approved size and section using 18 GI sheet. The shutter shall be painted with one coat of red oxide primer and the rate is inclusive of hood covers, transportation charges etc.,				
34.1	Manually operated (up to 8 m2 area)	Sqm	75		
35	Providing, fabricating, and fixing structural glazing with toughened/laminated/insulated glass of approved thickness (e.g., 6mm/8mm/10mm/12mm), including aluminum framing system, weather sealing, silicon sealant, EPDM gaskets, brackets, and necessary accessories, all as per architectural drawings and specifications. The work includes necessary scaffolding, fitting, and finishing to ensure a seamless appearance. Complete as per instructions of the Project Engineer	Sqm	23		
I	**SANITARY & PLUMBING WORKS**				

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
36	Supply, Installation and Commissioning of a sintex 2000L water tank with all necessary linking accessories, fittings, and supports with all connectors, CPVC Pipes with link two tanks, ball valves, all materials, tools and labour complete	Nos	2		
37	Supply, installation, testing, and commissioning of **Mono Block Pump 2 HP** of a reputed brand, IS-approved, suitable for continuous operation. The pump shall be capable of delivering the required flow and head as per site conditions. The scope includes all necessary accessories, piping, fittings, wiring, and commissioning	Nos	2		
38	Supplying, fitting and fixing white glazed earthenware European type water closet of Parry ware make No.WWC 31201/31202 or other approved equivalent make with “P”or ”S” trap with or without vent hole, black solid plastic seat and cover with chromium plated hinges and rubber studs, 12.5 litres capacity low down mosquito proof cistern of Parry ware Slimline or other approved equivalent make with syphon, non-ferrous internal and external fittings, all materials tool & labour complete	No	6		
39	Parry ware Indian water closet / Orrisa pan type with built in footrest with P or S trip and parry ware slimline flushing system with nonferrous internal and external system, and fixing in position on brickbat cement concrete, all materials and labour complete	No	6		
40	Supplying and fixing in position best white glazed wash basin of approved brand parry ware of Size 55 X 40 cm fixed on pair of CI brackets 15mm dia CP pillar tap and PVC 32mm dia waste pipe duly wiped solder jointed to union 90 cm long with CI value and bracket clearly painted including all materials labour tool etc complete.	No	4		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
41	Supplying, fitting, and fixing **white glazed earthenware urinal basin** of **Parry ware make** or other approved equivalent, including necessary brackets, spreaders, waste coupling, bottle trap, and all required CP brass fittings, with cutting and making good the walls and floors wherever required, including all materials, tools, and labour, complete in all respects.	No	4		
J	**Miscellaneous**				
42	Providing and fixing of false ceiling using gypsum board / mineral fiber / PVC / metal (as per specifications) including GI framework, suspenders, fasteners, and finishing with jointing compound, taping, and two coats of paint, complete in all respects as per approved design, pattern, as per approved by Project Engineer	Sqm	1180.98		
43	Supply, fabrication, and installation of stainless steel handrail made of Grade 304/316 stainless steel, with 50mm diameter circular top rail, supported on 38mm vertical posts, spaced at 1.2m centre-to-centre, with horizontal/vertical balusters as per design, including all necessary fixtures, fittings, welding, grinding, and polishing to a satin/mirror finish. The rate shall include all cutting, drilling, anchoring, and fixing to concrete/steel surfaces with appropriate fasteners, all as per approved drawings, specifications, and instructions of the Project Engineer/PMC	Rm	34		
K	**WEATHERING COURSE**				
44	Supplying and laying in position on the roof in terrace floor brick jelly in lime motor with necessary additives for hardening and ramming and malleating thoroughly to form a monolith layer and fixing weather proof Mangalore square tiles of 8" X 8" Size with pointing in CM 1:3 with bonding agents and making impervious layer all materials tool & labour complete	Sqm	590.49		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
45	Cleaning the terra surface with 2coat of approved make, laying of approved and providing of 2mm thick in cement mortar to make the required slope to drain the drain water and applied rain water with 2quote of water proofer with laying of 10X10 of approved make with joined filled with Epoxy title grout including material and labour Complete.	Sqm	590.49		
L	**Compound Wall**				
46	Construction of compound wall, including earthwork excavation (1m x 1m x 1m), footing in PCC (1:4:8), RCC columns of size 9" x 9" with necessary reinforcement, plinth beam of size 9" x 12", masonry wall using solid cement blocks, and necessary skirting for an aesthetic look. The work includes the cost of all materials, labour, tools, curing, and finishing, complete in all respects.	Rm	50		
47	Supply and installation of factory-made **PVC Trellis type compound wall panels** with **aesthetic finish** (wood/textured/brick look), including interlocking panels and vertical posts. Panel thickness not less than **24 mm**, UV-resistant, termite-proof and weatherproof. Wall to be installed with RCC/plasticized concrete supports embedded in PCC 1:3:6 foundation, including excavation, alignment, levelling, joint sealing and all associated civil works, complete in all respects as per manufacturer specifications and as directed by Engineer-in-charge.	Rm	120		
47.1	Supply and installation of diamond chain link fencing with 2-inch square mesh, made of galvanized iron (GI) or green PVC-coated wire, including vertical GI posts (minimum 50 mm diameter, 2 mm thick) and horizontal GI straining wires. Installation to include embedding posts in PCC 1:3:6 foundation (minimum 300 mm x 300 mm x 600 mm), with necessary excavation, alignment, tensioning, fixing with GI clips, and all associated civil works, complete in all respects as per specifications and as directed by the Engineer-in-charge.	Rm	420		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
M	**General Sanitary, water supply work & Drainage**				
	Sanitary Fixtures and CP fittinqs only will be supplied by owners. However all other piping accessories and consumables required for fixing and connecting of these fixtures, such waste, coupling, bottle traps, P. S traps, brackets, inlets, outlets, brass screws, Teflon tapes, hold fast or whatever required for proper finishing cutting, chasing, packing, making good of the areas shall be by contractors and no extra cost for such items shall be paid. 1st quality of materials alone should be used and others shall be reiected. Please note that these specifications are not exhaustive. However, keeping in mind the requirements of hiqh quality. The contractor should complete the work in the best workmanship complete in all respects D1. Sanitary, CP Fittings & Fixtures				
48	Wall mounted European water closets including fixing of seat cover, fixing of flushing tanks complete in all respects	Nos	6 White		
49	IWC Orissa Pan including flushing tanks. Complete in all respects	Nos	6 White		
50	Large flash back urinals including fixing integrated electronic flushing system, bottle traps concealed or otherwise complete in all respects	Nos	5 White		
51	Under cover/counter top hand wash basin, fixing bib cocks or other taps, waste lines, CP inlet connections etc complete in all respects	Nos	7 White		
52	Under rectangular top hand wash basin, fixing bib cocks or other taps, waste lines, CP inlet connections etc complete in all respects	Nos	4 White		
53	SS sink with drain board	Nos	4		
54	15 dia CP Heavy duty Health Faucets complete in all respects	Nos	16		
55	Vitreous China toilet paper holder	Nos	6		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
56	Providing & fixing 'Merino Besco' or equivalent 12mm laminated fabricated cubical for toilets consisting fixed partition and openable door with all fittings mentioned in their series for cubicle of 1000x1500 complete in all respects				
56.1	Zeus series or equivalent	Nos	6		
56.2	ZMS series or equivalent	Nos	6		
57	Providing and fixing 20mm thk jet black granite, cut and rounded to provide countertop or under basins and edges also rounded complete in all respects. Providing & fixing 25mm highly polished black granite urinal partition with exposed edgesrounded complete in all respects	Sqm	6		
58	Providing and fixing superior quality mirror with 6mm waterproof ply back complete in all respects 600x600	Sqm	6		
59	Providing and fixing transparent strong acrylic towel rods 600mm long	Sqm	6		
60	Providing and fixing superior quality PVC traps including necessary connections, gratings and inner surface properly finished				
60.1	a. Multi trap	Nos	10		
60.2	b. Nan hi trap	Nos	10		
60.3	c. Cockroach trap	Nos	40		
61	Providing and fixing solid state fully hygienic 'Hand Drier" of repeat use, season control, volume ON/OFF controls complete in all respects	Nos	2		
62	Providing and fixing CP brass Liquid soap container	Nos	6		
N	**Painting**				

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
63	Supplying and painting the walls with two coats of wall putty as instructed by the Project Officer including preparation of surface curing, etc., complete in all floors complying with standard specifications (The wall putty shall be got approved by the Project Officer before use of work).	Sqm	684		
64	Wall painting with two coats premium acrylic emulsion paint of interior grade, having VOC (Volatile Organic Compound) content less than 50 grams/ litre of approved brand and manufacture, including one oat of primer wherever required to achieve even shade and colour.	Sqm	288		
65	Whitewashing two coats with freshly burnt white shell lime in all floors including cost of lime, blue powder fevicol type gum, brushes, scaffolding charges, etc., complete complying with standard specification and as directed.	Sqm	972		
66	Painting the wall two coats with approved weatherproof Exterior Emulsion paint over one primer coat of over cement plastered wall surface etc., complete complying with standard specification.	Sqm	972		
67	Supplying and painting the walls with two coats of oil bound distemper over one coat of water-based cement primer including cost for distemper, primer, cleaning and scrapping the walls, rendering the walls smooth with necessary putty, brushes, scaffolding arrangements, labour charges, etc., as per standard specification. (The colour and shade of the distemper shall be got approved by the Project Officer before use of work).	Sqm	972		
68	Painting the new woodwork with three coats of best approved wine varnish etc., complete in all respects complying with relevant standard specification and as directed by the Project Officer (The quality and shade of paint should be got approved by the Project Officer before use).	Sqm	2.88		
O	**Road Work**				

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
69	Clearing Light jungle including uprooting of trunk vegetation, grass, brush wood, trees, and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared.	Sqm	500		
70	Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	31.25		
71	Providing, laying, spreading and compacting graded stone aggregates for **Wet Mix Macadam** 250mm thick, including premixing the materials with water at OMC in mechanical mix plant, conveyance of mixed materials by tipper to site, laying in uniform layers using pavers in Sub Base/ Base course on well-prepared surface and compacting with vibratory roller to achieve the desired density including cost of material, labour charges, rentals for machinery, fuel and all other incidental charges etc., complete as per clause 406 of MORTH Rev-5	Cum	31.25		
72	Providing and laying Prime Coat over WBM/ WMM surface using 7 Kg of Emulsion Bitumen (SS1) per 10 Sqm for preparatory to another bituminous construction over it, including cost of material, labour charges, rentals for machinery, fuel and all other incidental charges etc., complete as per Clause 502 of MORTH Rev-5	Sqm	500		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
73	Providing and laying Tack Coat over Existing BT surface using 2 Kg of Bitumen Emulsion (RS1) per 10 Sqm for preparatory to another bituminous construction over it is including cost of material, labour charges, rentals for machinery, fuel and all other incidental charges etc., complete as per Clause 503 of MORTH Rev-5	Sqm	500		
74	Providing, laying 90mm consolidated thick Dense Bituminous Macadam using 0.40Cum of 37.50-13.20mm, 0.35Cum of 13.20-2.36mm and 0.36Cum of 2.36mm & below size IRC metal with 71.30kgs of VG30 grade bitumen for premixing per 10Sqm including cost and conveyance of all materials to CMP site, heating the bitumen, aggregate and mixing them in the required temperature in central hot mix plant 20-30 ton capacity, conveying the mix by tipper trucks to site, spreading the mix to uniform thickness of 75mm with mechanical paver to the specified grades and cross sections and consolidated by Vibratory Roller to the required density etc., including labour for attending to paver to site etc., including hire and fuel charges for 20-30t CMP with bitumen boiler, tipper trucks, Paver Finisher, Vibratory roller and all other tools and plant required, including all other incidental charges etc., complete as per specification using CMP as per clause 505 of MORTH rev-5.	Cum	11.25		

No of Corrections……..

No of over writings……

S.No	Description	Unit	Qty	Rate	Amount
75	Providing and laying Bituminous Concrete to 40mm thick using 0.13 Cum of 19.00-9.50mm, 0.17 Cum of 9.50-2.36mm and 0.26 Cum of 2.36 and below with 50.30kgs of VG30 bitumen for premixing per 10Sqm including cost and conveyance of all materials to CMP site, heating the bitumen and aggregate to required temperature and mixing them in required temperature in central hot mix plant 20-30 ton capacity, conveying the mix by tipper trucks to paver site, spreading the mix to uniform thickness of 40mm with mechanical paver to the specified grades and cross sections and consolidated by 8-10 tonne Vibratory to the required density etc., including labour for attending to paver to site etc., including hire charges and fuel charges for 20-30 t CMP with bitumen boiler, tipper trucks, Paver Finisher, Vibratory roller and all other tools and plant required, including fuel and all other incidental charges etc., complete as per specification using CMP as per clause 507 of MORTH Rev-5	Cum	5.625		
76	Supplying and laying of Rubber moulded hydraulic pressed Paver Block Stone 63mm thk. Over a base layer of crushed stone sand filling incl. Cost of materials, laying and Labour charges etc., The Item shall include filling the gaps with crushed stone sand. Base layer of crushed sandstone shall be measured under separate item.	Sqm	440		
77	Supplying and laying of Rubber moulded hydraulic pressed Paver Block Stone 83mm thk. Over a base layer of crushed stone sand filling incl. Cost of materials, laying and Labour charges etc., The Item shall include filling the gaps with crushed stone sand. Base layer of crushed sandstone shall be measured under separate item.	Sqm	220		
	Total				
	GST 18 %				
	Sum of Value				
	Amount in Words				

No of Corrections……..

No of over writings……

PRICE BID – Part B

Tender Ref No: TPPA/CF Development/QC Lab/2025-26/01

Item-Wise Quantity Rate Only (QRO) – For Reference and Execution Purpose Only

S.No	Description	Unit	Qty	Rate
A	**Earthwork**			
1	Earthwork in excavation in hard rock requiring blasting, at all depths in foundations of structures, pipe trenches, sewer lines, drains, etc. to required levels, grades and dressing complete as per specifications and as per directions of the engineer in both dry and wet conditions, including necessary pumping/bailing out of water, slush removal etc.	Cum	QRO	
2	Carting away surplus excavated earth beyond initial lead of 10 m to approved designated locations within site including loading, unloading and stacking as directed. Lead shall be various kilometers from source location to stock yard.			
2.1	Within 1 Km	Cum	QRO	
2.2	Within 3 Km	Cum	QRO	
B	**Plain & Reinforced Cement Concrete**			
3	Supplying, mixing and placing in position in plain / reinforced cement concrete mortar of any grade or proportion one or more approved admixture/plasticizers as per drawings, specifications and /or as per manufacturer's instructions and as directed by the engineer (in writing), all materials, tools, plant and labour complete			
3.1	M20 Grade		QRO	
D	**FORMWORK (SHUTTERING)**			
4	Providing additional strutting to centering of RCC slabs of plain surface for every additional 1.0 meter height or part thereof but not less than 30 cm, over the initial 3.30 meter height from floor level using casurina props of 10cm to 13cm Dia including cross bracing etc., complete complying with standard specification and as directed by the Project Officer.	Sqm	QRO	
F	**Plastering & Finishing Items**			

No of Corrections……..

No of over writings……

5	Providing and laying plaster with (I:3) cement sand mortar at and at all heights and depths above and below plinth level to faces of walls, pillars, columns, lintel sides, drains, jambs, column projections narrow bands and widths etc. including chipping of concrete surfaces, raking brick joints, scaffolding, cleaning and curing, as per specifications, drawings and directions of the Engineer, all materials tools, plant and labour complete			
5.1	Soild block Pointing	Rm	QRO	
5.2	Soild Block Plastering	Rm	QRO	
6	Providing one coat of approved primer and two coats of ready mixed approved Enamel paint as specified at all heights and depths including rubbing, cleaning, putty filling etc. and scaffolding, all materials, tools, plant and labour complete(Measurements will be according to IS:1200)			
6.1	steel doors	Sqm	QRO	
7	Providing two coats of approved plastic emulsion paint of approved shade and quality to internal plastered surfaces as per drawings, specifications, directions of the Engineer, all materials, tools, plant and labour complete	Sqm	QRO	
G	**FLOORING**			
8	Providing and laying Damp Proof Trimix Flooring, including surface preparation, levelling, and finishing. The flooring shall be executed with a machine-laid Trimix process to achieve a smooth, even, and durable surface. The mix design shall ensure high strength and water resistance, preventing moisture ingress. The finished surface shall be free from undulations, cracks, or imperfections, ensuring long-term performance. The rate shall be inclusive of all necessary materials, equipment, and workmanship required to achieve the specified finish	Sqm	QRO	
9	Providing and applying Epoxy Flooring of [specify thickness, e.g., 2mm/3mm] using a high-performance, solvent-free, self-leveling epoxy system. The work includes surface preparation by mechanical grinding, removal of loose particles, and application of a suitable epoxy primer. The epoxy base coat shall be applied in multiple layers to achieve a smooth, seamless, and durable finish. The finished surface shall be resistant to chemicals, abrasion, and moisture. The rate shall be inclusive of all materials, labour, equipment, and necessary surface preparation to achieve the specified finish	Sqm	QRO	
H	**DOORS, WINDOWS & Ventilation**			
10	UPVC Door Shutters using 19 Gauge 19mm MS square tubes for styles and outer frames. 15mm MS square tubes for top, lock and bottom rails. The steel tubes shall be covered with 5mm thick solid PVC Sheets. Shutter using 5mm thick solid PVC Sheets for paneling shall rigidly fixed in position including necessary furniture and fittings. The overall size of styles shall be 50mm x 30mm. The over all size of top rail, lock rail and bottom rail shall be 75mm x 30mm. The overall size of frames shall be 50mm x 45mm with suitable rebate for housing the shutter			

No of Corrections……..

No of over writings……

10.1	Solid panel UPVC door with frame	Sqm	QRO	
11	Single/Double shutter glass door: Supply and installation of full height straight glass door 10mm thick toughened glass and proprietary powder coated aluminium sections of the approved make. The quoted rate shall be inclusive of Glass door soft Nose seal of approved make for dust proof and to avoid A/c leakage in the doors at all-round. The seals should be suitable for 10 glass thickness. Contractor has to prepare the shop drawing for the approval of Project Officer. Rate shall include for providing transport charges, handling, loading and unloading, Installation, protecting the module and glass till handing over, testing, commissioning all necessary hardware's, scaffolding, wastage, Structural supports if any, etc. complete and all as per manufacturers specifications as directed.	Sqm	QRO	
12	UPVC Window Specification: Supplying and fixing UPVC (Un-Plasticized Polyvinyl Chloride) Windows of casement type (open) from the profile are reinforcement with GI/1mm 125GSM and 100% corrosion free, the profiles are multi chambered sections with wall thick of 2mm. The EPDM rubber (black color) covered with over all the edges of frame and shutter the shutter will be provided with Espag multi power point locks and also it operates as handle. The window should be got approved from the Project Officer before use on work	Sqm	QRO	
I	**SANITARY & PLUMBING WORKS**			
13	Supplying, fitting and fixing 100 mm dia PVC soil pipes at all heights and depths above and below plinth level including caulking joints specified, clamps, wooden plugs, nails etc. and testing of pipes, all materials, tools and labour complete	Rm	QRO	
14	Supplying, fitting and fixing 75 mm dia PVC wastewater pipes at all height sand depths above and below plinth level including caulking joints specified, clamps, wooden plugs, nails etc. and testing of pipes, all materials, tools and labour complete	Rm	QRO	
15	Supplying and fixing CPVC waterline Pipe with adjunctions, bends, tees, inspection pieces etc. at all heights and depths above and below plinth level with clearing access door, as specified and testing, all materials, tools and labour complete			
15.1	12mm	Rm	QRO	
15.2	20mm	Rm	QRO	
15.3	25mm	Rm	QRO	
15.4	40mm	Rm	QRO	
15.5	50mm	Rm	QRO	

No of Corrections……..

No of over writings……

16	Supplying, fitting and fixing 100 mm dia PVC soil fittings such as junctions, bends, tees, offsets, cowl ec. At all heights and depths above and below plinth level excluding cleaning caps but including baulking joints with lead as specified and testing, all materials, tools and labour complete	Rm	QRO	
17	Supplying, fitting and fixing 100 mm dia PVC trap "P" or "S" type with or without 50 mm dia vent holes at all heights and depths above and below plinth level including caulking joints specified and testing, all materials, tools and labour complete	No	QRO	
18	Supplying, fitting and fixing 15 mm dia chromium plated brass deluxe head approved angular/straight stopcock, bib-cock with CP wall flange, all materials, tools and labour complete	No	QRO	
19	Supplying, fitting and fixing 15 mm dia chromium plated tested brass self-closing tap of approved make, all materials, tools and labour complete	No	QRO	
J	**Miscellaneous**			
20	Supplying, cutting, placing and fixing in position PVC downpipe to dispose off rainwater at all heights and depths above and below plinth level with joints including all PVC fittings, such as heads, bends, offsets, swan necks, shoes, bobbins, sockets, MS clamps, wooden plugs, nails etc. all materials, tools, plant and labour complete.			
20.1	a) 100 mm dia	Rm	QRO	
20.2	b) 150 mm dia	Rm	QRO	
21	Supplying and laying in position cast PVC grating in roof for disposal of water as shown in the drawing and as directed by the Engineer, all materials, tools, plant and labour complete.			
21.1	a) 200 mm dia	No	QRO	
21.2	b) 150 mm dia	No	QRO	
22	Construction of sewage manhole for a size of 600X600 in 9inch brick work plastered inside as well outside in cement mortar 1:5 and fixing of FRP manhole cover.		QRO	
23	Providing and fixing rainwater spouts of 100mm PVC pipes with necessary accessories medium quality embedded in concrete /masonry as per working drawings, at all heights above plinth level, all materials, tools and labour complete	RM	QRO	
24	Item to be added	Kg	QRO	
M	**General Sanitary, water supply work & Drainage**			

No of Corrections……..

No of over writings……

25	Sanitary Fixtures and CP fittinqs only will be supplied by owners. However, all other piping accessories and consumables required for fixing and connecting of these fixtures, such waste, coupling, bottle traps, P. S traps, brackets, inlets, outlets, brass screws, Teflon tapes, hold fast or whatever required for proper finishing cutting, chasing, packing, making good of the areas shall be by contractors and no extra cost for such items shall be paid. 1st quality of materials alone should be used and others shall be reiected. Please note that these specifications are not exhaustive. However, keeping in mind the requirements of hiqh quality. The contractor should complete the work in the best workmanship complete in all respects D1. Sanitary, CP Fittings & Fixtures			
26	Supplying, fixing, testing & commissioning UPVC-SWR pipes confirming to IS 13592/92 and fittings confirming to IS14935/99 – buried in floor with necessary bends, joints etc. at all levels complete in all respects inside toilet areas			
26.1	a. 160 dia	RM	QRO	
26.2	b. 110 dia	RM	QRO	
26.3	c. 80 dia	RM	QRO	
27	Supplying, fixing, testing & commissioning PVC soil waste running outside the building connecting chamber to chamber with necessary bends, joints etc. at all levels complete in all respects			
27.1	a. 160 dia	RM	QRO	
27.2	b. 110 dia	RM	QRO	
27.3	c. 80 dia	RM	QRO	
28	Same as above but for providing UPVC sewage lines from upper floor toilets to G.floor toilets with necessary tees, elbows, bends, rust proof double angle brackets, cowls complete in all respects			
28.1	a. 160 dia	RM	QRO	
28.2	b. 110 dia	RM	QRO	
28.3	c. 80 dia	RM	QRO	

No of Corrections……..

No of over writings……

TOWN AND COUNTRY PLANNING DEPARTMENT
VILLUPURAM DISTRICT

INDUSTRIAL LAYOUT APPROVAL: TANSIDCO Pharma Industrial Park Layout in Plot No.A17 of Approved SIPCOT Industrial Park Layout L.P/A.D.T.C.P(V.D) NO : 20/2022.

VILLUPURAM DISTRICT, TINDIVANAM TALUK, MAILAM PANCHAYAT UNION, PELLAKUPPAM VILLAGE: S.F.NOS: 1/1, 1/2A, 1/2B, 1/2C, 1/2D, 1/3, 1/4, 1/5A, 1/5B, 2, 3/1, 3/2, 4/1A, 4/1B, 4/1C, 4/2, 4/3, 4/4, 4/5, 4/6, 5/1, 5/2, 6/1, 6/2A, 6/2B, 6/3, 10/1A1, 10/1A2, 10/2A1, 10/2A2,14/1A1A, 14/1A2, 14/2A1, 14/2A2, 15/1, 15/4, 15/5, 16, 17/3A, 17/4, 17/5A1, 17/5A2, 17/5B, 17/5C, 17/7, 18/3, 18/4

MAILAM PANCHAYAT UNION, KOLLAR VILLAGE: S.F.NOS: 202/2A, 202/2B, 202/2C, 202/2D, 202/2E, 202/2F, 202/2G, 202/2H, 202/2I, 202/2J, 203/1A, 203/1B, 207/2

OLAKKUR PANCHAYAT UNION, VENMANIYATHUR VILLAGE: S.F.NOS: 50/2B, 51/1, 51/2, 51/3B, 51/4, 52/2B, 52/3, 52/5

FILE NO:HIVL68HD/2023/TCP — SCALE 1:1600

GENERAL NOTES

TOTAL EXTENT	:	111.47 Acres
ROAD AREA	:	15.95 Acres (14.31%)
EXTENT AFTER DETECTION OF ROAD AREA	:	95.52 Acres
PUBLIC PURPOSE	:	11.45 Acres (10.27%)
COMMERCIAL PURPOSE (CMP)	:	2.77 Acres (2.48%)
SALEABLE INDUSTRIAL AREA	:	81.30 Acres (72.93%)

NUMBER OF PLOTS

INDUSTRIAL PLOTS	:	46 NOS.
COMMERCIAL PURPOSE PLOTS(SHOP)	:	11 NOS.
PUBLIC PURPOSE PLOTS	:	9 NOS.
TOTAL NO OF PLOTS	:	66 NOS.

PUBLIC PURPOSE LAND

SL No	PP No	DESCRIPTION	EXTENT IN ACRES
1	PP - 1		1.29
2	PP - 2		0.43
3	PP - 3	STP & ETP	5.07
4	PP - 4	UTILITY	2.76
5	PP - 5	WTP	1.20
6	PP - 6	WELL	0.24
7	PP - 7	BORE WELL	0.04
8	PP - 8	STP Collection Well	0.16
9	PP - 9	ETP Collection Well	0.26
TOTAL			11.45

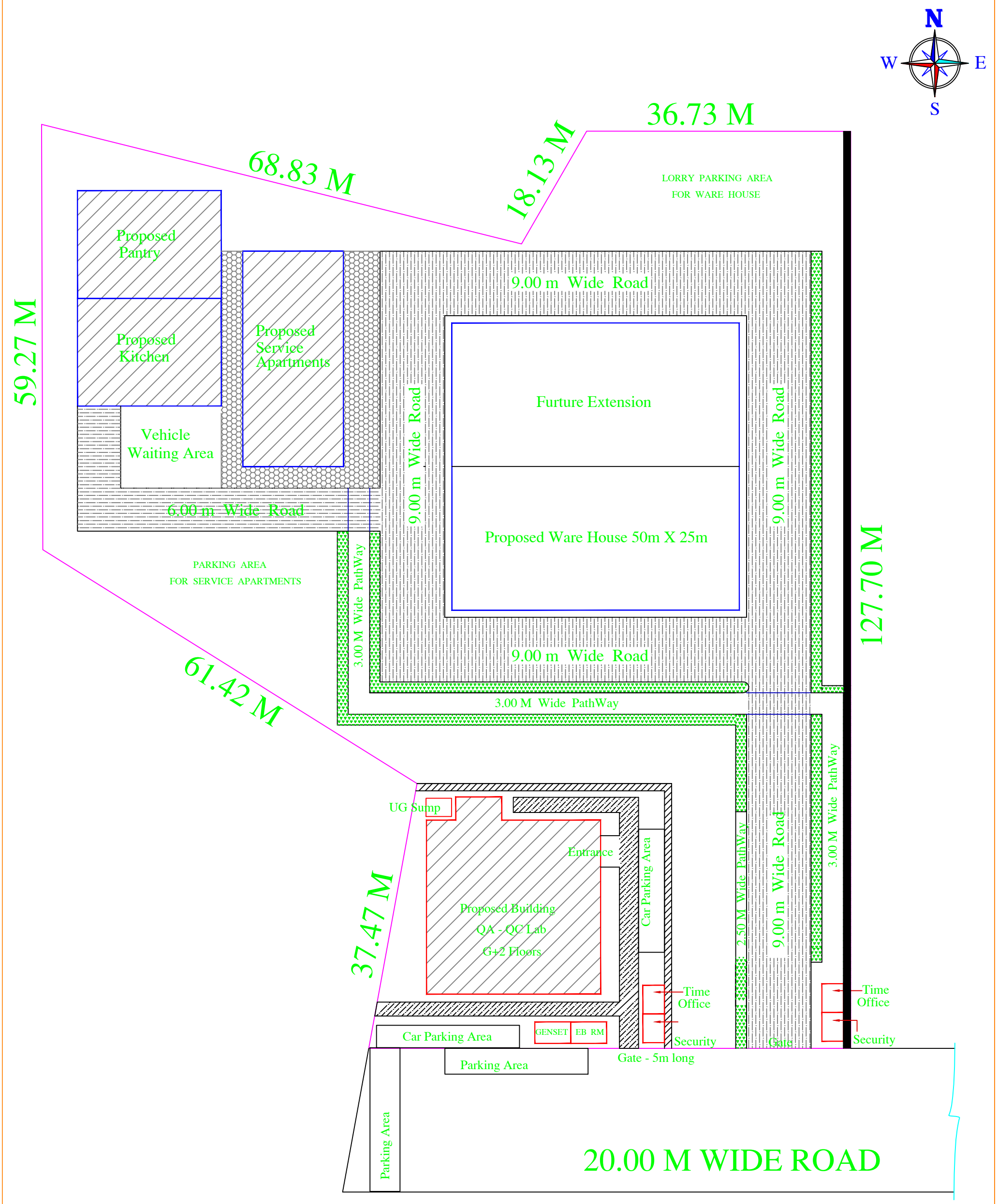
COMMERCIAL PURPOSE LAND

SL.NO	CMP No	EXTENT IN ACRES
1	CMP - 1	0.44
2	CMP - 2	0.38
3	CMP - 3	0.26
4	CMP - 4	0.21
5	CMP - 5	0.17
6	CMP - 6	0.12
7	CMP - 7	0.24
8	CMP - 8	0.20
9	CMP - 9	0.16
10	CMP - 10	0.22
11	CMP - 11	0.37
TOTAL		2.77

ALL DIMENSIONS ARE IN 'METER'

INDEX:

- LAYOUT HIGHWAYS ROAD
- INTERNAL ROADS
- COMMERCIAL PLOTS
- PUBLIC PURPOSE



SCHEMETIC PLAN SHOWING THE
PROPOSED COMMON QC LAB
AT TINDIVANAM PHARMA PARK
ESTATE, TINDIVANAM, MEGA PHARMA
CLUSTER, TINDIVANAM,
VILLUPURAM DISTRICT, TAMILNADU - 604 001.

SITE PLAN

DATE : 03.04.2025 | SCALE : N.T.S | DRG.No. TPP-7-R1

GEOTECHNICAL INVESTIGATION REPORT

for Common Testing & Training Hall (QC Lab) Building at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu

EXECUTIVE SUMMARY

M/s. Tindivanam Pharma Park Association, Chennai are proposing to construct Common Testing & Training Hall (QC Lab) Building at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

The sites for the proposed project is situated on the Northern side of 20m wide road and on the Western side 25m wide road in TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu. The proposed building measures approximately 25m x 25m in size. The site is open on all the sides and is fairly level in topography. The site is lower than the adjacent road by about 0.5m. Vegetation in the form of grass and bushes were observed within the site during the period of field investigations.

The proposed structure consists of a Common Testing & a Training Hall building (Quality Control Laboratory - QC Lab) Building.

Geotechnical investigations have been undertaken at the site as per the scope of investigations, stipulated by the client, which consisted of conducting 2 boreholes down to 10m depth below existing ground level irrespective of type of substrata encountered.

The results of borehole investigations indicate the presence of Brown clayey silty sand / silty sand down to 2.5/2.6m depth below existing ground level at which refusal/rock strata (where N-value is >100) was encountered. The refusal/rock strata encountered is in the form of Brownish white/white/yellow/brown completely weathered rock (Sandstone based) and continued down to the termination depths of the boreholes of 10m below existing ground level.

The soil strata is in a medium dense state down to the depths of refusal/rock strata encountered at 2.5m -2.6m depth below existing ground level.

Ground water table was encountered between 1.6m to 2m depth in the boreholes during the period of field investigations. This shallow depth of ground water table might be due to the rains prior to the period of field investigations and may go down in due course of time.

In view of the observed subsoil conditions, the proposed building can be supported on *Isolated/Strip footings laid at a minimum depth of 2m below the existing ground level* or *alternatively, at a minimum depth of 0.3m in weathered rock strata. Net allowable bearing pressures for Common Testing & Training Hall (QC Lab) with various widths of foundations laid at different depths are given below:*

Depth of Foundations Below EGL (m)	***Allowable Settlement (mm)***	***Net Allowable Bearing Pressure (t/m²) for Widths of Foundations (m)***	
		1.5	***≥3***
2	*25*	*16*	*21*
0.3m in WR	*12*	*40*	*40*

WR - Weathered Rock Strata

The excavated soil can be used for backfilling purposes.

After the excavations for the foundations, the foundation surface should be watered for at least 24 hours. The top slush should then be removed and the surface compacted heavily. If any loose pockets are observed, the same shall be filled with brickbats/ gravel and compacted well. Foundations can subsequently be laid over such a prepared surface.

Stiff Tie-beams connecting the columns in both directions may be provided which will render additional rigidity to the structure.

REPORT ON GEOTECHNICAL INVESTIGATION FOR COMMON TESTING & TRAINING HALL (QC LAB) BUILDING AT TANSIDCO PHARMA INDUSTRIAL PARK, PELLAKUPPAM, KOLLAR & VENMANIYATHUR VILLAGE, TINDIVANAM TALUK, VILLUPURAM DISTRICT, TAMIL NADU

1.0 INTRODUCTION

1.1 Overview

1.1.1 M/s. Tindivanam Pharma Park Association, Chennai are proposing to construct Common Testing & Training Hall (QC Lab) Building at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

1.1.2 The geotechnical investigations have been carried to ascertain the soil conditions for the design of foundations of the proposed building.

1.2 Authority

A detailed geotechnical investigations programme has been conducted as per the authorisation by M/s. Tindivanam Pharma Park Association, Chennai vide their Work Order No. TPPA/Soil Test/WO/2024/01 dated 05.12.2024.

2.0 PROJECT DETAILSt

2.1 Site Location

The site for the proposed project is situated on the Northern side of 20m wide road and on the Western side 25m wide road in TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

2.2 Site Layout and Topography

2.2.1 The proposed building measures approximately 25m x 25m in size. The site is open on all the sides and is fairly level in topography. The site is lower than the adjacent road by about 0.5m. Vegetation in the form of grass and bushes were observed within the site during the period of field investigations.

2.2.2 The colour of the exposed soil surface is Brown.

2.3 The Structure

As per information provided by the client, the proposed structure is a Common Testing & Training Hall (Quality Control Laboratory - QC Lab) Building.

2.4 Seismic Zone

Site for the proposed building is situated in Tindivanam near Chennai which falls under Seismic Zone III as per IS 1893 (Part 1) - 2016.

2.5 Geographical Information

2.5.1 The site for the proposed project is located at:

a) Latitude : 12° 25'

b) Longitude : 79° 38'

3.0 OBJECT OF INVESTIGATIONS

3.1 For designing the foundation system of the proposed building, the following data are required:

a) Type of foundation system.

b) Depth below the ground level at which the foundation system is to be laid.

c) Allowable bearing pressure at the foundations levels.

3.2 To determine above factors, the following information would be required:

a) The subsoil profile indicating thicknesses of the various soil strata, to a depth

down to the influence zone below the foundations.

b) Engineering properties of the soil strata at various levels.

c) Physical characteristics of the soil strata.

d) Variation of the strength of the strata with depth.

3.3 For evaluating the above parameters, field investigations and laboratory investigations on the soil samples collected during the field investigations, have been carried out.

3.4 The results from these investigations have been analysed to provide the recommendations for the design of foundations.

4.0 SCOPE OF INVESTIGATIONS

4.1 Scope of investigations as given in the work order consisted of:

a) Conducting 2 boreholes down to 10m depth below existing ground level irrespective of type of substrata encountered, as required by the client.

b) Conducting standard penetration tests at 1.5m intervals.

c) Recovering undisturbed soil samples from various levels of the subsoil strata.

d) Recording ground water table levels, if met with.

e) Conducting relevant laboratory tests on soil samples recovered.

f) Preparation and submission of a technical report containing the details of the tests carried out, their analysis and recommendations regarding the foundation system to be adopted. Two copies of the report are to be submitted.

5.0 FIELD INVESTIGATIONS

5.1 Preliminary Details

5.1.1 The locations of the boreholes were shown at site by the client's representative. A schematic site plan showing the location of the boreholes is given in fig. 1.

5.1.2 Weather was clear during the period of field investigations which were carried out in the

last week of December 2024. There were few spells of rain prior to the period of field investigations.

5.2 Boreholes

5.2.1 The boreholes were progressed by mechanically operated rotary core drill method.

5.2.2 Refusal strata (i.e. where N-value is >100) was encountered at 2.5/2.6m depths below the existing ground level in the form of completely weathered rock (Sandstone based). The drilling in rock strata was conducted using NX size core barrel fitted with diamond bits.

5.2.3 The boreholes were terminated at 10m depth below existing ground level, as per the stipulated scope of work.

5.2.4 The locations of boreholes, depths at which ground water table was encountered in the boreholes during the period of field investigations, depths at which refusal/rock strata was encountered and termination depths of the boreholes are given below:

BH No.	Depth of Ground Water Table Below EGL (m)	Depth of Refusal/ Rock Strata Below EGL (m)	Termination Depth below EGL (m)
1	2	2.5	10
2	1.6	2.6	10

5.2.5 Ground water table was encountered between 1.6 m to 2m depth in the boreholes during the period of field investigations. This shallow depth of ground water table might be due to the rains prior to the period of field investigations and may go down in due course of time.

5.2.6 Standard Penetration Tests were conducted in soil strata at 1.0m depth intervals.

5.2.7 Disturbed soil samples recovered from split spoon sampler were packed in polythene bags, labelled and retained for identification purposes.

5.2.8 Undisturbed soil samples were recovered by thin walled tubes conforming to IS 2132. These tubes had an area ratio of less than 10%. The diameter of soil samples were 50mm and length 45cm.

6.0 LABORATORY INVESTIGATIONS

6.1 The soil samples brought to the laboratory were subjected to various tests to determine the following properties

a) Type of soil and its gradation

b) Consistency limits

c) Natural density

d) Natural water content

e) Triaxial tests

6.2 In order to determine the above properties listed in 6.1, the following tests were conducted.

a) Sieve analysis on the coarse grained soil fraction

b) Hydrometer analysis on the fine grained soil fraction

c) Liquid and plastic limits

d) Natural Density and Water Content tests

e) Triaxial compression tests

f) Free Swell Index tests

6.3 The rock core samples brought to the laboratory were subjected to various tests to determine the following properties

a) Unit Weight

b) Porosity

c) Water Absorption

d) Uniaxial strength of rock

7.0 RESULTS AND ANALYSIS

7.1 Presentation of Results

7.1.1 The results of borehole investigations and of the laboratory investigations conducted on the soil samples collected from the boreholes have been presented in the form of soil profile tables in Table Nos. 1 to 4.

7.1.2 The soil profile tables indicate the following:

a) Standard Penetration Test Values (i.e. N- values observed) at various depths

b) Soil description identifying the type of soil

c) Grain size analysis indicating composition of sub soil

d) Consistency limits

e) In-situ bulk density and Water content

f) Triaxial test results

7.1.3 The rock profile tables indicate the following:

a) Description of rock

b) Number of core pieces in each drill run

c) Core Recovery in each drill run

d) RQD in each drill run

e) Unit Weight of rock samples

f) Porosity of rock samples

g) Water Absorption of rock samples

h) Uniaxial strength of rock derived from point load index

7.2 Analysis of Soil and Rock Profile

7.2.1 A perusal of the data presented in the soil and rock profile tables indicate the presence of the following soil strata.

a) Stratum - I : Brown clayey silty sand

b) Stratum - II : Brown silty sand

c) Stratum - III : Brownish white/white completely weathered rock strata (Sandstone based)

7.2.2 The thicknesses in each borehole of each strata described in 7.2.1 are given in the table below:

BH No.	Depth (m) : from - to		
	Stratum - I	Stratum - II	Stratum - III
1	0.0 - 2.5	-	2. 5 -10
2	-	0.0 - 2.6	2.6 - 10

7.2.3 The above results show that :

a) Stratum - I consisting of Brown clayey silty sand having significant percentages of sand and varying percentages of clay and silt , has been encountered from ground level down to 2.5m depths below existing ground level only at the location of borehole BH1.

b) Stratum - II consisting of Brown silty sand having significant percentages of sand and varying percentages of silt, has been encountered from ground level down to 2.6m depths below existing ground level only at the location of borehole BH2.

c) Stratum - III consisting of Brownish white/white completely weathered rock strata (Sandstone based) has been encountered from 2.5/2.6m depth down to the termination depths of boreholes of 10m depth below existing ground level.

7.3 Soil Composition

7.3.1 The grain size distribution of the soil samples at various depths, as determined in the laboratory have been presented in the form of grain size analysis curves in fig. 3.

7.3.2 The variations in the grain size distribution - strata wise across the boreholes are as

follows:

a) Stratum - I : Brown clayey silty sand

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	0	83	13	4

This stratum was encountered only at the location of borehole BH1.

b) Stratum - II : Brown silty sand

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
2	0	86	14	0

This stratum was encountered only at the location of borehole BH2.

7.3.3 The above results indicate that the soil in :

a) Stratum - I consists of about 4% of clay, 13% of silt and 83% of sand .

b) Stratum - II consists of about 14% of silt and 86% of sand.

7.4 In-situ Density and Water Content

7.4.1 The bulk/in-situ bulk densities, water contents and dry densities obtained from undisturbed soil samples are tabulated below.

BH No.	Depth (m)	In-situ Bulk Density (g/cm^3)	Water Content (%)	Dry Density (g/cm^3)
1	2	1.81	7.2	1.69
2	2	1.78	7.3	1.66

7.4.2 The above results indicate that the soil strata is in a medium dense state. Undisturbed soil samples could not be collected satisfactorily in some of the boreholes, as the tubes got damaged due to the presence of refusal at shallow depths below existing ground level.

7.5 Consistency Limits

7.5.1 The Consistency Limits determined for the soil in Stratum - I (Brown clayey silty sand) indicate that the soil in this stratum is non plastic in nature.

7.5.2 The Consistency Limits determined for the soil in Stratum - II (Brown silty sand) indicate that the soil in this stratum is non plastic in nature.

7.5.3 The Consistency Limits indicate that the soil in :

a) Stratum - I ((Brown/brownish grey clayey silty sand) is non plastic in nature.

b) Stratum - II (Brown silty sand) is non plastic in nature.

7.6 Standard Penetration Tests

7.6.1 Standard Penetration Test values (N-values observed) are presented in the soil/rock profile table nos.1 to 4.

7.6.2 The soil strata is in a medium to dense state from existing ground level down to refusal strata encountered at 2.5-2.6m depth below existing ground level with observed N-values ranging between 33 and 45.

7.6.3 In completely weathered rock, high blow counts have been recorded for small depths of penetration of the SPT sampler, indicating that the completely weathered rock encountered below refusal is very hard and compact in-situ.

7.7 Triaxial Test Results

7.7.1 The cohesion 'c' obtained from consolidated drained triaxial compression test varies negligible and the angle of shearing resistance 'ϕ' of the soil varies between 31° & 32°.

7.8 Free Swell Index

7.8.1 The free swell index of the soil samples collected at 1.5m depths are given below:

BH No.	Free Swell Index (%)
1	3.8
2	1.6

7.8.2 The above results indicate that the soil strata is low swelling in nature. Hence, the excavated soil can be used for backfilling purposes.

7.9 Rock Conditions

7.9.1 An analysis of the data provided in the rock profile tables indicates the following :

a) The rock strata generally consists of Sandstone based rock.

b) The colour of the rock generally is Brownish white/white down to the maximum depth investigated.

c) Core recoveries ranging from nil, small pieces to 14% have been observed at different depths in different boreholes.

d) RQD values of nil have been observed at different depths in boreholes.

e) Unit weight of the rock generally varies between 2.57g/cm^3 and 2.63g/cm^3.

f) Porosity of the rock varies between 0.35% and 0.57%.

g) Water absorption of the rock varies between 0.19% and 0.47%.

h) Point load strength of the rock generally varies between 40kg/cm^2 and 81kg/cm^2.

7.9.2 The above results indicate that the rock strata has been observed to be in a completely weathered state (i.e. characterised by nil, small pieces to 14% core recovery and nil RQD) at different depths in different boreholes.

7.9.3 In completely weathered rock strata, high blow counts have been recorded for small depths of penetration of the SPT sampler, indicating that the completely weathered rock encountered below refusal is very hard and compact in-situ.

7.10 Compiled Soil Profile

7.10.1 An overview of the results and their analysis has been presented in the form of a compiled soil (fig. 2).

7.10.2 The above figure shows the various strata encountered and their thicknesses in each of the boreholes and also gives the soil / rock composition and the observed N-values and undisturbed soil samples collected at various depths along with core recovery and RQD in the rock strata.

8.0 DESIGN CRITERIA

8.1 Design Parameters

8.1.1 The parameters required for the design of foundation system for the proposed Building are:

a) Type of foundation to be adopted

b) Depth at which the foundations have to be laid

c) Allowable bearing pressure on the soil at the foundation level

8.1.2 On the basis of the analysis of the results of investigations, the required design parameters have been arrived at and are given in the following sections.

8.2 Type of Foundations

8.2.1 The type of foundation depends on the following:

a) Subsoil conditions

b) Type of structure

c) Configuration at loading points

d) Loading intensity on each sub-structure/structural element.

8.2.2 As per information provided by the client, the proposed project consists of Common Testing & Training Hall (QC Lab) building.

8.2.3 The results of the investigations have shown that the soil is in a medium dense state state from the existing ground level down to the depths of refusal/rock strata.

8.2.4 In view of the above, *Shallow Foundations - Isolated/Strip Footings* can be adopted for the proposed structures.

8.3 Depth of Foundations

8.3.1 The depth at which foundations should be laid will be governed by the following criteria.

a) Top filled up strata/loose soil, if any

b) There should be sufficient thickness of soil above the footing/foundations so that the bearing capacity of the soil can be fully mobilised.

c) Soil below the level of footings/foundations should have the requisite strength to support the anticipated bearing pressures on the foundations without allowing the settlement of footings/foundations to exceed the acceptable limits.

d) Requirements of the type of structure is a (Common Testing & Training Hall (QC Lab) building).

8.3.2 The results of the investigations have shown that the soil is in a medium dense state state from the existing ground level down to the depths of refusal/rock strata encountered at 2.5m to 2.6m below existing ground level.

8.3.3 In view of the above factors, foundations of the proposed building can be laid at a *minimum depth of 2m below the existing ground level*. The soil available at the founding level will be Brown clayey silty sand /Brown silty sand.

8.3.4 Alternatively, as refusal/rock strata has been encountered at shallow depths below existing ground level, foundations of the proposed structures can be laid at a *minimum depth of 0.3m in completely weathered rock strata.*

8.4 Allowable Bearing Pressure

8.4.1 An allowable settlement of 25mm has been considered to evaluate the allowable bearing pressure for Isolated/Strip footings in soil strata.

8.4.2 Allowable bearing pressure has been evaluated by:

a) Shear failure criteria based on the average soil data

b) Settlement criteria based on the SPT values (N-values)

c) Settlement criteria based on deformation modulus

8.4.3 A water table correction factor of 0.5 has been considered.

8.4.4 The Allowable bearing pressure for foundations resting in weathered rock strata is based on the provisions given in Table 2 of BIS code IS 12070 - 1987 (RA - 1995).

8.4.5 On the basis of the above, net allowable bearing pressures for various widths of foundations laid at different depths are given below.

Depth of Foundations Below EGL (m)	*Net Allowable Bearing Pressure (t/m²) for Widths of Foundations (m)*	
	1.5	*≥3*
2	*16*	*21*
0.3m in WR	*40*	*40*

WR - Weathered Rock Strata

8.4.6 The settlement of foundations resting in completely weathered rock strata will be within 12mm as per IS 13063-1991 (RA 1996).

9.0 RECOMMENDATIONS

9.1 Type of Foundations

Shallow Foundations - Isolated/Strip Footings

9.2 Allowable Bearing Pressure

Net allowable bearing pressures for various widths of foundations laid at different

depths are given below:

Depth of Foundations Below EGL (m)	*Allowable Settlement (mm)*	*Net Allowable Bearing Pressure (t/m²) for Widths of Foundations (m)*	
		1.5	*≥3*
2	*25*	*16*	*21*
0.3m in WR	*12*	*40*	*40*

WR - Weathered Rock Strata

9.3 Construction Advisories

9.3.1 The soil of each strata has been described with name, colour etc. During excavation, any variations observed in the nature and condition of the soil from those given in this Report should be noted and appropriate action should be taken.

9.3.2 The excavated soil can be used for backfilling purposes.

9.3.3 After the excavations for the foundations, the foundation surface should be watered for at least 24 hours. The top slush should then be removed and the surface compacted heavily. If any loose pockets are observed, the same shall be filled with brickbats/ gravel and compacted well. Foundations can subsequently be laid over such a prepared surface.

9.3.4 Stiff Tie-beams connecting the columns in both directions may be provided which will render additional rigidity to the structure.

9.4 Appendices

9.4.1 The calculations for the allowable bearing pressure have been provided in Appendix-A of this report.

9.4.2 The List of IS codes referred for providing the recommendations and that which might be required to implement the same have been given in Appendix-B of this report.

9.5 Notes

9.5.1 The recommendations given in this report have been arrived at on the basis of design parameters which have been judiciously adopted by giving due consideration to the results of field and laboratory investigations as well as NAGADI's experience of over four decades in working in various types of soil and rock conditions all over India.

9.5.2 The entire report should be studied before adopting the recommendations given in the report.

10.0 LIMITATIONS

This Geotechnical investigation has been carried out at locations in the site chosen by the client as representing the entire site. The recommendations provided in this Report are hence valid only for those test locations. However, if there is any change in the subsoil conditions and properties at places between or beyond the chosen test locations, Nagadi may be contacted for further actions. Fresh investigations will have to be carried out at such locations.

Dr. N. Santosh Rao
Technical Director & Chief Consultant
*For **NAGADI CONSULTANTS PVT. LTD.***

ANALYSIS FOR ALLOWABLE BEARING PRESSURE

Data

(i) Soil Properties :

c (kg/cm^2) = - $\phi = 31^\circ$ γ (g/cm^3) = 1.9

(ii) Depth of Foundation, D (m) = 2

(iii) Allowable Settlement, s (mm) = 25

Shear Failure Criterion (Ref. IS : 6403)

$N_c = 27.05$ $N_q = 16.11$ $N_\gamma = 19.39$ $R_w = 0.50$ $R_w' = 0.50$

$$q_s = \frac{1}{2.5}\left(c \cdot N_c + \gamma D \cdot N_q \cdot R_w + 0.5 \cdot \gamma \cdot B \cdot N_\gamma \cdot R'_w\right) - \gamma D.R_w$$

B (m)	1.5	≥3
q_s (t/m^2)	15.9	21.4

Settlement Criterion (Ref. IS : 8009)

(i) From N Values

B (m)	1.5	≥3
H (m)	1	1
N_{av}	53	57
q_a (t/m^2)	31.2	28.3

(ii) From Triaxial Compression Tests : $q_a = \dfrac{s \cdot E}{0.7 \cdot H}$

B (m)	1.5	≥3
H (m)	1	1
E (kg/cm^2)	80	100
q_a (t/m^2)	28.5	35.7

ADOPT	**B (m)**	**1.5**	**≥3**
	q (t/m^2)	**16**	**21**

Note : q_s and q_a are NET VALUES, Weight of backfill etc. need not be added to the loading except in case of filling above original G.L.

LIST OF IS CODES

Field Investigation

1. IS : 1498 - 1970 : Classification and identification of soils for general engineering purposes (First Revision) (Amendment 2)
2. IS : 1892 - 1979 : Code of practice for sub surface investigations for foundations (First revision)
3. IS : 2131 - 1981 : Method of Standard Penetration Tests for soils (First revision)
4. IS : 2132 - 1986 : Code of practice for thin walled tube sampling of soils (Second revision)

Laboratory Tests

1. IS : 2720 - 1983 (Part 1) : Methods of test for soils: Preparation of dry soil samples for various tests (Second revision)
2. IS : 2720 - 1980 (Part 2) : Method of test for soils: Determination of water content (Second revision) Amendment 1
3. IS : 2720 - 1980 (Part 3/Sec 1) : Method of test for soils : Determination of Specific Gravity : Fine grained soils. (First revision)
4. IS : 2720 - 1980 (Part 3/Sec 2) : Method of test for soils : Determination of Specific Gravity : Fine, Medium & Coarse grained soils. (First revision).
5. IS : 2720 - 1985 (Part 4) : Method of test for soils : Grain size analysis (Second revision)
6. IS : 2720 - 1985 (Part 5) : Method of test for soils : Determination of liquid and plastic limit (Second revision)
7. IS : 2720 - 1977 (Part 40) : Methods of tests for soils: Determination of free swell index of soils.

Foundation Construction

1. IS : 1080 - 1986 : Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell) (Second revision)
2. IS : 1904 - 1986 : Code of practice for design and construction of foundation in soils: General requirements (Third revision)
3. IS 6403 - 1981 : Code of practice for determination of bearing capacity of shallow foundations : First revision (Amendment 1)
4. IS 8009 - 1976 (Part 1) : Code of practice for calculation of settlements of foundations : Shallow foundations subject to symmetrical static vertical loads (Amendment 2)
5. IS 12070 - 1987 : Design and construction of shallow foundations in rocks (RA - 1995)
6. IS 13063-1991 (RA 1996): Structural safety of buildings on shallow foundations on rocks — Code of practice

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Job No. (C)10004

Sheet No. : 1

SOIL PROFILE

Project: Common Testing & Training Hall (QC Lab) at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

B.H. Location: | Water Table: 2m | Term. Depth : 10m | B.H. No. : 1

N - Value#	Depth (m)	Soil Description	Grain Size Analysis				Atterberg Limits		In-situ properties		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density * (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0	Ground level											
45	1.5	Brown clayey silty sand	0	83	13	4	-	NP					
	2.0	Brown clayey silty sand							1.81	7.2	DS	-	32
	2.5	Change of strata											
>100 (125/40cm)		Brownish white Completely Weathered Rock (Sandstone based)											

*-Natural Bulk Density # -N Values (Observed)

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Job No. : (G)10004

Sheet No. : 2

ROCK PROFILE

Project : Common Testing & Training Hall (QC Lab) at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

Location :

B.H. Size :

Water Table (m) : 2m

Term. Depth (m) : 10m

BH No.: 1

Depth (m)	Strata Description	No. of Core Pieces of				Core Recovery (%)						RQD (%)	Run Time (min)	Unit Weight (g/cm^3)	Porosity (%)	Water Absorption (%)	Unconfined Compressive Strength (kg/cm^2)	Point Load Strength (kg/cm^2)	Remarks
		<10	10-25	25-75	>75	20	40	60	80	100									
2.5	Brownish white Completely Weathered Rock (Sandstone based)																		(N Values) >100 (125/40cm)
3.5	Brownish white Completely Weathered Rock (Sandstone based)										Nil	Nil	30						
4.5	Brownish white Completely Weathered Rock (Sandstone based)										Nil	Nil	35						
5.5	Brownish white Completely Weathered Rock (Sandstone based)										SP	Nil	40						
6.5	Brownish white Completely Weathered Rock (Sandstone based)	2									5	Nil	45	2.60	0.56	0.47		40	
7.5	Brownish white Completely Weathered Rock (Sandstone based)	2									6	Nil	47	2.61	0.53	0.42		81	
8.5	Brownish white Completely Weathered Rock (Sandstone based)	1									4	Nil	60	2.58	0.51	0.41		81	
9.5	Brownish white Completely Weathered Rock (Sandstone based)	1									5	Nil	60	2.61	0.44	0.38		40	
10.0	Brownish white Completely Weathered Rock (Sandstone based)	1									12	Nil	60	2.62	0.41	0.21		40	

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Job No. : 10004

Sheet No. : 3

SOIL PROFILE

Project: Common Testing & Training Hall (QC Lab) at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

B.H. Location: | Water Table: 1.6m | Term. Depth : 10m | B.H. No. : 2

N - Value#	Depth (m)	Soil Description	Grain Size Analysis				Atterberg Limits		In-situ properties		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density * (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (^{o})
	0.0	Ground level											
33	1.5	Brown silty sand	0	86	14	0	-	NP					
	2.0	Brown silty sand							1.78	7.3	DS	-	31
	2.6	Change of strata											
>100 (107/40cm)		White Completely Weathered Rock (Sandstone based)											

*-Natural Bulk Density # -N Values (Observed)

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Job No. : 10004

Sheet No. : 4

ROCK PROFILE

Project : Common Testing & Training Hall (QC Lab) at TANSIDCO Pharma Industrial Park, Pellakuppam, Kollar & Venmaniyathur Village, Tindivanam Taluk, Villupuram District, Tamil Nadu.

Location :

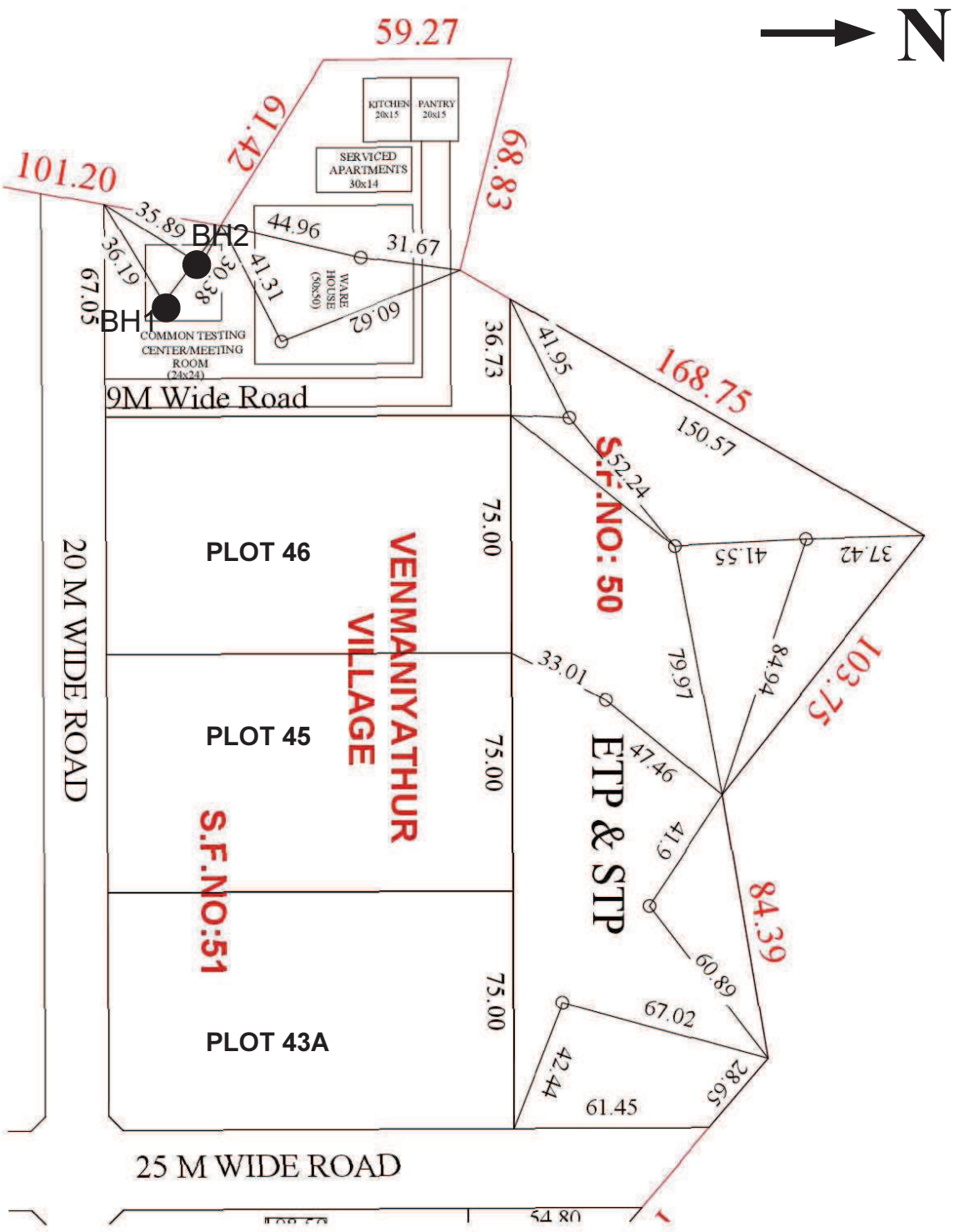
B.H. Size :

Water Table (m) : 1.6m

Term. Depth (m) : 10m

BH No.: 2

Depth (m)	Strata Description	No. of Core Pieces of				Core Recovery (%)						RQD (%)	Run Time (min)	Unit Weight (g/cm³)	Porosity (%)	Water Absorption (%)	Unconfined Compressive Strength (kg/cm²)	Point Load Strength (kg/cm²)	Remarks
		<10	10-25	25-75	>75	20	40	60	80	100									
2.6	White Completely Weathered Rock (Sandstone based)																		(N Values) >100 (107/40cm)
3.5	White Completely Weathered Rock (Sandstone based)										Nil	Nil	20						
4.5	White Completely Weathered Rock (Sandstone based)										Nil	Nil	27						
5.5	White Completely Weathered Rock (Sandstone based)	2									3	Nil	30	2.57	0.53	0.32		81	
6.5	White Completely Weathered Rock (Sandstone based)	2									5	Nil	35	2.59	0.57	0.31		40	
7.5	White Completely Weathered Rock (Sandstone based)	1									5	Nil	37	2.62	0.44	0.28		40	
8.5	White Completely Weathered Rock (Sandstone based)	1									5	Nil	40	2.60	0.41	0.23		40	
9.5	White Completely Weathered Rock (Sandstone based)	1									6	Nil	40	2.61	0.37	0.19		81	
10.0	White Completely Weathered Rock (Sandstone based)	1									14	Nil	35	2.63	0.35	0.21		40	



Legend

BH -Borehole

SCHEMATIC SITE PLAN
(Not to Scale)

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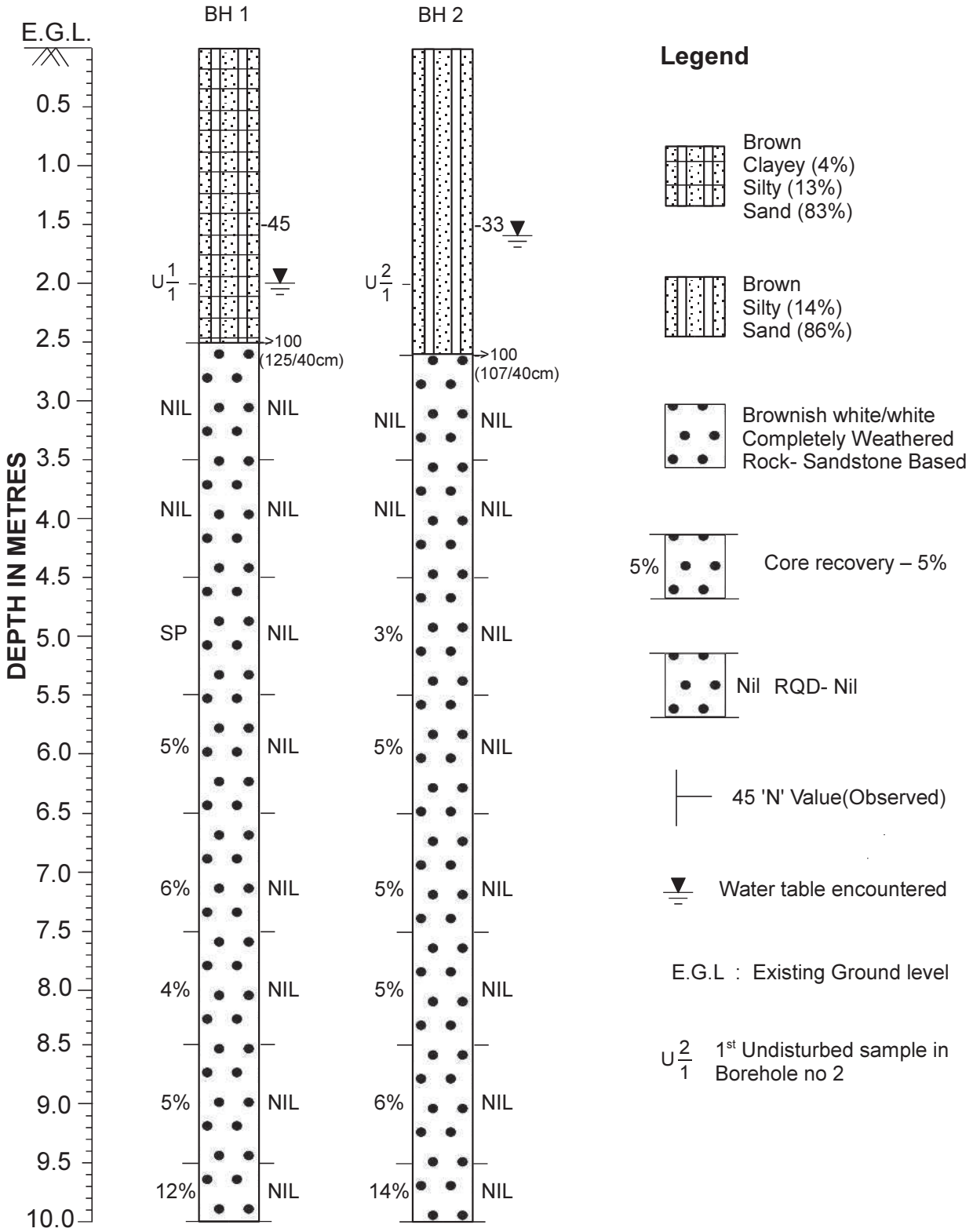

COMPILED SOIL/ROCK PROFILE

PROJECT : COMMON TESTING & TRAINING HALL (QC LAB) AT TANSIDCO PHARMA INDUSTRIAL PARK, PELLAKUPPAM, KOLLAR & VENMANIYATHUR VILLAGE, TINDIVANAM TALUK, VILLUPURAM DISTRICT, TAMIL NADU

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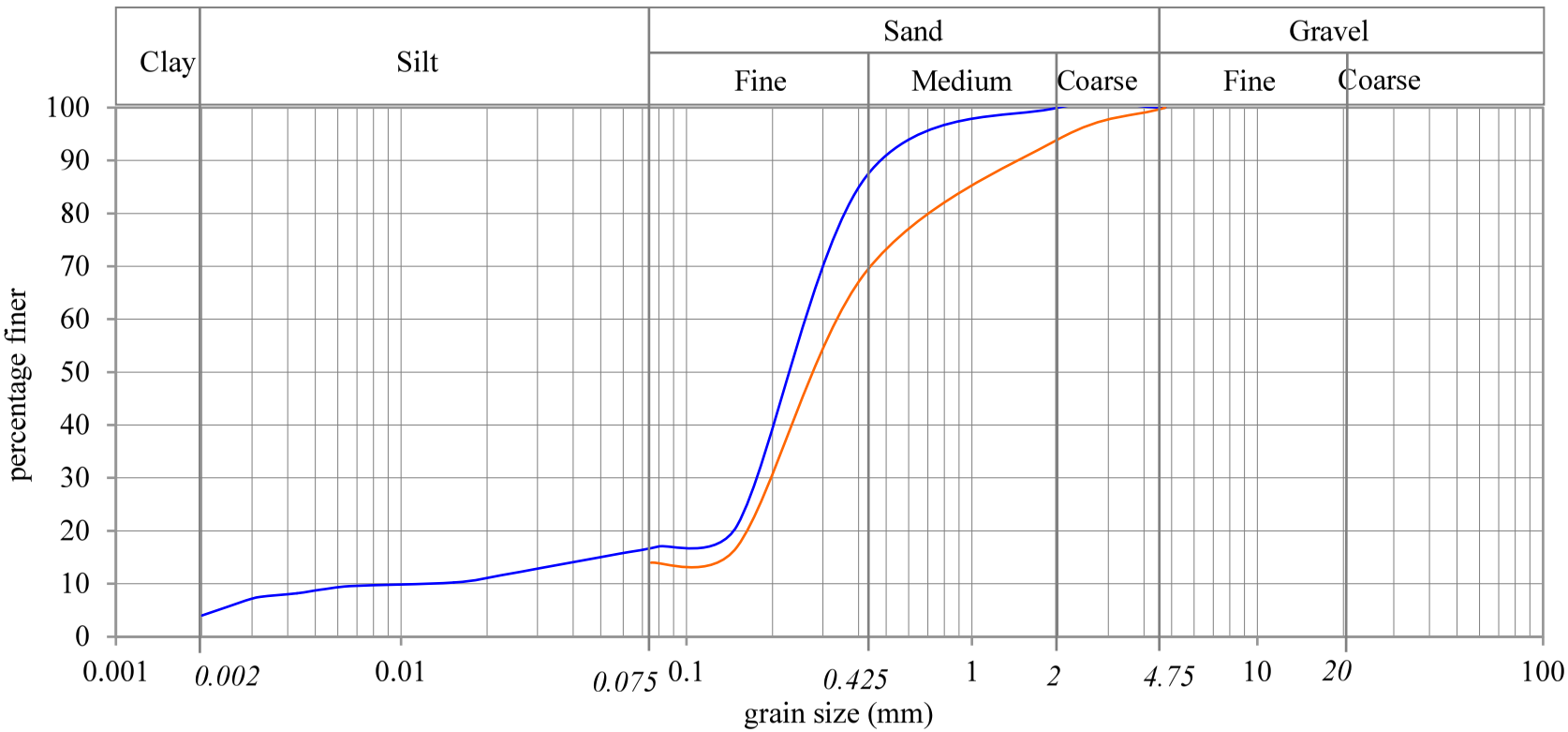
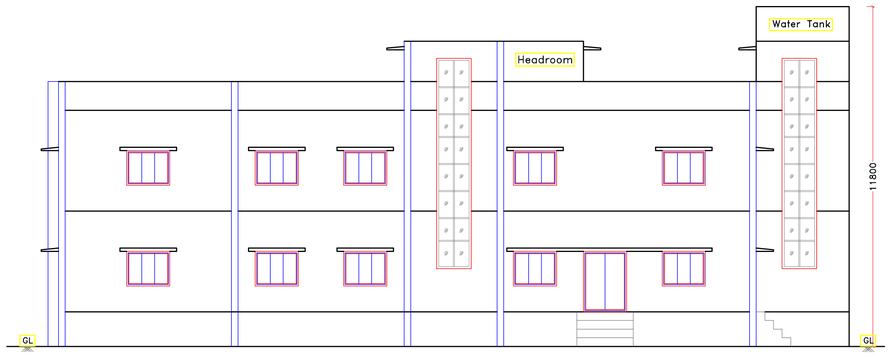
Job No. G(C)10004

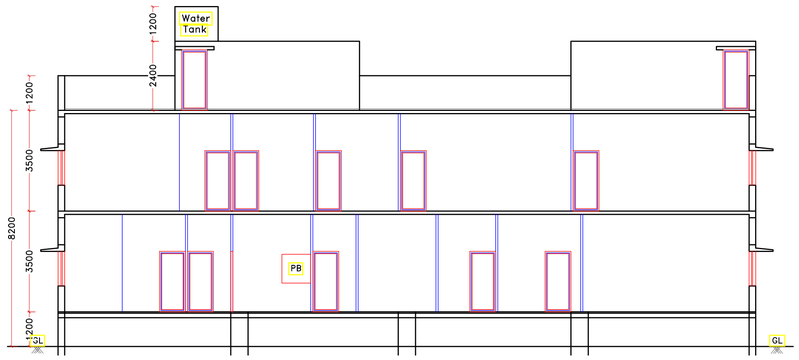
Sheet No. : 3



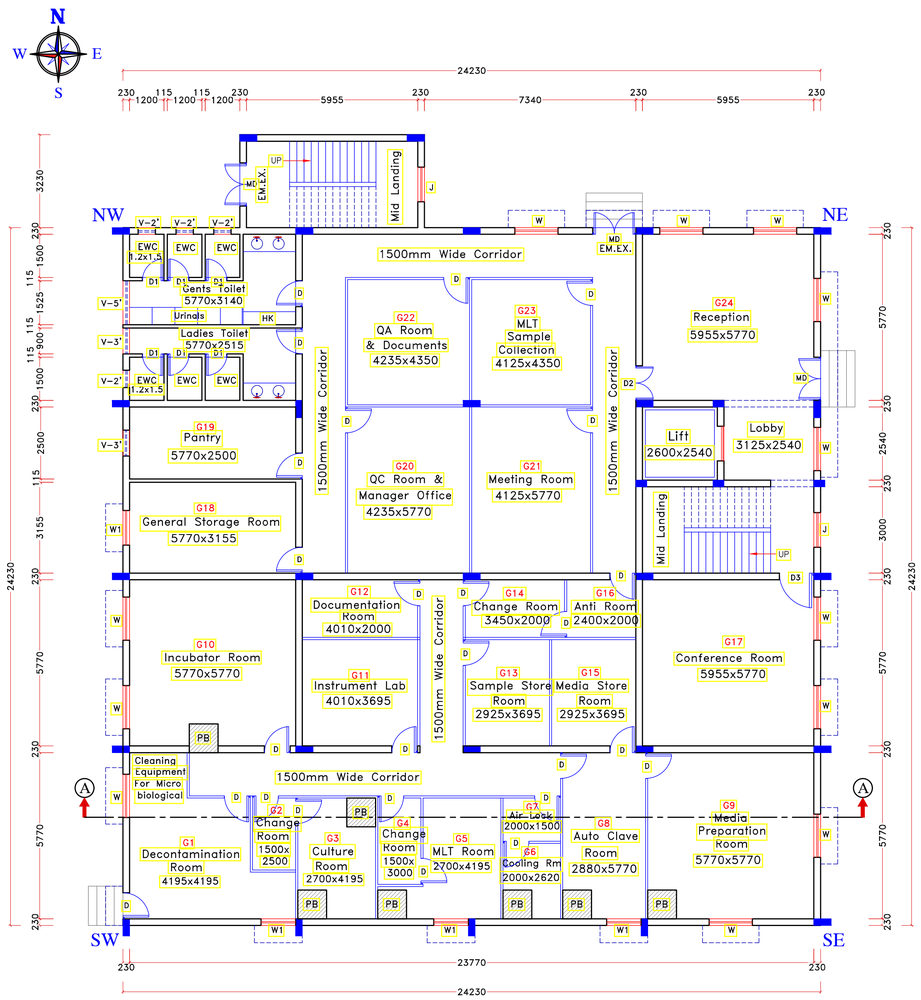
Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	U
	1	1.5	Clayey silty sand	0	83	13	4	0.260	0.007	37.1
	2	1.5	Silty sand	0	86	14	0	0.330	-	-



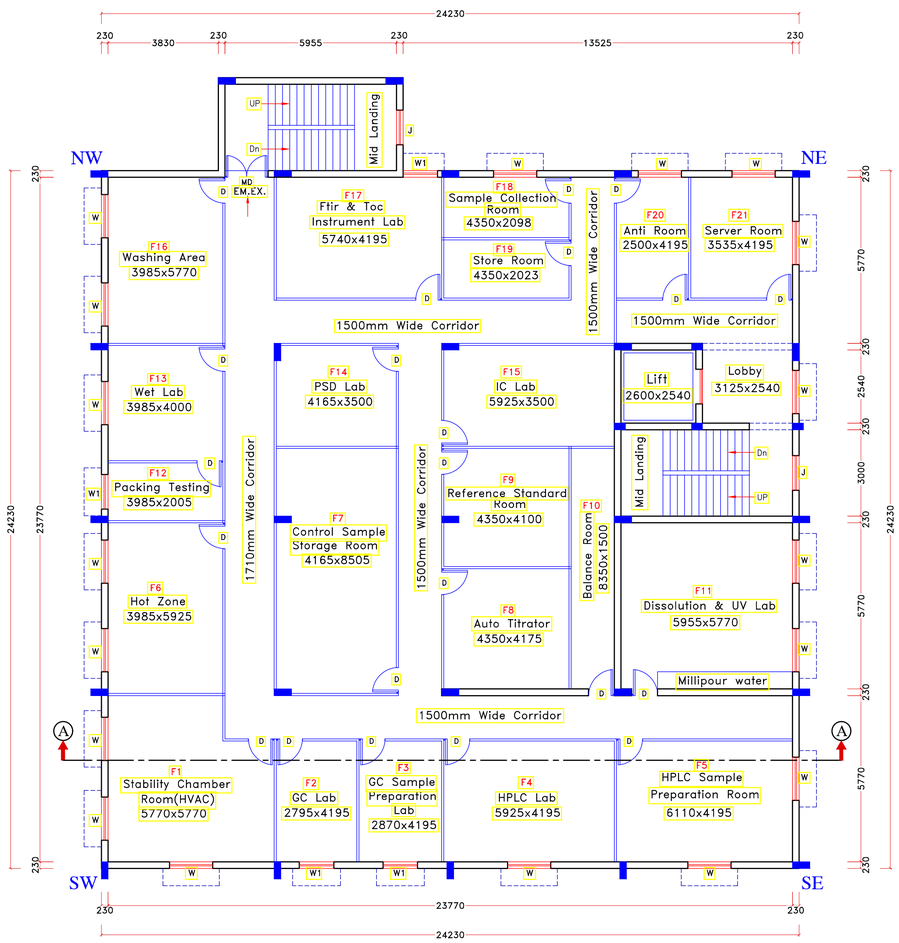
FRONT VIEW ELEVATION



SECTION ON A - A



GROUND FLOOR PLAN



FIRST FLOOR PLAN

SCHEMETIC PLAN SHOWING THE PROPOSED COMMON QC LAB (ITCOT) AT TINDIVANAM PHARMA PARK ESTATE, TINDIVANAM, MEGA PHARMA CLUSTER, TINDIVANAM, VILLUPURAM DISTRICT, TAMILNADU - 604 001.

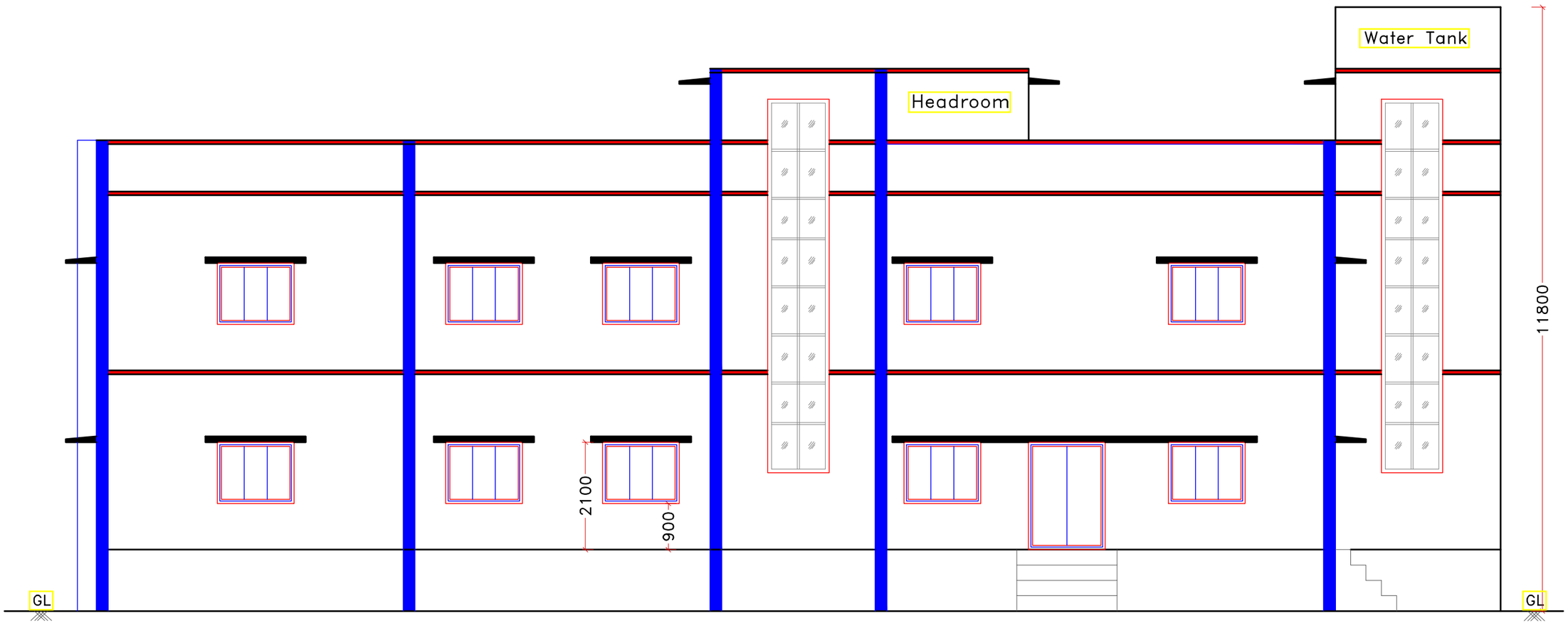
AREA STATEMENT		Sq.M	Sq.Ft.
SITE EXTENT	:	--	--
GROUND FLOOR	:	607.81	6542
FIRST FLOOR	:	607.81	6542
HEADROOM	:	62.15	669
TOTAL FLOOR AREA	:	1277.77	13753
F.S.I AREA	:	1215.62	13084
F.S.I	:	--	

SCHEDULE OF JOINERY:-

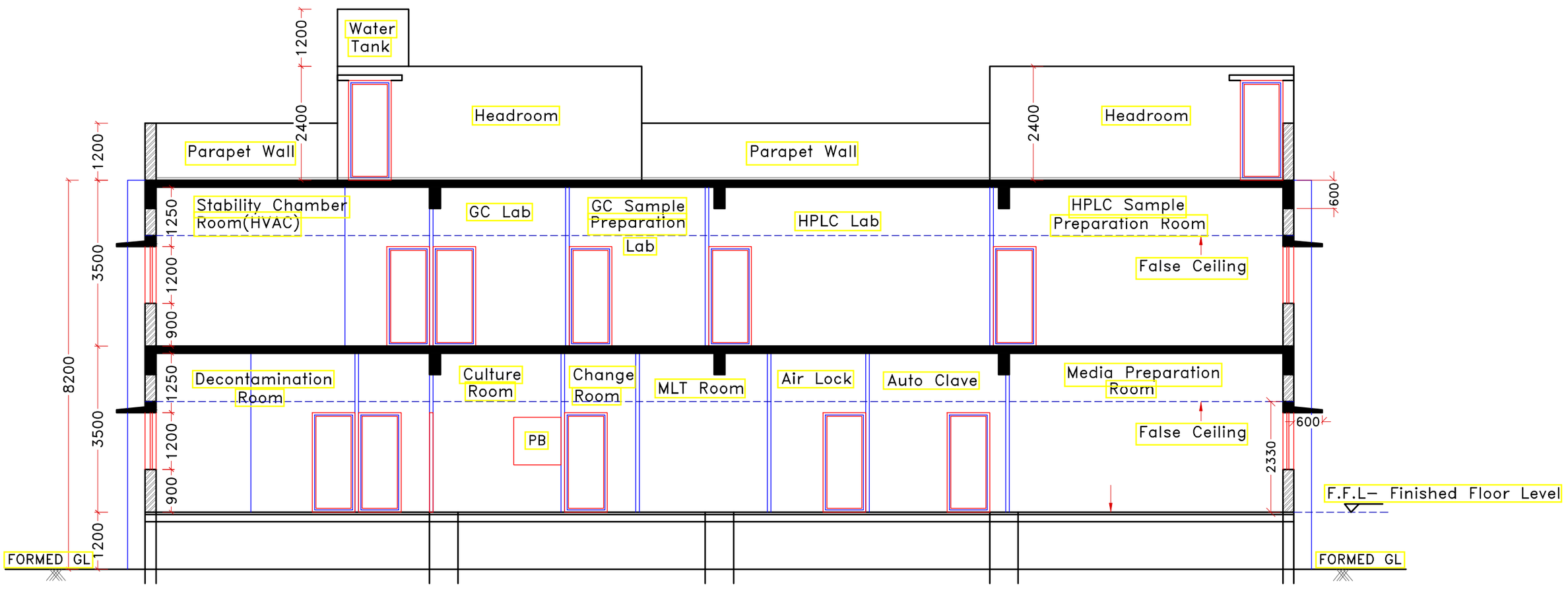
TYPE	DETAIL	SIZE (MM)
MD	DOOR	1500 x 2100
D	DOOR	900 x 2100
D1	DOOR	750 x 2100
W	WINDOW	1500 x 1200
W1	WINDOW	1200 x 1200
V	VENTILATOR	600x600
J	JALLY	1200x7300

GROUND FLOOR			FIRST FLOOR		
Room No.	Description	Sq.M / Sq.Ft.	Room No.	Description	Sq.M / Sq.Ft.
G1	Decontamination	23.29 /251	F1	Stability Chamber Room(HVAC)	30.48 / 328
G2	Change Room	3.75 / 40			
G3	Culture Room	11.32 /122	F2	GC Lab	11.72 / 126
G4	Change Room	4.50 / 49	F3	GC Sample Preparation Lab	12.03 / 130
G5	MLT Room	13.09 /141			
G6	Cooling Room	5.24 / 56	F4	HPLC Lab	24.85 / 268
G7	Air Lock	3.00 / 32	F5	HPLC Sample Preparation Room	25.63 / 276
G8	Auto Clave Room	16.61 /179			
G9	Media Preparation	33.29 /358	F6	Hot Zone	23.61 / 254
G10	Incubator Room	33.29 /358	F7	Control Sample Storage Room	35.42 / 381
G11	Instrument Lab	14.81 /159			
G12	Documentation	8.02 / 86	F8	Auto Titrator	18.16 / 195
G13	Sample Store Rm	10.80 /116	F9	Reference Standard	17.83 / 192
G14	Change Room	6.90 / 74	F10	Balance Room	12.52 / 135
G15	Media Store Room	10.80 /116	F11	Dissolution & UV Lab	34.36 / 370
G16	Anti Room	4.80 /52			
G17	Conference Room	34.36 /370	F12	Packing Testing	7.98 / 86
G18	General Storage	18.20 /196	F13	Wet Lab	15.94 / 172
G19	Pantry	14.42 /155	F14	PSD Lab	14.72 / 158
G20	QC Room & Manager Office	24.43 /263	F15	IC Lab	20.73 / 223
			F16	Washing Area	22.99 / 247
G21	Meeting Room	23.80 /256	F17	Ftir & Toc Instrument Lab	24.07 / 259
G22	QA Room & Documents	18.42 /198			
			F18	Sample Collection	9.12 / 98
G23	MLT Sample Collection	17.94 /193	F19	Store Room	8.79 / 95
			F20	Anti Room	10.48 / 113
G24	Reception	34.36 /370	F21	Server Room	14.82 / 160

DATE : 27.01.2025	SCALE : N.T.S	DRG.No. TPP -1



FRONT VIEW ELEVATION

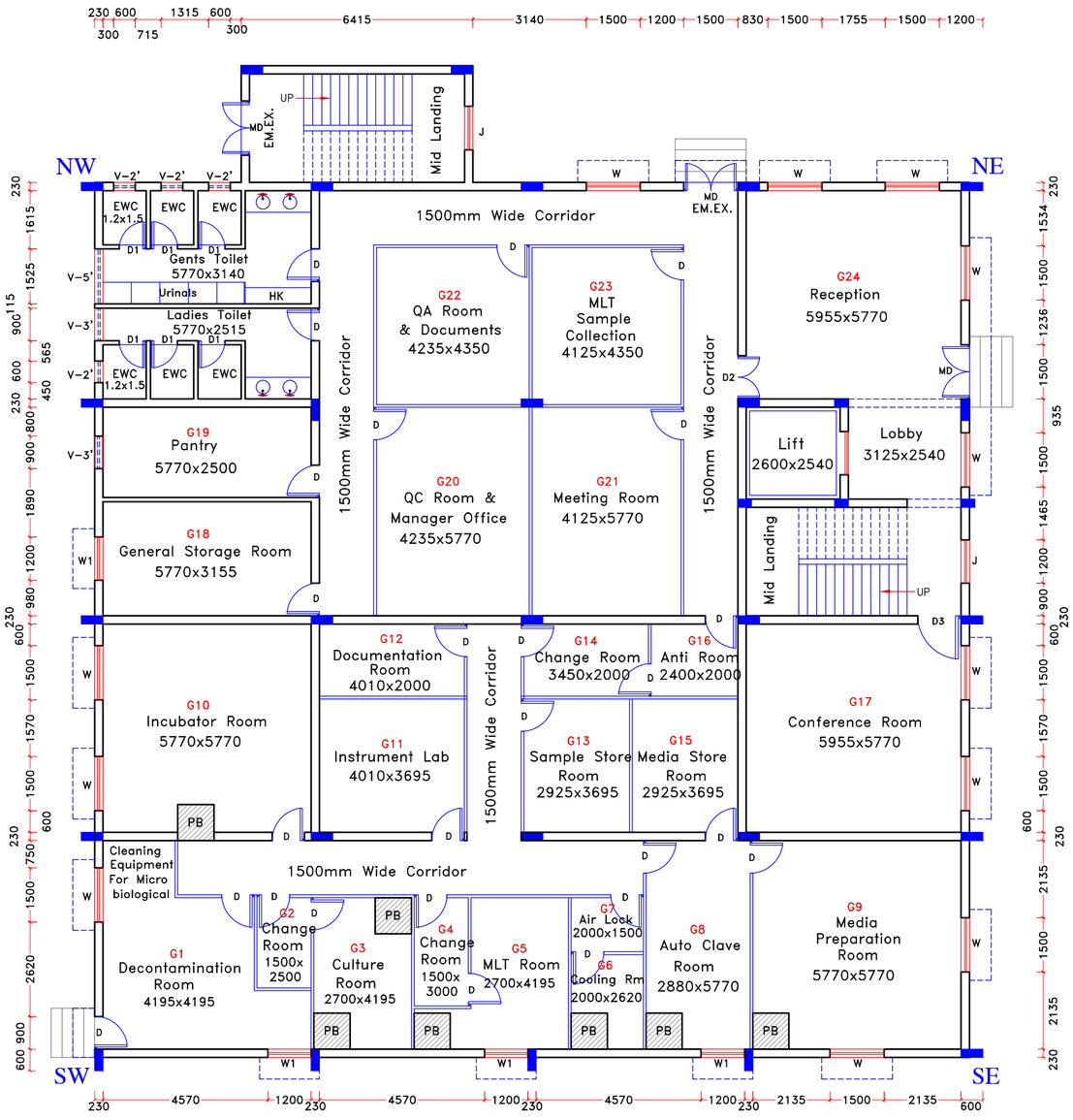


SECTION ON A - A

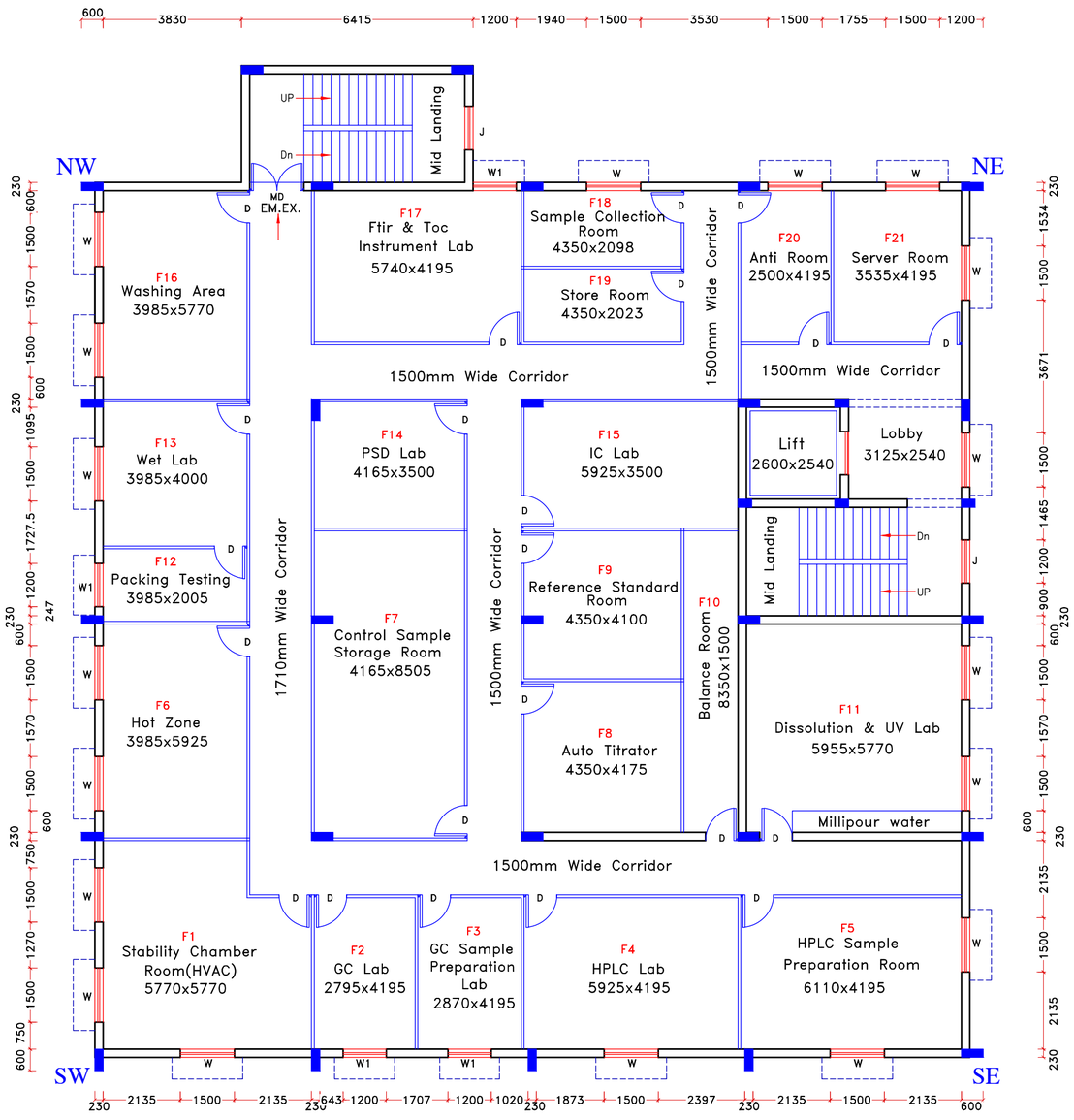
SCHEMETIC PLAN SHOWING THE PROPOSED COMMON QC LAB (ITCOT) AT TINDIVANAM PHARMA PARK ESTATE, TINDIVANAM, MEGA PHARMA CLUSTER, TINDIVANAM, VILLUPURAM DISTRICT, TAMILNADU - 604 001.

ELEVATION & SECTION DETAILS

DATE : 27.01.2025	SCALE : N.T.S	DRG.No. TPP -3



GROUND FLOOR PLAN



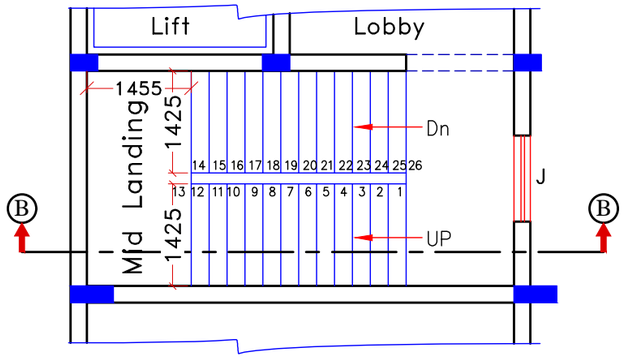
FIRST FLOOR PLAN

N
W E
S

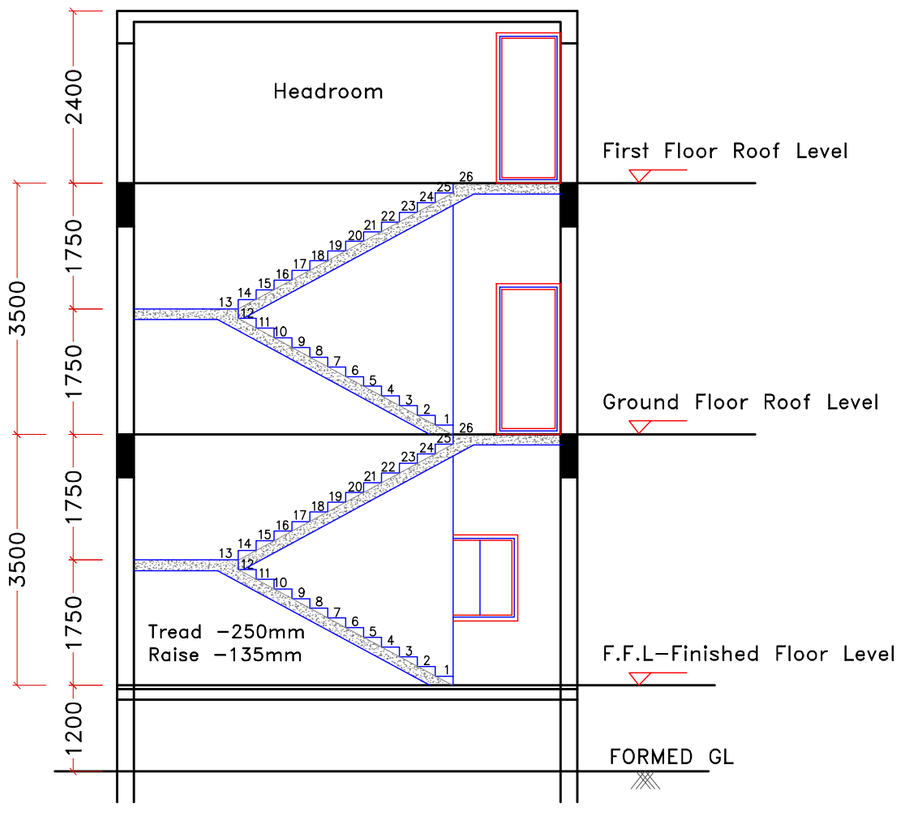
SCHEMETIC PLAN SHOWING THE PROPOSED COMMON QC LAB (ITCOT) AT TINDIVANAM PHARMA PARK ESTATE, TINDIVANAM, MEGA PHARMA CLUSTER, TINDIVANAM, VILLUPURAM DISTRICT, TAMILNADU - 604 001.

DRAWING SHOWING POSITION OF WINDOW IN OUTER WALL

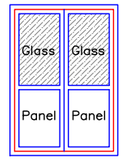
DATE : 27.01.2025	SCALE : N.T.S	DRG.No. TPP -5



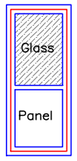
TYPICAL STAIRCASE PLAN
GROUND & FIRST FLOOR



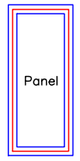
SECTION ON B -B



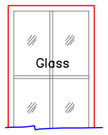
MD - MAIN DOOR
1500 x 2100 (mm)



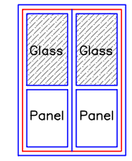
D - DOOR
900 x 2100 (mm)



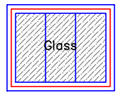
D1 - DOOR
750 x 2100 (mm)



J - JALLY
1200 x 7300 (mm)



MD - MAIN DOOR
1500 x 2100 (mm)
EM.EX.
EMERGENCY EXIT
PUSH BAR TYPE



W - WINDOW
1500 x 1200 (mm)

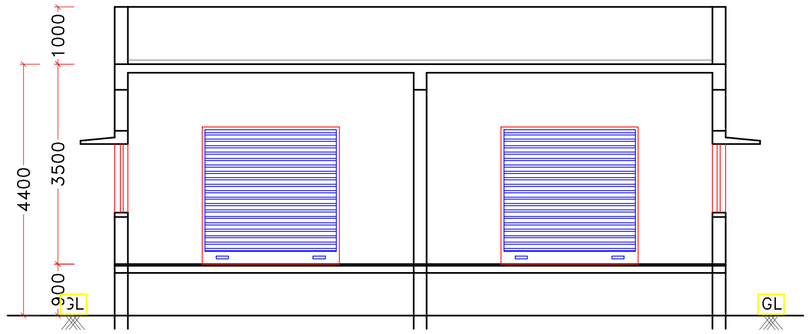
W1 - WINDOW
1200 x 1200 (mm)

V - VENTILATOR
600 x 600 (MM)
ADAPT SAME PATTERN FOR
OTHER VENTILATOR

NOTE :

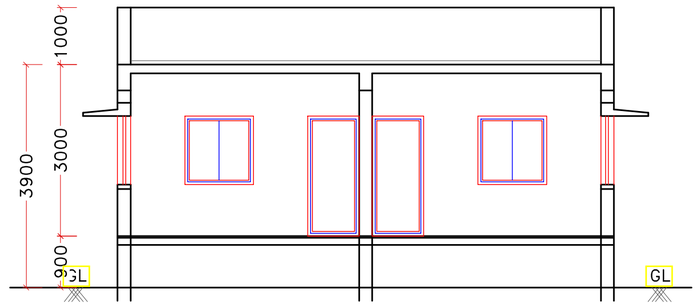
1. ALL DOOR, WINDOW & VENTILATOR FRAME PANEL SHALL BE OF UPVC MATERIAL
2. TOILET DOOR SHALL BE OF WPC FRAME AND SHUTTER

SCHEMETIC PLAN SHOWING THE PROPOSED COMMON QC LAB (ITCOT) AT TINDIVANAM PHARMA PARK ESTATE, TINDIVANAM, MEGA PHARMA CLUSTER, TINDIVANAM, VILLUPURAM DISTRICT, TAMILNADU - 604 001.	JOINERY AND STAIRCASE DETAILS	DATE : 27.01.2025	SCALE : N.T.S	DRG.No. TPP -4



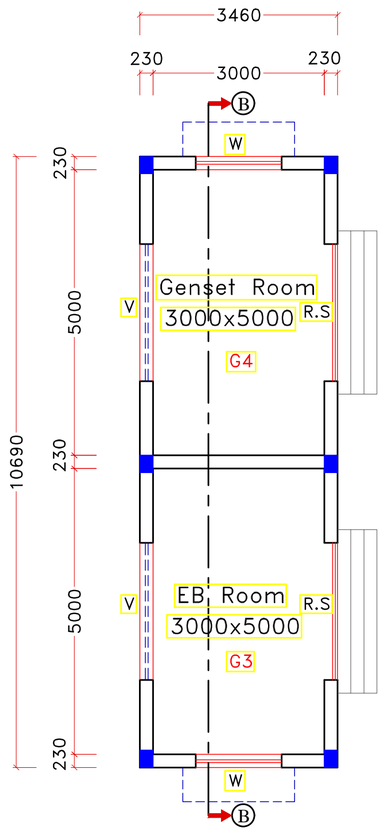
SECTION ON B - B

(EB & Genset Room)



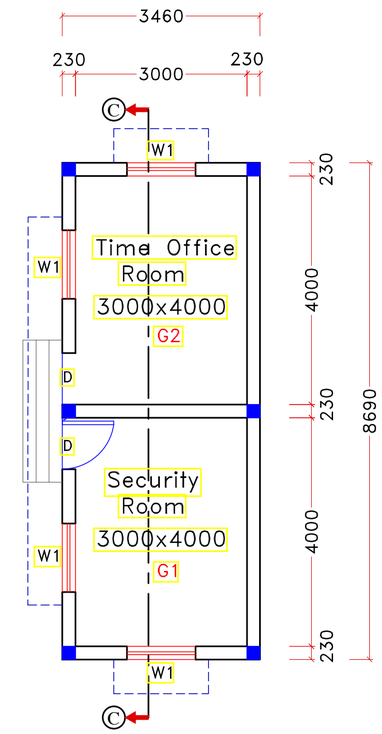
SECTION ON C - C

(Security & Time Office Room)



FLOOR PLAN

(EB & Genset Room)



FLOOR PLAN

(Security & Time Office Room)

SCHEMETIC PLAN SHOWING THE PROPOSED COMMON QC LAB (ITCOT) AT TINDIVANAM PHARMA PARK ESTATE, TINDIVANAM, MEGA PHARMA CLUSTER, TINDIVANAM, VILLUPURAM DISTRICT, TAMILNADU - 604 001.

SCHEDULE OF JOINERY:-

TYPE	DETAIL	SIZE (MM)
R.S	ROLLING SHUTTER	2400 x 2400
D	DOOR	900 x 2100
W	WINDOW	1500 x 1200
W1	WINDOW	1200 x 1200
V	VENTILATOR	2400x900

Room No.	Description	Sq.M / Sq.Ft.
G1	Security Room	12.00 / 129
G2	Time Office Room	12.00 / 129
G3	EB Room	15.00 / 161
G4	Genset Room	15.00 / 161

UTILITIES DETAILS

DATE : 27.01.2025	SCALE : N.T.S	DRG.No. TPP -6