INDIAN INSTITUTE OF TROPICAL METEOROLOGY
PASHAN, PUNE-411 008

Tender No. CE/Const./Security Gate/2012

TENDER NOTICE

Director, Indian Institute of Tropical Meteorology, Dr. Homi Bhabha Road, Pashan, Pune-411 008 (India) invites sealed separate tenders for following work (Part-I – Technical Bid, Part-II – Commercial Bid) in separate sealed covers from Contractors registered in the approved list of contractors of PWD/ MES/ CPWD/ Railways/P&T/Experienced industrial contractors and any other government departments in appropriate class for following work.

Name of work: - Construction & Development of IITM Main Gate & Security Cabin, At IITM Pune.

Tender documents can be obtained from Office of Civil Wing, of this Institute and also can be downloaded from the Institutes' website.

Date of issue of tender documents	from **07/01/2012 to 17/01/2012**
Pre - Bid Meeting	**13/01/2012 at 1100 hrs**
Last date of receipt of Tender at IITM, Pune:	**17/01/2012 at 1230 hrs**
Opening of Tenders (Technical Bids only) :	**17/01/2012 at 1500 hrs**

The Institute reserves the right to reject any or all tenders without assigning any reason there of. For further details please visit our Website: **www.tropmet.res.in**

Civil Engineer
For Director
Email: anupam@tropmet.res.in

TENDER DOCUMENT FOR PROPOSED

Civil, Plumbing and Electrical works for Proposed Construction and Development of Main Gate and Security Cabin at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008, Maharashtra State.

CLIENT:

INDIAN INSTITUTE OF TROPICAL METEOROLOGY.
DR. HOMI BHABA ROAD, PASHAN, PUNE 411008 MAHARASHTRA

ARCHITECT AND PROJECT MANAGEMENT CONSULTANTS:

ARCHIVISTA ENGINEERING PROJECTS PVT.LTD.
F201/202 SAI EMPIRE,BANER,PUNE-411045.

TECHNICAL BID

VOLUME –I (SECTIONS I TO VII)

(Invitation for Bids, Notice to Bidders, Letter of offer, Articles of agreement, General Conditions and Special conditions of contract)

VOLUME I - (SECTIONS I TO VII)

(Invitation for Bids, Notice to Bidders, Letter of offer, Articles of agreement, General and Special conditions of contract)

CONTENTS

SECTION – I

INVITATION FOR BIDS (IFB)

Indian Institute of Tropical Meteorology.

Dr. Homi Bhaha Road, Pashan, Pune 411008.

SECTION I - INVITATIONS FOR BIDS (IFB)

Director,Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008 invites sealed tenders (Part-I-Technical Bid,Part II-Commercial Bid) in separate sealed covers from contractors should be a well established and reputed Contractor, registered as a legal entity in India for a minimum period of five years, and having experience of minimum five years and capacity in appropriate class for following works.

Construction and Development of Main Gate and Security cabin and carry out other Infrastructural works at their existing campus at Dr. Homi Bhaha Road, Pashan, Pune, 411008 and intends to invite bid for Civil Plumbing & Electrical works under the Two Cover System from the contractors who meet the following criteria as mentioned in Section III..

Bids may be purchased from Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008, from **7/01/2012. To 17/01/2012 up to 1230hrs (Noon).** For a non refundable fee as indicated, in the form of cash or Demand Draft on any Nationalized Bank and scheduled Bank payable at Pune in favor of The Director, Indian Institute of Tropical Meteorology, Pune.

Bids must be accomplished by Earnest Money of the amount specified for the work in the table below, payable at Pune and drawn in favor of **"Indian Institute of Tropical Meteorology".** Bid security will have to be in any one of the forms as specified in the Bidding document and shall have to be valid for 45 (Forty five) days beyond the validity of the bid. Bid without EMD amount will be rejected.

Bids must be delivered to the Indian Institute of Tropical Meteorology, **Dr.** Homi Bhaha Road, Pashan, Pune 411008, on or before **12.30 Hrs, on 17/01/2012.** The Technical bids will be opened at **15.00 Hrs. on 17/01/2012;** The Schedule for opening of commercial Bids will be intimated to all on completion of evaluation of Technical bids,

A **pre-bid meeting** will be held **on 13/01/2012 at 11:00** Hrs. at the office of Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008, to clarify the Technical issues and to answer questions on any matter that may be raised at that stage. Also the IITM, Pune reserves the absolute right to reject any or all the bids/ tenders solely based upon the past unsatisfactory performance by the bidder/bidders, the opinion/ decision of the IITM**,** Pune regarding the same being final and conclusive.

Name of Work	EMD (Rs)	Cost Of Document (Rs)	Period of Completion
Civil, Plumbing and Electrical works for Proposed Construction and Development of Main Gate and Security Cabin **at Indian Institute of tropical** Meteorology, Pune.	**80,000=00**	**1,000=00**	**30 days (Thirty days) From the date of issue of LOI**

SECTION – II

NOTICE TO THE TENDERRS, BIDDERS QUALIFICATON CRITERIA AND GENERAL INSTRUCTIONS

SECTION II - NOTICE TO THE BIDDERSS, BIDDERS QUALIFICATION CRITERIA AND GENERAL INSTRUCTIONS

1. Sealed item rate tenders are invited from the qualified Contractors for the **Civil, Plumbing and Electrical works for Proposed Construction and Development of Main Gate and Security Cabin** at Indian Institute of tropical Meteorology, Pune.

2. Bidderss are strongly advised to go through all the documents in connection with this contract very carefully. Tender documents can be obtained from the Office of the Director, Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008,on Submission of DD of Rs. One Thousand only each (RS. 1000=00) [non-refundable] on any working day between **07/01/2012 to 17/01/2012**

   The drawings can be seen and examined during working hours in the office of the Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008. Clarifications, if any, on the tender documents or specifications, additional/particular conditions and specifications and schedule of quantities, etc. shall be obtained from the office of IITM, Pune.

   Tenders should be submitted in two (2) parts, in separate sealed envelopes super scribed with name of work, due date, item and nature of bid {priced or unpriced}.

3. In view of postal & other delays ,it is suggested that your tender be posted sufficiently in advance of the last date fixed for receipt of tenders or sent through a special messenger, if necessary .Tender received late will not be considered.Telegraphic communications like fax, E mails, soft copies etc. received in connection with this tender will also be not considered.

PART I: Technical Bid

[a] Complete with all tender documents, except schedule of rates, duly signed and stamped on all pages.
[b] Covering letter and all other enclosures to tenders shall be submitted.
[c] EMD Amount and copy of tender fee receipt to be submitted in separate envelope along with above envelopes.
[d] Technical write up on methodology of carrying out specialized items mentioned in clause 21 a And mentioned in special technical conditions.

PART II: Commercial Bid:

[a] Schedule of rates duly signed and stamped on all pages. One soft copy (CD) of schedule of rates shall also be submitted in Commercial Bid envelope.

3. Tenders not properly filled, mutilated with incorrect calculations or generally not complying with the conditions are liable to be rejected.

4. Bidderss should quote their rates both in figures and in words. In case of difference between figures & words, quote in words shall be considered. The bill of quantities must be fully priced and the total of each sub-head shall be carried over to the abstract page. In case of Arithmetical calculations, Outer vertical column amount shall be considered.
If the tender is made by an individual, it shall be signed with his full name and his complete address shall be given. If it is made by a firm, it shall be signed with the partnership name by an authorized member of the firm who shall sign his own name and give the name and address of each member of the firm and attach the copy of the Power of Attorney with the tender. In case the tender is made by or on behalf of the company incorporated under the Companies Act [1 of 1956] it shall be signed by its Managing Director duly authorized on that behalf and shall bear the official seal of the company. Tender documents duly completed and signed together with covering letter shall be placed in two separate sealed envelopes mentioning **"Tender for the Civil, Plumbing and Electrical works for Proposed Construction and Development of Main Gate and Security Cabin at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008, Maharashtra State.**

5. Each bidders shall furnish Earnest Money Deposit of **Rupees 80000=00 (Rs. Eighty thousand only)** by a Demand Draft or Bank Guarantee Drawn in favor of The Director, Indian Institute of Tropical Meteorology, Pune.[1] with the tender. The EMD amount will be sent back to the unsuccessful Bidders after award of the work and without any interest. **Tenders without earnest money shall be rejected.** The earnest money shall be retained in the case of the successful Bidders and shall not carry any interest.

6. In the case of the successful bidders, the Earnest Money will be adjusted against Security deposit to be deposited at the time of agreement.

7. Every bidders is expected to inspect the site of the proposed work before quoting their rates. They are also advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil, the form and nature of the site, the means of

access to the site, the accommodation they may require including that required for labour and in general shall themselves obtain all necessary information as to ticks, contingencies and other circumstances which may influence or effect their tender. The bidders- shall be deemed to have full knowledge of the site, whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed.

Bidders are requested to work out and quote the rate of each Item carefully by including cost of all the material, as IITM shall not be supplying any material to the Contractor.

8. Every bidder should inspect the source of materials, their quality and availability. The materials must strictly comply with the relevant specification. Samples of the materials, as required by the IITM/ Project Management Consultant/ Architect, in all cases shall be submitted for his approval before the supply at site of work begins. In absence of any specification of any material or workmanship the same shall have to be to the entire satisfaction of the IITM. He must go through all the drawings, specifications and tender documents and any further clarifications required in the drawings and documents can be had from the office of the Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008

9. A schedule of approximate quantities for various items accompanies this tender. It shall be definitely understood that the IITM/PMC do not accept any responsibility for the correctness or completeness of this schedule in respect of items and quantities and this schedule is liable to alteration by omission, deductions or additions at the discretion of the IITM and the PMC without affecting the term of the contract.

10. Timely completion of the works is the essence of this contract and the time of completion must be strictly adhered to as specified.

11. The bidders shall complete the annexed "Form of Tender" and fill in the rates and amounts in the "Schedule of Quantities." He shall sign and date the tender documents in the spaces provided for the purpose. All pages of the General Conditions of Contract [GCC] shall be signed and stamped. The bidders shall initial each page of the Schedule of Quantities.

12. The tender shall be signed by a person or persons so authorized by the bidders.

13. The tender form must be filled in English and all entries made by hand and written in ink. All corrections should be attested by the bidders with his dated initials as many times as the corrections occur.

14. No excise as regards want to information of any particular point will be considered after the tender has been submitted. No advice of any change in rate or conditions after the opening of tender shall be entertained.

15. The contractor shall not in any case, after acceptance of a contract rate, be paid any extra charges for lead involved in transport of materials to site of work, erection and hire of T & P sheds for materials, royalty for earth, boulders, metal and sand etc. or for any increase in price of materials or for any increase in wages of labour or for any other reasons whatsoever. All taxes Including octroi, toll or sales tax on Work Contract Tax, royalty, Work Contract Tax. Service Tax on Labour and or material, Value added Tax or any other tax etc. shall be payable by the contractor and no claim whatsoever in this respect shall be entertained,
BIDDERSS SHALL SEPARATLY MENTION IN THEIR FORWARDING LETTER THE PERCENTAGE OF VAT AND SERVICE TAX THEY HAVE CONSIDERED WHILE QUOTING RATES.

16. No alteration which is made by the bidders in the notice of tender instructions to the contractors, the contract form, the General Conditions of Contract, Special Conditions of Contract, the drawings, specifications, additional specifications, schedule of quantities accompanying this tender shall be recognized and if any such alterations are made, the tender is liable to be rejected.

17. No part of the contract shall be sublet / assigned without the written permission of the IITM nor shall transfer be made by power of attorney, authorizing others to receive payment on behalf of the contractor.

18. The following specialized works shall be carried out only by specialist firm / manufacturer after the approval of Architect / PMC / IITM.
    - All type of Form finish concrete centering & shuttering works.
    - Box type Waterproofing treatment & Toilet Sunk slab water proofing
    - Fabrication for structural steel and Roofing System.
    - External Facade System.
    - Anti termite treatment.
    - All type of Aluminum Doors & Windows.

19. The Bidders shall submit with his tender a list mentioning the name of manufacturers and sub-contractors whom they propose to utilize/employ for the above specialized items which he proposes to use in the work. The manufacturers/sub-contractors shall be used only if same get approval of IITM on advice of Project Management Consultants/Architect. Decision of the IITM shall be final and binding on contractor in respect of choice of manufacturers/sub-contractor [s]. Contractor shall not be entitled to claim any extra cost and/or extension of time due to decision of IITM in this respect.

20. The tender shall accompany the following Information and schedules With Technical Bid:

a) A tentative construction programme showing the bidders' proposed sequence of operations together with the estimated time for each activity.

b) Proposed supervision and control of works including the number and experience of the various grades of supervisory personnel for each month of the construction period.

c) Schedule of labour requirements showing the total estimated labour force for each month of the construction period.

d) Schedule of proposed sub-contractors.

e) Schedule of monthly electric power consumption.

f) Schedule of materials procurement/requirement.

g) The tender is to be accompanied with a statement of facts in details as to the following items for the bidders and his associates, if any,

- Business and technical organization.
- Financial resources.
- Construction equipment available and to be used for performing the work.
- List of completed work similar in nature and magnitude to that covered in this tender

h) The bidders must furnish a list of any civil or criminal litigation he is a party to, if any, either as a respondent/plaintiff, accused or complainant. This includes any of the partners to this firm.

i) If the bidders [or any of his legal partners] has at any time the accused in a criminal proceeding he must state so and give the outcome of the proceedings in a separate signed statement.

j) Income Tax and Sales Tax clearance certificate should be attached with the Tender Document, The tender will not be considered unless the tender encloses an attested true copy of Income Tax and Sales Tax clearance certificates.

21. The bidder whether he submits this tender or not, shall treat the details of the document as secret and confidential. In case the bidders does not tender, he shall return the documents on the date fixed for receiving the tender.

22. After acceptance of the tender, the bidders shall sign the necessary contract papers within 10 days of the above intimation. In case of delay, the earnest money may be forfeited and the tender cancelled or the contract enforced as per terms of the tender and invitation of tender and the bidders shall thus be bound even though the formal agreement has not been executed and signed within the time by the bidders.

23. Tenders shall remain valid for acceptance for a period of one hundred twenty days from the date of opening of the tenders.

24. The Director, Indian Institute of Tropical Meteorology, Pune, reserves the right of rejecting all or any of the tenders, without assigning any reason and does not bind itself to pay the expenses incurred in the preparation of the tender, or for any other reason thereof.

25. Any further information can be obtained on application in writing to IITM.

26. Submission of Tender: The tender shall be submitted as per the procedure mentioned above.

Signature of Bidders Seal of Bidders

Date: Address:

SECTION –III

BIDDERS QUALIFICATION CRITERIA

BIDDERS QUALIFICATION CRITERIA

- The BIDDER should be a well established and reputed Civil Engineering Contractor, registered as a legal entity in India for a minimum period of five years, and having experience of minimum ten years and capacity in the construction of multi-storied office buildings.

- The BIDDER should have an annual turnover of **RS 01=00 Crore (Rs. One Crore only)** in all kinds of civil works or civil and electromechanical works during any two of the past five financial years, ending on 31 st March 2011. The annual turnover of previous years will be adjusted to price level by assuming an annual inflation of 5%.

- The bidder should have satisfactorily completed as a prime contractor at least one single project of office space development involving not less than **1500 square feet in India**.

- The bidder should produce Banker's Solvency Certificate or Revenue Solvency Certificate of the value of **Rs.05=00 lakh** (Rs. Five Lakh Only) Solvency Certificate must have been obtained not earlier than 1 stJuly 2011.

- The successful bidder shall ensure that, the direct subcontractors engaged in the works, complies with all conditions as specified in the Agreement between the employer and the successful bidder.

A. General

1. Scope of Bid

1.1 On behalf of the Director, Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008,invites bids for the construction of works (as defined in these documents and referred to as "the works") detailed in the table given in IFB. The work includes civil, Plumbing and electrical works etc.

1.2 The successful bidder will be expected to complete the works by the intended completion date specified in the Contract data.

2. Source of Fund: Indian Institute of Tropical Meteorology.

3. Eligible Bidders

3.1 This Invitation for Bids is open to all reputed well established and experienced contractors , who satisfy the qualifying criteria stipulated in Clause 4.4 A

3.2 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design,

specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the works, and any of its affiliates, shall not be eligible to bid.

3.3 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by Government in accordance with sub-clause 34.1.

4. Qualification of the Bidder

4.1 All bidders shall be provided in Section 2 Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

4.2 Since the Employer has not undertaken pre-qualification of potential bidders, all bidders shall include the following information and documents with their bids in Section 2

(a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;

(b) Total monetary value of construction work performed for each of the last five years;

(c) Experience in works of a similar nature and size for each of the last five years, and details of works under way or contractually committed; and clients who may be contacted for further information on those contracts;

(d) Major items of construction equipment proposed to carry out the Contract;

(e) Qualifications and experience of key site management and technical personnel proposed for the Contract;

(f) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years;

(g) Evidence of adequacy of working capital for this contract (access to line (s) of credit and availability of other financial resources);

(h) Information regarding any litigation or arbitration resulting from contracts executed by the Bidder in the last five years or currently under execution. The information shall include the names of the parties concerned, the disputed amount, cause of litigation, and matter in dispute;

(g) Proposals for subcontracting components of the Works which in aggregate add to more than 20 percent of the Bid Price (*for each, the qualifications and experience of the identified sub-contractor in the relevant field should be annexed; no vertical splitting of work for sub-contracting is acceptable*); and

(k) The proposed methodology and program of construction including Environmental Management Plan, backed with equipment, materials and manpower planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

4.3 'Bids from Joint ventures are not acceptable'.

4.4 A. To qualify for award of the contract, each bidder in its name should have in the last five years *i.e.* 2006-07, 2007-08, 2008-09, 2009-10, 2010-11,

(a) On production of definite proof of valid contractor license/enlistment certificate with the CPWD, State PWD & MES, Railway, registered as legal entity issued by the respective enlistment authority of the concerned department for the amount not less than estimated value of the work.

(b) Been in the business of office space development in India.

(c) i)Achieved, at least in three financial years, an annual financial turnover (in all classes of integrated civil engineering construction works) of Rs 1=00(Rs. One Crore Only).(@), in India.

ii) Satisfactorily completed 3 similar works each costing Rs 15 lakhs or completed two similar works of each costing Rs.45 lakhs during the last five years

iii)Should not have incurred any loss in more than two year during the last five year ending 31st March 2011.

(d) Satisfactorily completed as a prime contractor at least one single project of office space development involving not less than 1500 sq.ft in India.

(@) *at* 2011-12 *price level*. Financial turnover and cost of completed works of previous years shall be given weightage of 5% per year based on rupee value to bring them to* 2011-12 *price level*.*

** the financial year in which bids are received.*

4.4 B. Shall produce Bankers solvency certificate or Revenue solvency certificate, for a value of **Rs. 05=00 Lakhs** (Rs Five Lakhs Only)- obtained not earlier than three months from the last date

of submission of bid

4.4 C. Each bidder should further demonstrate:

(a) Availability (either owned or leased or by procurement against mobilization advances) of the following key and critical equipment for this work:

1. 5 HP pump
2. 10 HP pump
3. Screen vibrator
4. Excavator
5. Plate Earth Runner
6. Air Compressor with Power Jack hammer for rock
7. Welding Set
8. Weigh batch Mixer-1Nos.

NOTE: Based on the studies, carried out by the Engineer the minimum suggested major equipment to attain the completion of works in accordance with the prescribed construction schedule are shown in the above list. The bidders should, however, undertake their own studies and furnish with their bid, with addition if any a detailed construction planning and methodology supported with layout and necessary drawings and calculations (detailed) as stated in clause 4.2 (k) above to allow the employer to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.

(b) availability for this work of 1 Project Manager with not less than Five years' experience in construction of similar civil engineering, Mechanical, Electrical and allied works and other key personnel with adequate experience as required. The bidders are to produce organization chart for the execution of the project with responsibilities included.

(c) Liquid assets and/or availability of credit facilities of no less than Rs -------- in the format given in Section 2.

(Credit lines/letter of credit/certificates from Banks for meeting the funds requirement etc.)

4.4 C. To qualify for a package of contracts made up of this contracts for which bids are invited in the IFB, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.

4.5 Sub-contractors experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria except to the extent stated in 4.4 (A) (e to h) above.

4.6 Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity is more than the total bid value. The available bid capacity will be calculated as under:

Assessed Available Bid capacity = (AxNx1.5 - B)

Where

A = Maximum value of civil engineering works executed in any one year during the last five years (updated to 2011-2012 price level) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which bids are invited.

B = Value, at 2011-2012 price level, of existing commitments and on-going works to be completed during the next 18 months (period of completion of the works for which bids are invited)

Note: *The statements showing the value of existing commitments and on-going works* as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent.*

** the financial year in which bids are received*

4.7 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and/or
- participated in the previous bidding for the same work and had quoted unreasonably high bid prices and could not furnish rational justification to the employer.

4.8 Technical evaluation committee of IITM will visit to Bidder's completed site & submit the report to IITM office,Pune. Based on IITM committee report bidders are subject to be disqualified.

5. One Bid per Bidder

5.1 Each bidder shall submit only one bid for one contract.

6. Cost of Bidding

6.1 The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.

7. Site visit

7.1 The Bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

B. Bidding Documents

8. Content of Bidding Documents

8.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 10:

Invitation for Bids Section

1 Instructions to Bidders

2 Forms of Bid and Qualification information

3 Conditions of Contract

4 Contract Data

5 Specifications

6 Drawings

7 Bills of Quantities

8 Forms of Securities

8.2 Of the three sets of the bidding documents supplied, two sets should be completed and returned with the bid

SECTION - IV

LETTER OF OFFER

SECTION III – LETTER OF OFFER

(Note: Appendix hereto forms a part of this letter of offer)

To,

_____

_____

_____

Dear Sir:

I/We do hereby tender for the execution of the work specified in the tender written memorandum within the time specified, at the rate specified therein and in accordance in all respects with the specifications, designs, drawings and General Conditions of Contract and specifications issued -

Memorandum

[a] General Description: Civil, Plumbing & Electrical Conduit works for Construction of Proposed Complex For Conference and lectures Hall at Indian Institute of tropical Meteorology, Pune

[b] Earnest Money: Rs. ---------- only)

[RS. ----------=00]

[c] Security Deposit: As mentioned in the Appendix.

[d] Time allowed for the works : ---------- Months [----], work commencing from the 14th day of the date of Commencement order issued by IITM.

I/We hereby distinctly and expressly declare and acknowledge that before the submission of my/our tender I/We have carefully followed the general instructions and read the detailed-specifications and schedule of quantities and clearly understood all the conditions of contract. I/We have also seen the location where the said work is to be done and made such investigations of the work required as to enable me/us to complete the work successfully.

I/We enclose herewith a Demand Draft No./ Bank Guarantee No. …… -Drawn from Bank …for RS…… duly certified from the bank as good for payment as Earnest Money not to bear interest.

Should this tender be accepted in whole or in a part, I/We hereby agree to abide by and fulfill all the terms and conditions annexed hereto. If I/We fail to commence the work specified in the above memorandum I/We agree that my/ our earnest money shall stand forfeited absolutely to the Employer otherwise the said earnest money shall be retained by the employer, towards total security deposit mentioned against column [c] of the above memorandum. I/We also agree to the balance retention money being deducted from my/our bills in accordance with the conditions of contract.

I/We agree to keep the offer open for 120 days from the date of opening the tender.

Yours Faithfully,

SEAL

Signature of Contractor

Complete Address:

_____

_____

_____

Date: _____

APPENDIX TO LETTER OF OFFER

Important Clauses of General Conditions of Contract as Attached to the Articles of Agreement

Sr. No.	Description	Clause No.	Remarks
1.	Security Deposit	19	05% of the Contract / Order value
2.	Minimum amount of Interim certificate	33.1	R.A. Bill Not less than Rs.20=00 Lakhs .
3.	Retention Money	33.3	05% of value of Interim [Running Work] bills up to a minimum of 5% of the final Contract Amount.
4.	Defects Liability Period	40.1	12 months from the date of taking over the site by the Institute.
5.	Time of Completion	41.1	Entire work under contract to be Completed in **30 Days from issue of LOI**.
6.	Liquidated Damages	43	1% per week and maximum up to 10% of Work Order value.
7.	Minimum amount of third Party insurance	49	Rs-**200000=00** any one incident With the number of incidents Unlimited.

Place:

Date:

Seal:

[Signature of Bidders]

SECTION- V

PROFORMA FOR ARTICLES OF AGREEMENT

SECTION V - PROFORMA FOR ARTICLES OF AGREEMENT

To be executed on non-judicial stamp paper of value not less than Rs. 1000/-

ARTICLES OF AGREEMENT for the **Civil, Plumbing and Electrical works for Proposed Construction and Development of Main Gate and Security Cabin** at Indian Institute of tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune 411008 made this

……day of **.....** ,……. …… M*Is* **.....** hereinafter called the "CONTRACTOR" [which term shall, unless excluded by or repugnant to the context, include its successors and permitted assigns] of the one part and Indian Institute Of Tropical Meteorology, Dr, Homi Bhaha Road, Pashan, Pune 411008, hereinafter called the IITM"/ "IITM" [which term shall, unless excluded by or repugnant to the context, include its successors and permitted assigns] of other part. The tender document showing and describing the work to be done under the directions of the "Project Management Consultant", Archivista Engineering Projects Pvt.Ltd.201/202,Sai Empire,Baner, Pune - 411045 hereinafter called as the "Project Management Consultant" [which term shall, unless excluded by or repugnant to the context, include its successors and permitted assigns].

A. WHEREAS THE IITM is desirous of being provided and having executed the work mentioned, enumerated of referred to in the Tender Document, including any one of or all of the documents such as Notice Inviting Tender/Letter inviting Tender, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, Plans, Time Schedule, Letter of Acceptance of Tender, Agreed Variations, other documents as called for Tender.

B. THE CONTRACTOR has inspected site and surroundings of work specified in the Tender Document and satisfied itself/himself by careful examination before submitting its/his tender as to the nature of the surface strata, soil, sub-soil and ground, the form and nature of site and local conditions, the quantities, nature and magnitude of work, availability of labour and materials necessary for the execution of work, the means of access to the site, the supply of power and water thereto and the accommodation it/he may require and has made local and independent inquiries and obtained complete information as to the matters and things referred to, or implied in the Tender Document, or having any connection therewith, and has considered the nature and extent of all probable and possible situations, delays, hindrances or interference to/or with the execution and completion of work, to be carried out under contract, and has examined and considered all other matters, conditions and things and probable and possible contingencies, and generally all matters incidental thereto and ancillary thereof affecting the execution and

completion of work and which might have influenced it/him in making its/his Tender.

C. WHEREAS the notice inviting tender/letter inviting tender, tender document, general conditions of contract, specification, letter of acceptance of tender, schedule of payments and other documents which, together with this agreement, constitute the terms and conditions under which the contractor shall perform the works, are listed in the Appendix to the agreement and they shall form part of this agreement. For purpose of this agreement, the expression "CONTRACT" shall also include any modifications, alterations, variations in the specifications by way of additions and deletion thereto, written instructions, directions etc. issued by the IITM from time to time.

AND WHEREAS the IITM accepted the Tender of the Contractor for the provision and execution of work at the rates stated in the schedule of rates and finally approved by the IITM upon the terms, and subject to the conditions, of the Contract.

Now this Agreement witness and it is hereby agreed and declared as follows:

1. In consideration of the payment to be made to contractor for work to be executed by it/him the contractor hereby covenants with the IITM that the contractor shall and will duly provide, execute and complete the work and shall do and perform all other acts and things, in the contract mentioned or described, or which are to be implied there from or may be reasonably necessary for completion of the work, and at the said times and in the manner and subject to the terms and conditions, or stipulations, mentioned in contract.

2. In consideration of the due provision, execution and completion of the work, the IITM does hereby agree with the contractor that the IITM will pay to the contractor the respective amounts for the work actually done by him and approved by the IITM at the scheduled rates and such other sum payable to the contractor under provision of the contract, such payment to be made at such time and in such manner as provided for in contract.

3. In consideration of the award of the work, the contractor does hereby agree to pay such sums as may be due to the IITM for the services rendered by the IITM to the contractor such as power supply, water supply and others as set forth in the contract and such other sums as may become payable to the IITM towards the controlled items of consumable materials or towards loss, damage to the IITM's equipment, materials, construction plant and machinery, such payments to be made at such time and in such manner as is provided in the contract.

4. It is specifically and distinctly understood and agreed between the IITM and the contractor, that the contractor shall have no right, title or interest in the site made available by the IITM for execution of work, or in the building structures, or work executed on site made available by the IITM for execution of work or in the building structures or work executed on site by the contractor or in the goods, articles, materials, etc. brought on site [unless the same specifically belongs to contractor] and the contractor shall not have or deemed to have any lien whatsoever and/or charge for unpaid bills nor will be entitled to assume or retain possession or control of site or structures and IITM shall have an absolute and unfettered right to take full possession of the site and to remove the contractor, their sen/ants, agents and materials belonging to the contractor and lying on site.

5. The contractor shall be allowed to enter upon site for execution of work only as a licensee simpliciter and shall not have any claim, right title or interest in site or the structures erected thereon and the IITM shall be entitled to terminate such license at any time without assigning any reason.

6. The materials including sand, gravel, stone, loose earth, rock etc., dug up or excavated from the site shall unless otherwise expressly agreed under this contract, exclusively belong to the IITM and the contractor shall have no right to claim over the same and such excavations and materials should be disposed of on account of IITM according to the instructions in writing issued from time to time by Engineer-in- Charge.

7. The contractor shall effect the payment of wages to its/his labourers directly without the intervention of any intermediary and no amount by way of commissions or otherwise shall be deducted or recovered from the wages of workmen. The contractor shall take adequate insurance cover at its/his cost for its/his properties etc,, used in the work against all risks and the IITM shall not in any way be liable for the damages or loss caused to such properties etc., due to whatever causes.

8. Wrongful appropriation, or proven attempt to wrongful appropriation, of materials belonging to the IITM or any other contractor working within the premises of the IITM, or employees or workers shall be deemed to be a breach of contract on the part of the contractor, and the IITM shall in addition to the remedies available under this agreement, be entitled to terminate the contract forthwith at the risk and cost of the contractor

9. Terms of conditions, if any, stipulated by the contractor while submitting his tender, or otherwise, shall be applicable only to the extent such terms and conditions are specifically accepted in writing by the IITM.

IN WITNESS whereof the parties have executed these above mentioned articles on the day and the year first above written.

Signed and delivered for and on behalf of Contractor

Witness:

1. Sign:
   Name:
   Address:

Witness:

1. Sign:
   Name:
   Adress:

Signed and Delivered for and on behalf of IITM

Witness:

1. Sign:
   Name:
   Address:

Witness:

2. Sign:
   Name:
   Adress:

SECTION- VI

GENERAL CONDITIONS OF CONTRCT

SECTION VI - GENERAL CONDITIONS OF CONTRACT

1.0 **Definitions**

1.1 The contract document consists of the agreement, the General Conditions of the Contract, Special Conditions, Specifications and bills of quantities, including all modifications thereof incorporated in the document before the execution and the contract drawings prepared by the architect from time to time. All these form the contract, including everything from Section One to Section Eleven.

1.2 The IITM / Architect / PMC / Contractor
The Client
The Architect
The Project Management Consultant (PMC)
The Contractor

Are those mentioned as such in the Agreement and shall include their legal representatives, assigns or successors. They are treated throughout the Contract Document as if each were of a singular number and masculine gender.

1.3 "The Site" shall mean the site of the contract work including any building and erections thereon and any other land allotted by the IITM for contractor's use.

1.4 The term "Sub-Contractor," as employed herein, includes those having a direct contract with the contractor and it includes one who furnishes material worked to a special design according to the plans or specifications of this work but does not include one who merely furnishes material not so worked.
Any one doing work on a piece rate basis shall be deemed; a Sub-Contractor.

1.5 Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an office of the corporation for whom it is intended or if delivered at or sent by registered mail to the last business address known to him who gives the notice.

1.6 The term "work" of the Contractor of Sub-Contractor includes labour or material or both.

1.7 All time limits stated in the Contract Document are the essence of the contract.

1.8 The law of the place of work shall govern the construction under this contract.

1.9 The date of virtual completion of a project or specified area of a project is the date when construction Is sufficiently completed, in accordance with the contract documents as modified by any change or variation orders, agreed to by the parties, so that the IITM can occupy the project for the use it was intended for.

1.10 In construing these conditions, the interpretations, specifications, Schedule Of Quantities, and Contract agreement, the following words shall have the meanings herein assigned to them except where the subject or content otherwise required:

[a] "IITM / Employer"	Shall mean Indian institute Of Tropical Meteorology, Whose registered office is (which shall include it's legal representatives, assigns or successors and nominees) Dr.Homi Bhaha Road, Pashan, Pune 411008.
[b] "Contract	The "Contract" shall mean the notice inviting Tender, the tender and the acceptance thereof and the formal agreement, if any, executed between Institute Of Tropical Meteorology, and the Contractor together with the documents referred to therein including these conditions, the specifications, designs, drawings, schedule of quantities with rates and amount and schedule of rates. All these documents taken together shall be deemed to form one Contract and shall be complementary to one another.
[c] "Contractor"	Shall mean the individual or firm or company whether incorporated or not, undertaking the works shall include legal representatives of such individual or persons composing such firm or successors of such firm or unincorporated company or successors of such firm or company as the case may be and permitted assigns of such individuals or firm or company.
[d] "Contract Sum"	Shall mean, in case of Item rate contracts the cost of the works arrived at after extension of the quantities shown in schedule of quantities by the item rates quoted by the bidderss for various Items.
[e] "Architect"	Architect, shall be **Archivista Engineering Projects Pvt.Ltd.,** 201/202,Sai Empire,Baner, Pune - 411045, Phone-02066294444

[f]	"Project Management	Project Management Consultancy , shall be **Archivista Engineering Projects Pvt.Ltd.,** 201/202,Sai Empire,Baner, Pune - 411045, Phone-02066294444.
[g]	"Project Engineer"	Project Engineer/s shall mean person/s appointed by Project Management Consultants and working under the instructions/directions of the Project Management Consultants and the Architect who shall be responsible for day to day supervision of the works.
[h]	"Site"	Shall mean the site of the contract works including any building and erections thereon and any other land (inclusively) as aforesaid allotted by the IITM for the purpose of this Contract.
[i]	"The Work"	Shall mean the works to be executed in accordance with the contract or part(s) there of as the case may be and shall include all extra or additional works/ items or temporary and urgent works required for the performance of this contract.
[j]	"Temporary Works"	Shall mean all temporary works of every kind required in or about the execution, completion or maintenance of the works.
[k]	"Urgent Works"	Shall mean any urgent measures which in the opinion of the Architect/ Project Management Consultant become necessary during the progress of the work to obviate any risk of accident or failure of which become necessary for security.
[l]	"Notice in writing"	Written notice shall mean a notice written, typed or printed characters sent (unless delivered personally) or otherwise prove to have been received by registered post to the last known private or business address or registered office of the addressed and shall be deemed to have been received when in the ordinary course of post it should have been delivered.
[m]	"Act of insolvency"	Shall mean any Act of Insolvency as defined by the Presidency Town Insolvency Act, or the Provincial Insolvency Act or any act amending such original.
[n]	"Net Prices"	If in arriving at the contract amount, the

Contractor shall have added to or deducted from the total of the items in the tender any sum, either as percentage or otherwise, then the net price of any item in the tender shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender as the price of lhat item a similar percentage or proportionate sum. Provided always lhat in determining the percentage or proportion of the sum to be added or deducted by the contractor the total amount of any prime cost items and provisional sum of money shall be deducted from the total amount of the Tender. The expression "net prices" or "net rates" when used with reference to the contract or account shall be held to mean rates or prices so arrived at.

[o] "Material to be supplied — **No Material shall be supplied by IITM**

[p] "Expected risks" — All risks due to riots (otherwise than among contractor's employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or unsurped power, any acts of Government, damage from aircraft, acts of God, such as earthquake, lightning and unprecedented floods and other causes over which the contractor has no control and accepted as such by IITM/ Project Management Consultants.

[q]" Market Rates" — Shall be at the rate as decided by the Architect/ Project Management Consultant on the basis of the cost of materials and Labour at the site where the work is to be executed, plus the percentage mentioned in Appendix to cover all overheads and profit.

Shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day,

Shall mean seven days without regard to the number of hours worked in any day in that week.

2.0 Contract Document

The following documents shall constitute the contract document.

[a] Articles of Agreement.
[b] General and Special Conditions of Contract.
[c] Specifications,
[d] Bills and Quantities
[e] Any additional Specification or Conditions agreed to by consenting parties at the rate of entering, or later mutually agreed upon.
[f] Drawings.
[g] Letter of Intent.

The contract document is complementary. What is called for in any one part shall be as binding as if called for by all.

The contract document shall remain in the custody of the IITM & Copy will be with PMC so as to be available at all reasonable times for the inspection. Immediately after the execution of the contract one copy of the contract document and two copies of the contract drawings shall, without charge, be supplied by the PMC to the contractor. The PMC shall supply one copy of the contract document and two copies of the contract drawings to the Consultants.

So soon as is possible after the execution of this contract, two copies of the specifications, descriptive schedule or other like document necessary for use in carrying on the work shall without charge be supplied by the PMC to the contractor.

Provided that nothing contained in the said specifications, descriptive schedules or other documents shall impose any obligation beyond those imposed by the contract document namely by the contract drawing, the contract bills, the articles of agreement and these conditions.

After the award of the contract, the contractor shall without charge be supplied with all such further drawings and details as may be prepared by the PMC/architect and his consultant from time to time as the work proceeds as are reasonably necessary either to explain or amplify the contract drawings or to enable the contractor to carry out and complete the work in accordance with these conditions. Provided all such drawings shall be a reasonable development of the work described in the contract document.

The contractor shall keep one copy of the specifications, descriptive schedule or other like document referred to in this clause and one copy of the contract drawings and such other drawings and details supplied to him, from time to time and referred to in this clause and the written instructions referred to In clause and

sub-clauses 11, 18.1, 18.2, and 33 upon the site so as to be available to the architect or his representative at all reasonable times

None of the documents herein before mentioned shall be used by the contractor for any purpose other than this contract.
Upon final payment, under the clause 33.6 of these conditions, the contractor shall, if so requested by the PMC/architect, forthwith return to the PMC/architect all drawings, details, specifications, descriptive schedules and other documents of like nature which bears his name or that of the consultant.

3.0 Type of Contract

The contract shall be an item rate contract. The contractor shall be paid for the actual quantity of work done, as measured at site, at the item rates finally agreed between IITM and Contractor.

4.0 Schedule of Quantities

a) The schedules of quantities given in the contract bill are provisional and are meant to indicate the intent of the work and to provide a uniform basis for tendering. The IITM reserves the right to increase or decrease any of the quantities or to totally omit any item of work and the contractor shall not claim any extras or damages on these grounds.

b) So also, the quantities mentioned in the schedule of quantities are approximate and if the actual quantities executed are less or more than the schedule, the contractor shall not claim any damages for the same.

c) The schedule of quantities unless otherwise shall be deemed to have been prepared in accordance with the standard method of measurement of works adopted by PWD/ CPWD.

d) The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the schedule of quantities and / or the schedule of rates and prices which rates and prices shall cover all his obligations under the contract and all matters and things necessary for the proper completion of the works.

e) The PMC/Architect may from time to time may intimate to the contractor that he requires the work to be measured and the contractor shall forthwith attend or send a qualified agent to assist the Project Engineers taking such measurements and calculations and to furnish all particulars or to give all assistance required.

f) Should the Contractor not attend to or neglect or omit to send such agent then the measurements taken by the pro/ecf Engineer tn accordance with ffie standard mode of measurements adopted by PWD/CPWD shall be final and binding on the Contractor.

g) The Contractor or his agency at the time of measurement take such notes and measurements as he may required.

h) The Contractor shall submit running bills supported by detailed measurement sheets recorded jointly by Project Management Consultant and Contractor in measurement books. The Contractor shall submit running bills in triplicate to the Project Management Consultants for their Scrutiny and Certification.

i) Within seven days after the submission of running bills by the Contractor, PMC shall scrutinize and forward their payment certification along with Corrected copy of bill to the Architect for his Certification. Architect shall scrutinize and forward his payment Certification along with corrected bill in triplicate to the Administrative Officer IITM Pune within three days.

j) IITM shall honor the payment within Fifteen days from receipt of Architect's payment Certification.

k) Contractor shall submit the final bill only after completion of work to the satisfaction of Architect, PMC and Client. The final bill shall be settled within two months from the date of submission of final bill by the Contractor to PMC.

5.0 Material to be supplied by the Contractor

5.1 The Contractor shall procurer and provides the whole of the materials required for the Construction including tools, tackles, construction plant and equipment for the completion and maintenance of the work except the materials which will be supplied by IITM and shall make his own arrangements for procuring such materials and for the transport / storage thereof. The IITM will insist on the procurement of all materials confirming to IS or relevant standard and from reputed suppliers. Samples where applicable shall be got approved from Architect / Project Management Consultants. All equipment marks to be got approved prior to procurement.

5.2 All materials procured should meet the specifications given in the tender document. The Architect / Project Management Consultant may at his discretion ask for samples and test certificate of any batch of any material procured. Before procuring the contractor should get the approval of Architect / Project Management Consultants for any material to be used for the works.

5.3 Manufacturer's certificate shall be submitted for all materials supplied by the Contractor. As directed by Architect / Project Management Consultant any material which is procured by the contractor shall have to got tested either in the site laboratory or in any outside laboratory approved by Architect / Project Management Consultants at cost of contractor.

6.0 Material to be supplied by IITM.

6.1 No material shall be supplied by IITM.

7.0 Contract Drawings

7.1 In general the drawings shall indicate dimensions, position and type of construction; the specifications shall indicate the qualities and the methods; and the bill of quantities shall indicate the quantum and the rate for each item of work. Any work indicated on the drawings and not mentioned in the specification or vice versa shall be furnished as though fully set forth in both. Work not specifically detailed, called for, marked or specified shall be the same as similar parts that are detailed, marked or specified.

7.2 The contractor's work shall not deviate from the drawings and the specifications. The architect's interpretation of these documents shall be final.

7.3 Errors or inconsistencies discovered in the drawings and specifications shall be promptly brought to the attention of the architect, through the Project Management Consultants, for interpretation or correction. Local conditions, which may affect the work, shall likewise be brought to the architect's attention. If at any time, It is discovered that work is being done which is not in accordance with the contract drawings and specifications, the contractor shall correct the work immediately. Corrections of defective work shall not be a bias for any claim for extension of time, The contractor shall not carry on work except with the knowledge of the Project Management Consultants.

7.4 Figured dimensions on the scale drawings and large size details shall govern. Large size details shall take precedence over small-scale drawings. Any work done before receipt of such details, if not in accordance with the same, shall be removed and replaced or adjusted, as directed, by the contractor without expense to the IITM. The general conditions apply with equal force fo all the work including authorized extra works.

7.5 Ail drawings, bills of quantities and specifications and copies thereof furnished by the architect are his property. They shall not be used on any other work and shall be returned to the architect at his request on completion or termination of the contract.

7.6 Reinforcing steel bar bending schedules shall, if requested by the architect, be furnished to the architect / Project Management Consultant at least fifteen days prior to the fabrication of the reinforcement.

8.0 Contract Sum

The contract sum shall not be adjusted or altered in any way whatsoever other than in accordance with the express provisions of these conditions. Any error, whether of arithmetic or not, in the computation of the contract sum shall be deemed to have been accepted by the parties hereto.

9.0 **Contract Bills**

9.1 The quality and quantity of the work included in the contract sum shall be deemed to be that which is set out in the contract which bills unless othenA/ise expressly stated in respect of any specified item, shall be deemed to have been prepared in accordance with the principles of the standard method of measurement of building works last issued by the Indian Standards Institution; but same as aforesaid nothing contained in the contract bills shall override, modify or affect in any way whatsoever the application or interpretation of that which is contained in these conditions.

9.2 Any error in description or in quantity or omission of items from the contract bills shall not vitiate this contract but shall be corrected and deemed to be a variation required by the PMC/architect.

10.0 Scope arid Intent

10.1 *Scope*: The general character and the scope of the work is illustrated and defined by the specifications and the Bills of Quantities herewith attached and by the signed drawings, of the contractor shall find any discrepancy in or divergence between the contract drawings and of the contract bills he shall immediately give to the PMC/architect a written notice specifying the discrepancy or divergence and the PMC/architect shall issue instructions in regard thereto.

10.2 *Extent* : The contractor shall carry out and complete the work in every respect in accordance with this contract and with the directions of, and to the reasonable satisfaction of the PMC/architect. The PMC/architect may in his absolute discretion and from time to time, issue further drawings, details and/or written instructions, written directions and written explanations all of which are collectively referred to as PMC's/architect's Instructions. All such drawings and instructions shall be consistent with the contract document; true developments thereof and reasonably inferable therefrom'

10.3 *Intent:* The Intention of the document is to include all labour and materials, equipment and transportation necessary for the proper execution of the work, All such drawings and instructions shall be consistent with the contract document, true developments thereof and reasonably inferable therefrom. Materials of work described in words, which so applied, have a well known technical or trade meaning, shall be held to refer to such recognized standard meaning.

11.0 Architect's I Project Management Consultant's (PMC's) Instructions

11.1 The contractor shall forthwith comply with and duly execute any works comprised in, such instructions issued to him by the Architect | PMC in regard to any matter, in respect of which the architect / PMC is expressly empowered by these conditions to issue instructions; provided always that verbal Instructions, directions and explanations given to the contractor or his work representative by the Architect / PMC shall, if involving a variation, be confirmed in writing.

11.2 Upon receipt of what purports to be instruction; issued to him by the Architect / PMC. the contractor if in doubt may request the Architect / PMC to specify in writing, the provision of these conditions which empowers the issue of the said instruction. The Architect / PMC shall forthwith comply with any such request, and if the contractor shall thereafter comply with the said instruction; then the issue of the same shall be deemed, for afl purposes of this contract, to have been empowered by the provision of these conditions specified by the Architect / PMC in answer to the contractor's request.

11.3 All instructions issued by the Architect / PMC shall be in writing. Any instruction issued orally shall be of immediate effect, but shall be confirmed in writing by the contractor to the Architect / PMC within seven days, and if not dissented from in writing, by the Architect / PMC to the contractor within seven days from receipt of the contractor's confirmation, shall take effect as from the expiry of the latter said seven days:

Provided Always

[a] That if the Architect / PMC within seven days of giving such an oral instruction shall himself confirm the same in writing, then the contractor shall not be obliged to confirm as aforesaid, and the said instruction shall take effect as from the date of the Architect I PMC's confirmation.

[b] That if neither the contractor nor the architect / PMC shall confirm such an oral instruction in the manner and at the time aforesaid, yet the contractor shall have nevertheless complied with the same; then the Architect / PMC may confirm the same in writing at any time prior to the issue of the Final Certificate, and the said instruction shall thereupon be deemed to have taken effect on the date on which it was issued.

11.4 Project Management Consultant (PMC)

The IITM has chosen to appoint of Consultants (PMC) Archivista Engineering Projects Pvt.Ltd. as Project Management Consultant and their responsibility jointly with the Architects would cover among other things, the assessment of the quality of materials delivered at site, adequacy of method employed by the Contractor, adequacy of the tests performed by the Contractor, Creditability of Staff, Craftsmen, Sub Contractors on site, joint measurements for ascertaining quantities of work completed, speed of work, adequacy of equipment, material supply members of workmen in place. The Project Management Consultants are on behalf of IITM, whose primary responsibility is to see that the architect's drawings, specifications and other directions are carried out on site in a speedy and efficient manner.

12.0 Facilities and Co-operation

In the case of works indicated on the drawings, but not included in the contract, the contractor shall provide necessary facilities and co-operation for any sub-contractor or supplier, who may be approved by the IITM. The contractor shall do all cutting, ping or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon or reasonably implied by the drawings and specifications for the completed structure, and he shall make good after them as the architect / PMC may direct. Any cost incurred by the defective or ill-timed work shall be borne by the contractor.

The contractor shall not endanger any work by cutting, excavating or otherwise altering the work and shall not cut or alter the work of any other contractor, save with the consent of the architect / PMC.

13.0 Setting out

The architect / PMC shall determine any lines or levels which may be required for the execution of the work and shall furnish to the contractor by way of accurately dimensioned drawings such information as shall enable the contractor to set out the work at ground level.

The contractor shall set out and level the work and shall be responsible for the accuracy of the same. He shall provide all the instruments and attendance required by the architect / PMC for checking the work. He shall, entirely at his own cost, amend to the satisfaction of the architect / PMC any error found at any stage which may arise through inaccurate setting.

14.0 Site

14.1 *Visit* - Before tendering, the contractor shall have visited and examined the site and satisfied himself as to the nature of the existing roads or other means of

communication; the character of the soil and of the excavations; the correct dimensions of the work and the facilities for obtaining any special articles called for in the contract document; and shall have obtained his own information on all matters affecting the continuation and progress of the works.

No extra charge made in consequence of any misunderstanding or incorrect information on any of these points, or on the grounds of insufficient description, will be allowed. Should the contractor after visiting the site, find any discrepancy, omissions, ambiguities or conflicts in or among the contract document, or to be in doubt as to their meaning, he shall bring the questions to the IITM attention, not later than seven days before the last date for submission of the tender.

14.2 *Possession*: The contractor shall be allowed admittance to the site on the "Date of Commencement" stated in the appendix and he shall there upon and forthwith begin the work and shall regularly proceed with and complete the same on or before the "Date of Completion" stated in the appendix subject nevertheless to the provision for extension of time hereinafter contained.

14.3 *Treasures:* Any treasures, coins or objects of antiquity, which may be found at site shall be handed over to the IITM at the earliest.

15.0 Samples and Shop Drawings

15.1 After the award of the contract, the contractor shall furnish for the approval of the PMC/architect, with such promptness as to cause no delay in his work or in that of any other sub-contractor, samples and shop drawings required by the specifications or by the architect. Samples shall be delivered as directed by the architect.

15.2 A schedule, giving dates for the submission of samples shall be included in the schedule described under clause 16. Unless specifically authorized all samples must be submitted for approval within fifteen days of signing the contract and not less than twenty days before the date, the particular work is scheduled to begin.

15.3 The architect / PMC shall check and approve such samples, with reasonable promptness, only for conformity with the design concept of the project and for compliance with the information in the contract document. The work shall be in accordance with the approved samples.

16.0 Progress Chart

The contractor shall prepare progress charts and submit the same for approval of the IITM with a copy to architect / PMC and for his record within [5] five days of the award of the contract. The charts shall indicate the expected date of commencement and completion of each of the items of the work and shall be in a form approved by the architect. The chart shall also indicate the scheduling of samples, shop drawings and approvals.

17.0 Access of Architect / PMC to the Works

The architect / PMC and his representatives shall, at all reasonable times, have access to the works and to the workshops or other places of the contractor where work is being prepared for the contract and when work is to be so prepared in workshops or another place of a sub-contractor [whether or not a nominated subcontractor as defined in clause 28 of these conditions] the contractor shall have a term In the sub-contract so as to secure a similar right of access to those workshops or places for the architect and his representatives and shall do all things reasonably necessary to make such right effective.

18.0 Architect's / PMC's Status and Decisions

18.1 The architect / PMC shall be the working on behalf of IITM during the construction period. The architect / PMC shall periodically visit the site to familiarize himself generally with the progress and the quality of the work and determine in general, if the work is proceeding in accordance with the contract document. He shall not be required to make exhaustive or continuous, onsite inspections, to check the quality or quantity of the work and he shall not be responsible for the contractor's failure to carry out the construction work in accordance with the contract document. During such visits and on the basis of his observations while at the site he shall keep the IITM informed of the progress of the work, and shall endeavor to guard the IITM against defects and deficiencies in the work of the contractor and he shall condemn work which fails to confirm to the contract document. He shall have authority to act on behalf of the IITM, only to the extent expressly provided in the contract document [or otherwise in writing which shall be shown to the contractor). He shall have authority to stop the work whenever such stoppage may be necessary in his opinion to ensure the proper execution of the contract.

The architect / PMC shall be, in the first instance, the interpreter of the conditions of this contract and the judge of its performance. He shall side neither with the IITM nor with the contractor but shall use his powers, under the contract, to enforce its faithful performance by both. In case of the termination of the appointment of the architect / PMC, the IITM shall appoint a capable and reputable architect / PMC, against whom the contractor shall make no unreasonable objection and whose status under the contract shall be that of the former architect. Any dispute in connection with such appointment shall be subject to arbitration.

18.2 *Decision*: The architect / PMC shall, within a reasonable time, make decisions on all claims of the contractor on the advice of IITM and all other matters relating to the execution and progress of the work or the interpretation of the contract document.

The architect / PMC may, in his absolute discretion, from time to time issue further drawings. Details and/or written instructions, written directions and explanations in regard to:

[a] Variation or modifications of the design.
[b] The quality or quantity of works or the additions or omission or substitution of any work.
[c] Any discrepancy In, or divergence between the drawings and/or specifications.
[d] The removal and/or re-execution of any works executed by the contractor.
[e] The dismissal from the works, of any persons employed thereon.
[f] The opening-up, for inspection of any work covered up.
[g] The amending and making good of any defects under the defects liability period.
[h] The removal from the site of any materials brought thereon, by the contractor and the substitution of any other material therefore.
[i] Assignment and sub-letting.
[j] Delay and extension time.
[k] The postponement of any work, to be executed under the provision of this contract.

18.3 Dismissal: The contractor shall, on the request of the architect / PMC, immediately dismiss from the works any person employed thereon by him who may, in the opinion of the architect, be incompetent or misconduct himself; and such person shall not be again employed on the work, without the permission of the architect.

19.0 Security Deposit

Within ten days of the signing of this contract; the contractor shall deposit with the IITM, for due performance of this contract, as security deposit, a sum which together with the earnest money shall be equal to that referred to in the appendix to this contract as "Security Deposit."

The security deposit shall be in a form, approved by the IITM and shall remain so deposited with the IITM till the end of the defects liability period i.e. one year, referred to in the appendix.

The said security deposit shall indemnify the IITM against loss from defects arising from any clause under the contract or due to the failure of the contractor to promptly carry out any matters arising under the contract.

20.0 Project Management Consultants

The term Project Management Consultant shall mean the person, appointed and paid by the IITM, to inspect the works and coordinate the project of their behalf, The contractor shall afford such consultants every facility and assistance for

inspecting the works and materials, and for checking and measuring time and material.

The Project Management Consultants, or any representatives of the Architect, shall have power to give notice to the Contractor, or to his representatives, the non-approval of any work or materials, and such work shall be suspended or the use of such materials shall be suspended until the decision of the architect is obtained. The works will, from time to time, be examined by the Architect, Project Management Consultants or the Architect's representatives; but examination shall not in any way exonerate the Contractor from the obligation to remedy any defects which may be found to exist at any stage of the works or after the same is completed. Subject to the limitation of this Clause, the Contractor shall take instructions from The Architect/ Project Management Consultants and IITM.

20.1 Contractors Field Organization and Equipment

21.1 *Engineer-in-Charge:* The contractor shall constantly keep on his work, during its progress, one or more qualified and competent Engineers-in-Charge, who will be responsible for the carrying out of the works to the true meaning of the drawings. Specifications and schedule of quantities, Architect's/ ' PMC's instructions and directions to the satisfaction of the architect/ PMC. Any directions or instructions given to him by the architect/ PMC shall be deemed to have been issued to the contractor. Attention is called to the importance of requesting instructions from the architect/ PMC before undertaking any work where the architect's/ PMC's directions or instructions are required. Any such work done in advance of such instructions will be liable to be removed.

21.2 *Equipment:* The contractor shall provide and in staff all necessary hoists, ladders scaffolding, tools, tackles, plants, lifts, and all transport for labour materials, necessary for the proper carrying on of execution and completion of the work to the satisfaction of the architect / PMC.

21.3 *Office Accommodation:* The contractor shall provide, erect and maintain where directed, simple watertight office accommodation for the Project Management Consultants. This accommodation shall be well light and ventilated and provided with windows, doors with a lock, and a Telephone. The PMC office shall be of a minimum of 150 sq.ft. And shall have Office tables, One Conference table, desks, chairs, and drawers for keeping drawings and a tack board for displaying drawings, ' The Contractor shall make arrangement of one telephone connection and drinking water in this PMC office, The accommodation is to be demolished, when directed.

21.4 *Watchman:* The contractor shall make his own security arrangements to guard the site and premises at all times, at his own expense. The security arrangements shall

be adequate, to maintain strict control on the movement of material and labour. The contractor shall extend the security arrangements to guard the material stored and/or fixed on the premises by the sub-contractors.

21.5 *Storage of Materials:* The contractor shall provide, erect and maintain proper sheds for the storage and protection of the materials etc. and also for the execution of work which may be prepared on the site. Contractor shall also construct temporary shed of @ 450 sqft for storage of radiant cooling pipes at site.

21.6 *Sanitary Conveniences:* The contractor shall provide and erect all necessary sanitary convenience for the site-staff and the workmen, maintained in a clean orderly condition and clean and deodorize the ground after removal.

21.7 *Telephone:* The contractor shall provide a separate telephone, for the works and shall pay all charges in connection with the same during the execution of the work.

21.8 *Scaffolding. Staging, Guardrails:* The contractor shall provide scaffolding, staging, guardrails, and temporary stairs which shall be required during construction. The support for the scaffolding, staging, guardrails and temporary stairs shall be strong, and adequate for the particular situation, The temporary access to the various parts of the building under construction shall be rigid and strong enough to avoid any chance of mishaps. The arrangement proposed shali be subject to the approval of the architect. All safety measures which are required shall be undertaken by contractor during construction

21.9 Site Laboratory: The Contractor shall Construct and establish a site laboratory for carrying out different testing of work and material, This laboratory shall be equipped with a Cube testing machine, Sieves, weigh balances, measuring jars, slump cone, concrete cube moulds, cement cube moulds, Vicat apparatus for cement tests, oven etc.

21.10 Sample room: The Contractor shall Construct and establish a Sample room adjacent to site laboratory. He shall keep all approved samples in a disciplinary manner as directed by PMC.

22.0 Taxes

The contractor's rates shall be inclusive of All taxes including octroi, toll or sales tax on Work Contract Tax, royalty. Work Contract Tax. Service Tax on Labour and or material, Value added Tax or any other tax and all duties, etc and all these taxes & duties shall be payable by the contractor and no claim whatsoever in this respect shall be entertained.

23.0 **Statutory Obligations, Notices, Fees and Charges**

23.1 The contractor shall comply with and give, all notices required by any government authority, Instruments, rule or order made under any Act of Parliament or any regulation or Bye-law of any local authority relating to the work or with whose system, the same is or will be connected. The contractor before making any variation from the contract drawings or contract bills necessitated by such compliance shall give to the architect / PMC a written notice specifying and giving reasons for such variations and the architect / PMC may issue instructions in regard thereto. If within 10 days of having given the said written notice, the contractor does not receive any instructions in regard to the matters therein specified, he shall proceed with the work conforming to the Act of Parliament, instrument, rule, order and regulations or Bye-laws in question, and any variation thereby necessitated shall be deemed to be a variation required by the architect / PMC,

23.2 The contractor shall pay and indemnify the IITM against liability in respect of any fees or charges [including any rates and taxes] legally demandable under any Act of Parliament, instrument, rule or order or any regulation or Bye-law of any local authority in respect of the work.

24.0 Royalties and Patent Rights

All royalties or other sums payable, in respect of supply and use in carrying out the work as desired by or referred to the contract bills of any patented articles, process or inventions, shall be deemed to have been included in the contract sum, The contractor shall indemnify the IITM from and against all claims, proceedings, damages, costs and expenses which may be brought or made against the IITM, or to which he may be put, by reason of the contractor infringing or being held to have infringed any patent rights in relation to any such articles, processes and inventions. Any damage done shall be made good at the contractor's expenses.

25.0 Licenses and Permits for Materials under Government Control

Licenses and permits for all materials under government control, shall be obtained by the contractor through the collaboration and help of the IITM, the contractor shall include in his tender, ail transport charges and other expenses likely to be incurred to bring the materials to the site.

26.0 Water and electric power for Construction

The IITM shall provide water for construction at one point. The contractor has to make his own arrangements for storage of water, pipelines, maintenance of pumps, electrical supply system and general maintenance of the water system. If due to any reason the Client is unable to provide water then in such cases Contractor has to make his own arrangements for bringing water.

The contractor shall make his own arrangements for Electrical power either by applying and taking temporary construction power from MSEDCO Ltd. And/ or making own arrangements for DG. The contractor has to make his own arrangement for distribution, cables, panels, boards, switches, earthling, maintenance etc. at his own cost.

27.0 The work shall in no way be delayed or stopped by the contractor on account of any dispute between him and his nominated/other sub-contractors.

28.0 **Sub-Contractor**

As soon as practicable and before awarding any sub-contract, the contractor shall notify the architect / PMC in writing, the details of the sub-contractor proposed for the principal parts of the work and for such other parts as the architect / PMC may direct, and shall not employ any of whom the architect / PMC or the IITM may have a reasonable objection.

The architect / PMC, however, shall have power to obtain estimate and select other agencies to carry out any of the work as described below:

28.1 All specialists, merchants, tradesmen, and others executing any works or supplying and fixing any goods, which may be nominated or selected by the architect / PMC, shall be deemed to be sub-contractors employed by the contractors and are to be referred as nominated sub-contractors. No nominated sub-contractor shall be employed on or in connection with the work against whom the contractor shall make reasonable objection or [save where the architect / PMC and contractor shall otherwise agree] who will not enter into a contract providing.

[a] That the nominated sub-contractor shall carry out and complete the sub-contract works in every respect to the reasonable satisfaction of the contractor and of the architect / PMC and in conformity with ail the reasonable directions and requirements of the contractor.

[b] That the nominated sub-contractor shall observe, perform and comply with all the provisions of this contract on the part of the contractor to be observed, performed and complied with [other than clause 50 of these conditions, if applicable] so far as they relate and apply to the sub-contract works or to any portion of the same.

[c] That the nominated sub-contractor shall indemnify the contractor against the same liabilities in respect of the sub-contract work, as those for which the contractor is liable to indemnify the IITM under this contract.

[d] That the nominated sub-contractor shall indemnify the contractor against claims in respect of any negligence, omission or default of such sub-contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant, and shall insure himself against any such claims and produce the policy, or policies and premium receipts as and when required by the contractor or architect / PMC.

[e] That payment in respect of any work, materials or goods comprised in the sub-contract shall be made within fourteen days after receipt by the contractor of the architect's / PMC's certificate under clause 32 of these conditions which states as due an amount calculated by including the total value of such work, materials or goods, and shall when due be subject to the retention by the contractor of the sums mentioned in sub-paragraph.

[f] That the architect / PMC and his representative shall have right of access to the workshops and other places of the nominated sub-contractor as mentioned in clause 17 of these conditions.

[g] That the sub-contract work shall be completed within the period or [where they are to be completed in sections] periods therein specified, that the contractor shall not, without the written consent of the architect / PMC, grant any extension of time for the completion of the sub-contract work or any section thereof, and that the contractor shall inform the architect / PMC of any representations made by the nominated sub-contractor as to the cause of any delay in the progress of completion of the sub-contract work or of any section thereof.

[h] That if the nominated sub-contractor shall fail to complete the sub-contract work or [where the sub-contract works are to be completed in sections] any section thereof within the period therein specified or within any extended time granted by the contractor with the written consent of the architect I PMC, and the architect / PMC certifies in writing to the contractor that the same ought reasonably so to have been completed, the nominated sub-contractor shall pay or allow to the contractor either a sum calculated at the rate therein agreed as Liquidated and Ascertained Damages, for the period during which the said work or any section thereof, as the case may be, shall so remain or have remained incomplete or (where no such rate is therein agreed) a sum equivalent to any loss or damage suffered or incurred by the contractor and caused by the failure of the nominated sub-contractor as aforesaid.

[i] That the contractor shall retain from the sum directed by the architect / PMC having been included in the calculation of the amount stated as due in any

certificate issued under clause 33 of these conditions in respect of the total value of work, materials or goods executed or supplied by the nominated sub-contractor, the percentage of such value named in the appendix to these conditions as percentage of certified value retained upto a total amount not exceeding a sum which bears the same ratio to the sub-contract price as the unreduced sum named in the appendix to these conditions as limited of retention fund bears to the contract sum; and that the contractor's interest in any sums so retained [by whomsoever held] shall be fiduciary as trustee for the nominated sub-contractor's beneficial interest in such sums shall be subject only to the right of the contractor to have recourse thereto from time to time for payment of any amount, which he is entitled under the subcontract to deduct from any sum due or to become due to the nominated subcontractor, and that if and when such sums or any part thereof are released to the nominated sub-contractor they shall be paid in full, if paid within 14 days of the date fixed for their release in the sub-contract.

28.2 Before issuing any certificate under clause 33 of these conditions, the architect PMC may request the contractor to furnish him with reasonable proof that all amounts included in the calculation of the amount stated as due on previous certificates in respect of the total value of work materials or goods executed or supplied by any nominated sub-contractor have been duly discharged and if the contractor fails to comply with any such request the architect I PMC shall issue a certificate to that effect and thereupon the IITM may himself pay such amounts to any nominated subcontractor concerned and deduct the same from any sums due or to become due to the contractor.

28.3 [a] The contractor shall not grant to any nominated sub-contractor any extension of the period within which the sub-contract works or [where the sub-contract works or to be completed in sections] any section thereof is to be completed without the written consent of the architect / PMC. Provided always that the contractor shall inform the architect I PMC of any representation made by the nominated sub-contractor as to the cause of any delay in the progress or completion of the sub-contract work or any section thereof and that the consent of the architect shall not be unreasonably with held.

[b] If any nominated sub-contractor fails to complete the sub- contract work or [where the sub-contract works are to be completed in sections] any section thereof within the period specified in the sub-contract or within the extended time granted by the contractor with the written consent of the architect, then if the same ought reasonably so to have been completed the architect shall certify in writing accordingly. Any such certificates shall be issued to the contractor and immediately upon issue the architect I PMC shall send a duplicate copy thereof to the nominated sub-contractor.

28.4 If the architect / PMC desires to secure final payment to any nominated sub-contractor before final payment is due to the contractor, and if such contractor has

satisfactorily indemnified the contractor against any latent defects then the architect / PMC may in an Interim Certificate include, an amount to cover the said final payment and thereupon the contractor shall pay such nominated sub-contractor the amount so certified. Upon such final payment the amount named in the appendix to these conditions as limit of retention fund shall be reduced by the sum which bears the same ratio to the said amount as does such sub-contractor's sub-contract price to the contract sum, and save for latent defects, The contractor shall be discharged from all liability for the work materials or goods executed or supplied by such sub-contractor under the sub-contract to which the payment relates.

28.5 Neither the existence nor the exercise of the foregoing powers nor anything else contained in these conditions shall render the IITM in any way liable to any nominated sub-contractor.

28.6 Where the contractor in the ordinary course of his business directly carried out works for which prime cost or provisional sums are included in the contract bills and the architect / PMC is prepared to receive tenders from the contractors for such items, then the contractor shall be permitted to tender for the same or any of them but without prejudice to the IITM's right to reject the lowest or any tender. If the contractor's tender is accepted he shall not sub-let the work without the consent in writing of the architect / PMC.

28.7 It shall be a condition of any tender accepted under this paragraph that clause 32 of these conditions shall apply in respect of the item work included in the tender as if for the reference therein to the contract drawings and the contract bills there were references to the equivalent documents included in or referred to in the tender.

28.8 The contractor shall allow for general attendance upon sub-contractors including free sue of plant scaffolding and is to allow them the use of sanitary conveniences, storage facilities for storing materials, other amenities and affording them all reasonable facilities for carrying out their contracts.

29.0 Prime Cost

The following provisions of these conditions shall apply where prime cost sums are included in the contract bills or arises as a result of architect's PMC's instructions given in regard to the expenditure of provisional sums in respect of any materials or goods to be fixed by the contractor.

29.1 Such sums shall be understood to mean the net cost to be defrayed as a prime cost after deducting any trade or other discount and shall include sales-tax [where applicable] and other taxes and duties and the cost of packing carriage and delivery. Provided that where in the opinion of the architect / PMC the contractor has incurred expense for special packing or special carriage such special expense shall be allowed as part of the sums actually paid by the contractor.

29.2 Such sums shall be expended in favour of such persons as the architect / PMC shall instruct, and all specialists, merchants, tradesman or others who are nominated by the architect / PMC, to supply materials or goods, are hereby declared to be the suppliers to the contractor and are referred to in these conditions as "Nominated Suppliers"; provided that the architect shall not [save where the architect / PMC and contractor shall otherwise agree] nominate as a supplier a person who will not enter into a contract of a sale which provides [inter alia]:

[a] That the materials or goods to be supplied shall be to the reasonable satisfaction of the architect / PMC.

[b] That the nominated supplier shall make good, by replacement or otherwise, any defects in the materials or goods supplied which appear within such period as is therein mentioned and shall bear any expenses reasonably incurred by the contractor as a direct consequence of such defects, provided that:

i] Where the materials or goods have been used or fixed, such defects are not such that examination by the contractor ought to have revealed them before using or fixing.

ii] Such defects are due solely to defective workmanship or material in the goods supplied and shall not have been caused by Improper storage by the contractor or misuse or by any act or neglect of either the contractor, the architect or the IITM or by any person or persons for whom they may be responsible.

[c] That delivery of the materials or goods supplied, shall be commenced and completed at such times as the contractor may reasonably direct.

29.3 All payments by the contractor for materials or goods supplied by a nominated supplier shall be in full, and shall be paid within 30 days of the end of the month during which delivery is made.

30.0 Artists and Tradesmen

The contractor shall permit the execution of work, not forming part of this contract, by artist's tradesmen or others engaged by the IITM. Every such person shall, for the purposes of clause 47, or these conditions be deemed to be a person for whom the IITM is responsible and not be a sub-contractor.

31.0 Separate Contracts

The IITM reserves the right to let other contracts in connection with his work under similar general conditions. The contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and co-ordinate his work with theirs. If any part of contractor's/sub-contractor's work depends for proper execution or results, upon the work of any other contractor/ sub-contractor, the contractor shall inspect and promptly report to the architect / PMC, any defects in such work that render it unsuitable for such proper execution and results. Failure of the contractor to so inspect and report, shall constitute an acceptance of the other contractor's work as fit and proper for the reception ot his work; except as to defects which may develop in the other contractor's or sub-contractor's work after the execution of the work, after ensuring the proper execution of his subsequent work the contractor shall measure work already in place and shall at once report to the architect / PMC any discrepancy between the executed work and the drawings.

32.0 Variations; Provisional and Prime Cost Sums

32.1 The architect / PMC may issue instruction requiring a variation and he may sanction in writing any variation made by the contractor with the prior approval of IITM authorities otherwise than pursuant to an instruction of the architect / PMC. No variation required by the architect / PMC or subsequently sanctioned by him shall vitiate this contract.

32.2 The term "Variation," as used in these conditions, means the alteration or modification of the design, quality/quantity of the work as shown on the contract drawings and desired by or referred to in: the contract bills, and includes the addition, omission or substitution of any work, the alteration of the kind of standard of any of the materials or goods to be used in the work, and the removal from the site of any works materials or goods, executed or brought thereon by the contractor, for the purposes of the work other than work, materials or goods which are not in accordance with this contract.

32.3 The architect / PMC shall issue instructions in regard to the expenditure of Prime Cost* and provisional sums included in the contract bills and of prime cost sums which arise as a result as a result of instruction issued in regard to the the expenditure of provisional sums.

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* The term "Prime Cost" may be indicated by the abbreviation "P.C." in any document relating to this contract [including the contract bills] and wherever the abbreviation is used it shall be deemed to mean "Prime Cost."

32.4 All variations required by the architect / PMC or subsequently sanctioned with the prior approval of IITM authorities in writing and all work executed by the contractor for which provisional sums are included in the contract bills [other than work for which a tender made under clause 28.7 of these conditions has been accepted] shall be measured and valued by the architect / PMC who shall give to the contractor an opportunity of being present at the time of such measurement and of taking such notes and measurements as the contractor may require. The valuation of variations and of work executed by the contractor for which a provisional sum is included in the contract bills, [other than work for which a tender has been accepted as aforesaid] unless otherwise agreed, shall be made in accordance with the following rules.

[a] The price in the contract bills shall determine the valuation of work of similar character executed under similar conditions as work priced therein.

[b] The said prices, where work is not of a similar character or executed under similar conditions as aforesaid, shall be the basis of prices for the same so far as may be reasonable, failing which a fair valuation thereof shall be made.

[C] Where work cannot properly be measured and valued the contractor shall be allowed day work rates on the prices prevailing when such work is carried out [unless otherwise provided in the contract bills]:

i] At the rates if any, inserted by the contractor in the contract bills or in the form of tender or,

ii] When do such rates have been inserted, at the rates prevailing in the market, for material and labour and at the control rates for the controlled materials including, in all cases, the rate for delivery of the material at the work.

32.5 Effect shall be given to the measurement and valuation of variations under subclause [4] of this condition in term certificates and by adjustment of the contract sum; and effect shall be given to the measurement and valuation of work for which a provisional sum is included in the contract bills under the said sub-clause in Interim Certificate and by adjustment of the contract sum in accordance with clause 34 of these conditions.

32.6 If upon written application being made to him by the contractor, the architect / PMC is of the opinion that a variation or the execution by the contractor of work for which a provisional sum is included in the contract bills [other than work for which a tender made under clause 28.6 of these conditions has been accepted] has involved the contractor in direct loss and/or expense for which he would not be reimbursed by payment, in respect of a valuation made in accordance with the rules contained in sub-clause (4) of the condition and if the said application is made within a reasonable time of the loss or expense, having been incurred, then the architect I PMC shall ascertain the amount of such loss or expense. Any amount, from time to

time so ascertained, shall be added to the contract sum, and if an Interim Certificate is issued after the date of ascertainment, any such amount shall be added to the amount which would otherwise be stated as due in such certificate.

33.0 **Certificate and Payment**

33.1 At the period of Interim Certificate, named in the appendix to these conditions the architect / PMC shall issue a certificate stating the amount due to the contractor from the IITM, and the contractor be entitled to payment therefore within the period for honoring certificates named in the appendix to these conditions, interim valuations shall be made whenever the architect I PMC considers them to be necessary for the purpose of ascertaining the amount to be stated as due in an Interim Certificate.

33.2 The amount, stated as due in an Interim Certificate, shall subject to any agreement between the parties as to stage payments, be the total value of the work properly executed and of the materials and goods delivered to, or adjacent to the work for use thereon up to and including a date not more than seven days before the date of the said certificate, less any amount which may be retained by the IITM [as provided in sub-clause (3) of this condition] and less any installments previously paid under this condition, provided that such certificate shall only include the value of the said materials and goods as an from such time as they are reasonably, properly and not prematurely brought to or placed adjacent to the work and the only if adequately protected against whether or other casualties.

33.3 The IITM may retain the percentage of the total value of the work, materials and goods referred to in sub-clause (2) of this condition, which is named in the appendix to these conditions as retention percentage. Provided always, that when the sum of the amounts so retained equals the amount named in the said appendix as limit of retention fund or that amount as reduced in pursuance of clause 28.4 of these conditions, as the case may be, no further amounts shall be retained by virtue of this sub-clause.

33.4 The amounts retained by virtue of sub-clause (3) of this condition shall be subject to the following rules:

[a] The IITM's interest in any amounts so retained shall be fiduciary as trustee for the contractor [but without obligation to invest], and the contractor's beneficial interest therein shall be subject only to the right of the IITM to have recourse thereto, from time to time, for payment of any amount to which he is entitled under the provisions of this contract to deduct from any sum due or to become due to the contractor.

[b] On the issue of the certificate of virtual completion the architect / PMC shall issue a certificate for one moiety, of the total amounts then so retained and the contractors shall be entitled to payment of the said moiety within the period for honoring the certificate named in the appendix to these conditions.

33.5 [a] The measurement and valuation of the work shall be completed within the period of final measurement and valuation stated in the appendix to these conditions, and the contractor shall be supplied with a copy of the priced bills of variation not later than the end of the said period and before the issue of the final certificate under sub-clause (6) of this condition.

[b] Either before or within a reasonable time after virtual completion of the work the contractor shall send to the architect all documents necessary for the purposes of the computations, required by these conditions, including all documents relating to the accounts of nominated sub-contractors and nominated suppliers.

[c] In the settlement of accounts, the amounts paid or payable under the appropriate contracts by the contractor to nominated sub-contractors or nominated suppliers, the amounts paid or payable by virtue of clause 23.2 of these conditions in respect of fees or charges for which a provisional sum is included in the contract bills, the amounts paid or payable in respect of any insurance maintained in compliance with clause 48 and 49(a), of these conditions, the tender sum [or such other sum as is appropriate in accordance with the terms of the tender] for any work for which a tender made under clause 28.6 of these conditions is accepted and the value of any work executed by the contractor for which a provisional sum mentioned in the contract bill or arising under architect's / PMC's instructions issued under clause 32.3 of these conditions as the case may be, and the balance, after allowing in all cases prorate for the contractor's profit at the rates shown in the contract bills, shall be added to or deducted from the contract sum. Provided that no deduction shall be made in respect of any damage paid or allowed to the contractor by any sub-contractor or supplier.

33.6 So soon as is practicable, but before the expiry of the period the length of which is stated in the appendix to these conditions from the end of the defects liability period also stated in the said appendix or from completion of making good defects under clause 42 of these conditions or from receipt by the architect / PMC of the documents referred to in paragraph (b) of sub-clause (5) of this condition, whichever is the latest, the architect / PMC shall issue the final certificate. The final certificate shall state:

[a] The sum of the amount paid to the contractor under interim certificate and the amount named in the said appendix as limit of retention fund, and,

[b] The contract sum adjusted as necessary in accordance with the terms of these conditions, and the difference [if any] between the two sums shall be expressed in the said certificate as a balance, due to the contractor from the IITM or to the IITM from the contractor's the case may be, and subject to any deductions authorized by these conditions; the said balance shall, as from the fourteenth day after the issue of the said certificate be a debt payable as the case may be by the IITM to the contractor or by the contractor to the IITM.

33.7 Unless a written request to concur, in the appointment of an arbitrator shall have been given under clause 58 of these conditions by either party before the final certificate has been issued or by the contractor within 28 days after such issue. The said certificate shall be conclusive evidence in any proceedings arising out of this contract [whether by arbitration under clause 58 of these conditions or otherwise] that the works have been properly carried out and completed in accordance with the terms of this contract and that any necessary effect has been given to all the terms of this contract which require an adjustment to be made to the contract sum, except and in so far as any sum mentioned in the said certificate is erroneous by reason of:

[a] Fraud, dishonesty or fraudulent concealment relating to the works, or any part thereof, or to any matter dealt with in the said certificate; or

[b] Any defect [including any omission] in the works, or any part thereof which reasonable inspection or examination at any reasonable time during the carrying out of the works or before the issue of the said certificate would not have disclosed; or

[c] Any accidental inclusion or exclusion of any work, materials, goods or figure in any computation or any arithmetical error in any computation.

33.8 Save as aforesaid no certificate of the architect / PMC shall of itself be conclusive evidence that any works materials or goods to which it relates are in accordance with contract.

33.9 The Architect I PMC may withhold or, on account of subsequently discovered evidence, nullify the hole or part of any certificate to such extent as may be necessary in his reasonable opinion to protect the IITM from loss on account of

[a] Defective work not remedied

[b] Failure of the contractor to make payments properly to sub contractor or for material or for Labour.

[c] Reasonable doubts that the Contract can be completed for the balance then unpaid.
[d] Damage to another Contractor or sub-contractor.
[e] Claims filed on reasonable evidence indicating probable filing if claims,

When the above grounds are removed the payments shall be made for the amounts with held because of them.

34.0 Claims for Extra

When any instruction or decision given at site involve an extra or whereby the contractor may plan to claim an extra, it shall be the responsibility of the contractor to inform the architect / PMC and IITM of the extra amount and get written authorization for the architect / PMC and IITM before proceeding with the work involved.

Any modification carried out for expediting or simplifying work at the request of the contractor or his representatives shall not be taken as the basis for claiming an extra. However, if such modification shall also involve an extra, the rate for such modification shall be settled in advance and written authorization obtained by the contractor from the architect / PMC I Client before proceeding with the work involved. If the contractor in writing gives no such information to the architect / PMC I client such modification shall not be accepted as the basis for extra charge.

35.0 Extra Items

The rate of Extra Items shall be worked out in accordance with the following rules –

1) The rates for the extra items shall be derived from the rate of an appropriate item of the similar class for which the rate has already been accepted, where same can be directly derived.
2) Where the rates cannot be worked out by the method given above, the Contractor shall be allowed the market rates for the materials and labour as applicable to the area plus 15 % Profits and overheads provided the voucher for the materials supported by authorized dealers are delivered for the verification of the PMC or his representative within a week after the purchase of the same and that the daily time sheets for the labour are verified at the time of the execution of the work from the PMC or his representative and later presented along with the bill.

36.0 Deduction for Uncorrected Work

If the architect / PMC / Client deem it inexpedient to correct work damaged or not done in accordance with the contract, an equitable deduction from the contract price shall be made therefore.

37.0 Fluctuations

The contractor shall not claim any extras for fluctuation of price and the contract price shall not be subject to any rise or fall of prices.

38.0 Unfixed Goods and Materials

Unfixed materials and goods intended for, delivered to and placed on or adjacent to the work shall not be removed except for use upon the work unless the architect / PMC has consented in writing to such removal which consent shall not be unreasonably withheld. Where the value of any such materials or goods has in accordance with clause 33.2 of these conditions been included in any interim certificate under the contract for which the contractor has received payment, such materials and goods shall become the property of the IITM, but subject to clause 49.2(b) of these conditions [if applicable] the contractor shall remain responsible for loss or damage to the same.

39.0 **Materials and Workmanship**

39.1 All materials and workmanship shall be as per the relevant code of ISI specification and of approved type and the contractor shall immediately remove from the works any material and/or workmanship which in the opinion of the architect / PMC are defective or unsuitable and shall substitute proper materials and/or workmanship at his own cost. The term approval used in connection with this contract shall mean the approval of the architect / PMC.

39.2 The contractor shall if required submit satisfactory evidence as to the kind and quality of material.

39.3 Where special makes or brands are called for, they are mentioned as a standard. Others of equal quality may be used provided approval is first obtained in writing from the architect / PMC. Unless substitutions are requested no deviation from the specification will be permitted. Failure to purpose the substitution of any article within 30 days after singing of the contract will be deemed sufficient cause for denial of the request for substitution.

39.4 The contractor shall indicate and submit evidence in writing of those materials or articles called for in the specifications that are not obtainable for installation in the work within the time limits of the contract. Failure to indicate the above, within 30 days after the signing of the contract, will be deemed sufficient cause for the denial of request for the extension of the contract time.

39.5 All material shall be delivered so as to insure a speedy and uninterrupted progress of the work, Such material shall be stored so as to cause no obstruction and so as to prevent overloading of any portion of structure and the contractor shall be entirely responsible for damage or loss by weather or other cause.

39.6 Within 30 days after signing the contract, the contractor shall submit for approval of the architect / PMC a complete list of ail material he and his sub-contractors propose to use in the work of definite brand or make which differ in any respect from those specified; also the particular brand of any article where more than one is specified as a standard. He shall also list items not specifically mentioned in the specifications but which are reasonably inferred and necessary for the completion of the work.

39.7 *Inspection:* All materials and workmanship shall be subject to inspection, examination, and test by the architect / PMC at any and all times during manufacture and/or construction. The architect / PMC shall have the right to reject defective material and workmanship or require its correction. Rejected workmanship shall be satisfactorily replaced with proper material without additional charge therefore and the contractor shall promptly segregate and remove the rejected material from the works, if the contractor fails to proceed at once with the replacement or rejected materials and or the correction of defective workmanship, the architect / PMC may by contract or otherwise replace such materials and/or correct such workmanship and charge the cost thereof to the contractor, or may terminate the right of the contractor to proceed further with the work.

The contractor shall furnish promptly without additional charge all reasonable facilities, labour and materials necessary for the safe and convenient inspection and test that may be required by the architect / PMC.

40.0 **Defects**

40.1 The contractor shall make good at his own cost and to the satisfaction of the architect / PMC and IITM, all defects, shrinkage's or small faults, arising in the opinion of the architect / PMC from work or materials not being in accordance with the drawings or specifications or schedule of quantities or the instructions of the architect / PMC, which may appear within "Defects Liability Period" referred to in the appendix.

40.2 Such defects, shrinkage's shall upon directions in writing of the architect / PMC and within such reasonable time as shall be specified therein be amended and made good by the contractor, at his own cost unless the architect / PMC shall decide that he ought to be paid for such amending and making good and in case of default the IITM may employ and pay other contractor to amend and make good such defects, shrinkage, settlements or other faults and all damages loss and expense consequent thereon or incidental thereto shall be made good and borne by the contractor and such damage, loss or expense shall be recoverable from him by the IITM or may be deducted by the IITM upon the architect's / PMC's certificate in writing from any

amount due or may become due to the contractor or the IITM may, in lieu of such amending and making good by the contractor deduct from any moneys due to the contractor a sum to be determined by the architect / PMC as equivalent to the cost of amending such work and in the event of the retention amount being insufficient recover the balance from the contractor, together with any expenses the IITM may have incurred in connection therewith.

41.0 **Possession Completion and Postponement**

41.1 On the date for commencement stated in the appendix to these conditions possession of the site shall be given to the contractor who shall thereupon begin the works and regularly and, diligently proceed with the same, and who shall complete the same on or before the date for completion stated in the said appendix subject nevertheless to the provisions for extension of time contained in clause 42 of these conditions.

41.2 The architect / PMC may issue instructions in regard to the postponement of any work to be executed under the provisions of this contract.

41.3 If at any time or times before virtual completion of the work the IITM with the consent of the contractor shall take possession of any part or parts of the same for handing over to the finishing contractor or other agency, then notwithstanding anything expressed or implied elsewhere in this contract:

41.4 Such part or parts shall not be deemed to be virtually complete.

41.5 Virtual completion of such part or parts would occur on the completion of the last part of the structure under this contract.

41.6 The contractor shall not claim that such part or parts are complete and request refund of payments in lieu thereof.

42.0 **Extension**

Upon it becoming reasonably apparent that the progress of the works is delayed, the contractor shall forthwith give written notice of the cause of the delay to the architect / PMC / client, and if in the opinion of the architect / PMC I Client, the completion of the work is likely to be or has been delayed beyond that date for completion stated in the appendix to these conditions or beyond any extended time previously fixed under this clause.

42.1 By force majeure, or

42.2 By reason of any exceptionally inclement weather, or

42.3 By reason of loss or damage occasioned by any one or more of the contingencies referred to in clause 48 of these conditions, or

42.4 By reason of civil commotion, local combination of workmen strike or lockout affecting any of the trades employed upon the works or any of the trades engaged in the preparation, manufacture or transportation of any of the goods or materials required for the work, or

42.5 By reason of architect's / PMC's instructions issued under clauses 11, 32.1 or 41.2 of these conditions, or

42.6 By reason of the contractor not having received in due time necessary instructions drawings, details or levels from the architect for which he specifically applied in writing on a date which having regard to the date for completion stated in the appendix to these conditions or to any extension of time then fixed under this clause was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same, or

42.7 By delay on the part of nominated sub-contractors or nominated suppliers which the contractor has taken all practicable steps to avoid or reduce or

42.8 By delay on the part of artists, tradesmen or others engaged by the IITM in executing work not forming part of this contract, or

42.9 By reason of the opening up for inspection of any work covered up or of the testing of any of the work, materials or goods in accordance with clause 39.7 of these conditions [including making good in consequence of such opening up or testing] unless the inspection of test showed that the work materials or goods were not in accordance with this contract, or

42.10 By reason of the contractor's inability for reason beyond his control and which he could not reasonably have foreseen at the date of this contract to secure such labour goods or materials as are essential to the proper carrying out of the works.

Then the architect I PMC shall as soon as he is able to estimate the length of the delay beyond the date or time aforesaid make in writing a fair and reasonable extension of time for completion of the works, provided always that the contractor shall use constantly his best endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of the architect / PMC to proceed with the work,

43.0 Damages for Non-completion

If the contractor fails to complete the works by the date specified in these conditions or within any extended time fixed under clause 41 of these conditions and the architect I PMC certifies in writing that in his opinion the same ought reasonably so to

have been completed, the contractor shall pay or allow to the IITM a sum calculated at the rates stated in the appendix as agreed liquidated damages for the period during which the said work shall so remain or have remained incomplete, the IITM may deduct such damages from any money otherwise payable to the contractor under this contract.

44.0 **Virtual Completion and Defects Liability Period**

44.1 When in the opinion of the architect / PMC the works are practically completed, he shall forthwith issue a certificate to that effect and virtual completion of the works shall be deemed for all the purpose of this contract to have taken place on the day named in such certificate.

44.2 Any defects, shrinkage or other faults which are appeared within the "Defects Liability Period" stated in the appendix to these conditions and which are due to materials and workmanship not in accordance with this contract shall be specified by the architect I PMC in a schedule of defects which he shall deliver to the contractor not later than 14 days after the expiration of the said defects liability period and within a reasonable time after receipt of the schedule the defects, shrinkage's and other faults therein specified shall be made good by the contractor and [unless the architect / PMC shall otherwise instruct in such case the contract sum shall be adjusted accordingly] entirely at his own cost.

44.3 Notwithstanding sub-clause (2} of this conditions the architect I PMC may whenever he considers it necessary so to do, issue instructions requiring any defect, shrinkage's or other fault which shall appear within the defects liability period named in the appendix to these conditions and which is due to materials and workmanship not in accordance with this contract to be made good and the contractor shall within a reasonable time after receipt of such instructions comply with the same [and unless the architect / PMC shall otherwise instruct in which case the contract sum shall be adjusted accordingly] entirely at his own cost. Provided that no such instruction shall be issued after 14 days from the expiration of the said defects liability period.

44.4 When in the opinion of the architect / PMC any defects, shrinkage's or other defaults which he may have required to be made good under sub-clause (2) & (3) of this condition shall have been made good he shall issue a certificate to that effect, and completion of making good defects shall be deemed for all the purposes of this contract to have taken place on the day named in such certificate.

44.5 In no case shall the contractor be required to make good at his own cost any damage which may appear after the virtual completion of the work, unless the architect I PMC

shall certify that such damage is due to injury which took place before virtual completion of the works.

45.0 **Loss and expenses caused by disturbance of regular progress of the works:**

45.1 If upon written application being made to him by the contractor the architect / PMC is of the opinion that the contractor has been involved in direct loss and/or expense for which he would not be reimbursed by a payment made under any other provision in this contract by reason of the regular progress of the works or of any part thereof having been materially affected by:

45.2 [a] The contractor not having received in due time necessary instructions, drawings detail or levels from the architect for which he specifically applied in writing on a date which having regard to the date of completion stated in the appendix to these conditions was neither unreasonably distant from nor unreasonably close to the date on which it was necessary to receive the same; or

[b] The opening up for inspection of any work covered up or the testing of any work, materials or goods in accordance with clause 39.7 of these conditions [including making good in consequence of such opening up or testing], unless the inspection or test showed that the work materials or goods were not in accordance with this contract; or

[c] Any discrepancy or divergence between the contract drawings and/or the contract bills; or

[d] Delay on the part of the artists, tradesman or others engaged by the IITM in executing work not forming part of this contract; or

[e] Architect's / PMC's instructions issued in regard to the postponement of any work to be executed under the provisions of this contract; and if the written application is made within a reasonable time of it becoming apparent that the progress of the work or of any part thereof has been affected aforesaid:

Then the architect / PMC shall ascertain the amount of such loss and/or expense. Any amount from time to time so ascertained shall be added to the amount, which would otherwise be stated as due in such certificate.

45.3 The provisions of this condition are without prejudice to any other rights and remedies which the contractor may possess.

46.0 **Payment Withheld**

The architect / PMC may withheld on account of a subsequently discovered evidence nullify the whole or a part of any certificate to such extent as may be necessary in this reasonable opinion to protect the IITM from loss on account of.

46.1 Defective work not remedied.

46.2 Failure of the contractor to make payments properly to sub-contractor or for materials or labour.

46.3 A reasonable doubt that the contract can be completed for the balance then unpaid.

46.4 Damage to another contractor or sub-contractor.

46.5 Claims filed on reasonable evidence indicating probable filing of claims.
When the above grounds are removed payments shall be made for amounts withheld because of them.

47.0 **Injury to Persons and Property IITMs**

47.1 The contractor shall be liable for and shall indemnify the IITM against any liability, loss, claim or proceedings whatsoever arising out of any statute or at a common law in respect of personal injury or the death of any person whosoever arising out of or in the course of or caused by the carrying out of the works, unless due to any act or neglect of the IITM or of any person for whom IITM is responsible.

47.2 Except for such loss or damages as is at the risk of the IITM under clause 49(b) or clause 49(c) of this conditions [if applicable] the contractor shall be liable for and shall indemnify the IITM against any expense, liability, loss, claim or proceedings in respect of any injury or damage whatsoever to any property real or personal insofar as such injury or damage arise out of or in the cause of or by reason of the carrying out of the works, and provided always that the same is due to any negligence, omission or default of the contractor, his servants or agents or of any sub-contractor, his servant or agent.

48.0 **Insurance against Injury to Persons and Property**

48.1 Without prejudice to his liability to indemnify the IITM under clause 47 of this condition, the contractor shall maintain and shall cause any sub-contractor to maintain:

[a] Such insurance's as are necessary to cover the liability of the contractor or as the case may be of such sub-contractor, in respect of personal injuries or deaths arising out of or In the course of or caused by the carrying out of the work; and

[b] Such insurance's as may be specifically required by the contract bills in respect of injury or damage to properly real or personal arising out of or in the course of or by reason of the carrying out of the work, and caused by any negligence, omissions or default of the contractor, his servants or agents or, as the case may be of such sub-contractor, his servants or agents.

The contractor shall produce or cause any sub-contractor to produce for inspection the relevant policy or policies of insurance together with the receipts in respect of premiums paid under such policy or policies as and when required so to do by the architect / PMC provided always that as and when maybe reasonably required by the architect / PMC the production by either by the contractor any sub-contractor of a current certificate of insurance from the company or firm which shall have issued the policy or policies aforesaid shall be a good discharge of the contractor's obligation to produce or to cause the production of the policy or policies and the receipts in respect of premium paid.

48.2 [a] The contractor shall maintain in the joint names of the IITM and the contractor such insurance's as may be required in respect of any expense, liability, loss, claim, or proceedings which the IITM may incur or sustain by reason of injury or damage to property real or personal arising out of or in the course of or by reason of the carrying out of the work, and caused otherwise than by the negligence, omission or default of the contractor, his servants or his agent or any sub-contractor, his servants or agents.

[b] Any such insurance as if referred to in the immediately preceding paragraph shall be placed with insurers to be approved by the architect / PMC and the contractor shall have to deposit with him the policy or policies and the receipts in respect of premium paid.

48.3 Should the contractor or any sub-contractor make default in insuring or in continuing to insure as provided in sub-clauses (1) & (2) of this conditions the IITM may himself insure against any risk with respect to which the default shall have occurred and may deduct a sum equivalent to the amount paid in respect of premiums from monies due to or become due to the contractor.

49.0 Insurance of the Works against Fire, etc.

49.1* [a] the contractor shall in the joint names of the IITM and contractor insure against loss or damage by fire, storm, tempest, lightning, flood, earthquake, aircraft, or anything dropped there from, arial objects, riot and civil commotion for the full value thereof all work executed and all and fixed materials and goods intended for, delivered to and placed on adjacent to the work, but excluding temporary building, plant, tools and equipment owned or hired by the contractor or any sub-contractor and shall keep such work, materials and goods so insured until virtual completion of the

work, Such insurance's shall be with insurers approved by the architect / PMC and the contractor shall deposit with the architect / PMC the policy or policies and the receipt in respect of premiums paid: and should the contractor make default in insuring or continuing to insure as aforesaid the IITM may himself insure against any risk with respect of which the default shall have occurred and deduct a sum equivalent to the amount paid by him in respect of premium from any monies due to or to become due to the contractor.

Provided always that if the contractor shall independently of his obligations under this contract maintain a policy of insurance which covers [inter alia] the said work, materials and goods against the aforesaid contingencies to the full value thereof then the maintenance by the contractor of such policy shall if the IITM's interest in endorsed thereon, be a discharge of the contractor's obligation to insure in the joint names of the IITM and contractor and the production by the contractor as and when may reasonably be required by the architect of a current certificate of insurance from the company or firm which shall have issued the said policy shall be a discharge of the contractor's obligation to deposit with the architect a policy or policies and the receipts in respect of premium paid.

[b] Upon settlement of any claim under the insurance's aforesaid the contractor with due diligence shall restore work damaged, replace or repair unfixed materials or goods which have been destroyed or injured, removed or disposed of any debris and proceed with the carrying out and completion of
the work. All monies received from such insurance's shall be paid to the contractor by installments under certificates of the architects issued at the period of interim certificates named in the appendix to these conditions. The contractor shall not be entitled to payment in respect of the restoration of work damaged, the replacement and repair or any unfixed materials or goods and the removal and the disposal of debris other than the monies received under the said insurance's.

50.0 Termination of contractor by the IITM

50.1 *Default:* If the contractor shall make default in any one or more of the following respects, that is to say;

[a] If he without reasonable cause wholly suspends the carrying out of the works before completion thereof, or

[b] if he fails to proceed regularly and diligently with the works, or

[c] If he refuses or persistently neglects to comply with the written notice from the architect / PMC requiring him to remove defective work or improper materials or goods and by such refusal or neglect the work is materially affected, or

[d] If he fails to comply with the provision of clause 27.

Then the architect / PMC may give him the notice by registered post or recorded delivery specifying the default, and if the contractor either shall continue such a default for 14 days after receipt of such a notice and shall at any time thereafter repeat such a default [whether previously repeated or not]. Then the IITM without prejudice to any other rights or remedies may within ten days after such continuance or repetition of notice by registered post or recorded delivery forthwith terminate the employment of the contractor under his contract, provided that such notice shall not be given unreasonably or vexatiously.

50.2 *Bankruptcy of Contractor:* In the event of the contractor becoming bankrupt or making a composition or arrangement with his creditors or being a company having a winding up order made or [accept for purposes of reconstruction] a resolution for voluntary winding up past or a receiver or manager of his business or undertaking duly appointment or possession taken. By or on behalf of the holders of any debentures secured by a floating charge, of any property comprised in or subject to the floating charge the employment of the contractor under his contract shali be forthwith automatically terminated by the said employment may be reinstated and continued if the IITM and the contractor, his trustee in bankruptcy, liquidation, receiver or manager as the case may be shall so agree.

50.3 The IITM shall be entitled to terminate the employment of the contractor under this contract. If the contractor shall have offered or given or agreed to give to any person any gift or consideration of any kind as an inducement or reward for doing or for bearing to do or for having done or foregone to do any action in relation to the obtaining or execution of this contract with the IITM, or for showing or forbearing to show favors or disfavor to any person in relation to this contract or any other contract with the IITM, or if the like acts shall have been done by any person employed by the contractor or acting on his behalf [whether with or without the knowledge of the contractor], or if in relation to this contract or any other contract with the IITM the contractor or any person employed by him or acting on his behalf shall have committed any offense under the Prevention of Corruption Act, or shall have given any fee or reward the receipt of which is an offense under the Local Government Act.

50.4 In the event of the employment of the contractor being terminated as aforesaid and so long as it has not been reinstated and continued, the following shall be the respective rights and duties of the IITM and contractor.

[a] The IITM may employ and pay other persons to carry out and complete the works and he or they may enter upon the works and use all temporary buildings, plants, machinery, appliances, goods and materials intended for, delivered to and placed on or adjacent to the works and may purchase ail materials and goods necessary for the carrying out and completion of the works.

[b] The contractor shall if so required by the IITM or architect within 14 days of the date of termination assigned to the IITM without payment the benefit of any agreement or the supply of materials or goods and/or for the execution of any works for the purposes of this contract but on the terms that a supplier or sub-contractor shall be entitled to make any reasonable objection to any further assignment thereof by the IITM. In any case the IITM may pay any supplier or sub-contractor for any materials or goods delivered or works executed for the purpose of the contract [whether before or after the date of the termination] in so far as the price thereof has not already been paid by the contractor. The IITM's rights under this paragraph are in addition to his rights to pay nominated sub-contractors as provided in clause 28.2 and payments made under this paragraph may be deducted from any sum due or to become due to the contractor,

[c] The contractor shall as and when required in writing by the architect / PMC so to do [but not before] remove from the works any temporary buildings, plants, tools, equipment's, goods and materials belonging to or hired by him. If within a reasonable time after any such requirement has been made the contractor, has not compiled therewith then the IITM may [but without being responsible for any loss or damage] remove and sell any such property of the contractor, holding the proceeds less all costs incurred to the credit of the contractor.

[d] The contractor shall allow or pay to the IITM in the manner herein after appearing the amount of any direct loss and/or damage caused to the IITM by the termination. Until after completion of the works under paragraph (a) of this sub-clause the IITM shall not be bound by any provisions of this contract to make any further payment to the contractor, but upon such completion and the verification within a reasonable time of the accounts therefore the architect *I* PMC shall certify the amount of expense properly incurred by the IITM and the amount any direct loss and/or damage caused to the IITM by the termination and if such amounts when added to the monies paid to the contractor before the date of termination exceed the total amount which would have been payable on due completion in accordance with this contract, the difference shall be a debt payable to the IITM by the contractor, and if the said amounts, when added to the said monies be less than the said total amounts, the difference shall be a debt payable by the IITM to the contractor.

51.0 Termination by the Contractor

Without prejudiced to any other rights and remedies which the contractor may Posses.

[a] The IITM does not pay the contractor the amount due on any certificate within the period for Honoring Certificates named in the appendix to these conditions and continues such default for seven days after the receipt by registered post or recorded delivery of a notice from the contractor stating that notice of termination under this condition will be served if payment is not made within seven days from the receipt thereof; or

[b] The carrying out of the whole or substantially the whole of the uncompleted works [other than the execution of work required under Clause 44 of these conditions] is suspended for a continues period of more than 60 days by the reason of.

i] Force majeure, or

ii] Loss or damage occasioned by any one or more of the contingencies referred to in Clause No, 49 of the conditions [if applicable], or

iii] Civil commotion, or

iv] Architect's instructions based under Clauses 7.3, 32.1 or 41.2 of these conditions, or

v] The contractor not having received in due time necessary instructions drawings, details or levels from the architect for which he specifically applied in writing on a date of completion stated in the appendix to these conditions or to any extension of time then fixed under Clause 42 of these conditions was neither unreasonably distant from or unreasonably close to the date on which it was necessary for him to receive the same, or

vi] Delay on the part of artists, tradesmen or others engaged by the IITM in executing work not forming a part of this contract, or

vii] The opening up for inspection of any work covered up or of the testing of any of the work materials or goods in accordance with Clause 39.7 of these conditions [including making good in consequence of such opening up or testing] unless the inspection or test showed that the work materials or goods were not in accordance with this contract.

The contractor may thereupon by notice, by registered post or recorded delivery to the IITM or architect forthwith terminate the employment of the contractor under this contract; provided to such notice shall not be given unreasonably or vexatiously.

51.2 Upon such termination, then without prejudice to the accrued rights or remedies of either party or any liability of the classes mentioned in clause 47 of these conditions which may accrue either before the contractor or any sub-contractor shall have removed his or their temporary buildings, plants, machinery, appliances, goods or materials or by reason of his or their so removing the same, the respective rights and liabilities of the contractor and the IITM shall be as follows that is to say:

[a] The contractor shall with all reasonable dispatch and in such a manner and with such precautions as will prevent injury, death or damage of the classes in respect for which before the date of determination he was liable to indemnify the IITM under clause 47 of these conditions remove from site all his temporary buildings, plant, machinery, appliances, goods and materials and give facilities for his sub-contractors to do the

same but subject to the provisions of sub-paragraph [111] of paragraph (b) of this sub-clause.

[b] After taking into account amounts previously paid under this contract the contractor shall be paid by the IITM :

i] The total value of the works completed at the date of termination.

ii] The total value of the work begun and executed but not completed at the date of termination the value being ascertained mutatis an accordance with clause 32.4 of these conditions,

iii] The cost of materials or goods properly ordered for the works for which the contractor shall have paid or off which the contractor is legally bound to pay, and on such payment by the IlTM materials or goods so paid for shall become the property of the IlTM,

iv] The reasonable cost of the removal under paragraph [a] of this sub-clause.

v] Any direct loss and/or damage caused to the contractor by the termination.

Provided that in addition to all other remedies the contractor upon such termination may take possession of and shall have a lien upon all unfixed materials which may have become the property of the IITM under clause 38 until the payment of all monies due to the contractor from the IITM.

52.0 Co-ordination of Work

52.1 At the commencement of work, and from time to time, the contractor shall confer with the sub-contractors, persons, engaged on separate contracts in connection with the work, and with the architect / PMC for the purpose of the co-ordination and execution of the work in various phases of work.

The contractor shall ascertain the sub-contractors, persons engaged on separate contracts in connection with the works, the extent of all chasing, cuttings and forming of all openings, holes, grooves, etc. as may be required to accommodate the various services. The contractor shall ascertain the routes of all services and the positions of all floor outlets, traps, etc. in connection with the installation of plant and services and arrange for the construction of work accordingly. The breaking and cutting of the completed work must be avoided.

53.0 Labour

53.1 The contractor shall employ no child labour under 14 years of age on the work. If female labour is engaged the contractor shall make necessary provisions for safeguarding small children and keeping them clear of site operations. No labourer shall reside within the compound except for authorized guards.

54.0 **Protections of Trees and Shrubs**

54.1 Trees and shrubs designated by the architect shall be protected from damage during the course of the work and the earth level shall not be changed within three feet of such tree. Where necessary, such trees and shrubs shall be protected by means of temporary fencing.

55.0 **Guarantee**

55.1 Besides guarantees required elsewhere, the contractor shall guarantee the work in general for one year as noted under clause of the conditions.

55.2 All required guarantees shall be submitted to the architect by the contractor when requesting certification of accounts for payment by the IITM.

56.0 **Antiquities**

56.1 All fossil antiquities and all other objects of interest or value which may be found on the site or in excavating the same during the progress of the work shall become the property of the IITM. The contractor shall carefully take out and preserve ail such objects and shall immediately or as soon as convenient, may be after the discovery of such articles, deliver the same into the possession of the IlTM uncreated and as excavated.

56.2 If in the opinion of the architect I PMC compliance with the provisions of the preceding sub-clause has involved the contractor in direct loss and/or expense for which he would not be reimbursed by a payment made under any other provision in this contract then the architect I PMC shall ascertain the amount of such loss and/or expense, any amount from time to time so ascertained shall be added to the contract sum, and if an interim certificate is issued after the date of ascertainment any such amount shall be added to amount which would otherwise be stated as due in such certificate.

57.0 **Excepted Matters**

57.1 The decisions, opinion, direction, certificate [except for payment] with respect to all or any of the matters under clauses 7,1:1,24,28,39,42(1,2,4,7&8), 50 hereof [which matters are herein referred to as the excepted matters] shall be final and conclusive and binding on the parties hereto and shall be without appeal. Any other decision, opinion, direction, certificate or valuation of the architect I PMC or any refusal of the architect / PMC to give any of the same shall be subject to any right of arbitration and review in the same way in all respect [including the provisions as to opening the reference] as if it were a decision of the architect I PMC under the foil clause.

58.0 **Arbitrator**

58.1 All dispute and differences of any kind whatever arising out of or in connection with the contract or the carrying out of the works [whether during the progress of the works or after the completion and whether before or after the termination, abandonment or breach of the contract] shall be referred to and settled by The Director, IlTM, who in consultation with architect / PMC shail state his decision in writing. Such decision made in the form of a final certificate or otherwise. The decision of the Director. IlTM, with respect to any of the accepted matters shall be finai and without appeal. But if either the IlTM or the contractor be dissatisfied with the Advice of the architect I PMC on any matter, question or dispute of any kind [except any of the excepted matters] or as to the withholding by the architect / PMC of any certificate, to which the contractor may claim to be entitled than and in any such case either party [the IITM or the contractor] may within 28 days after receiving notice of such decision give a written notice to the other party through the architect / PMC requiring that such matters in dispute be arbitrated upon. Such written notice shall specify the matters which are in dispute and such dispute or difference of which such written notice has been given and no other shall be and is hereby referred to the arbitration and final decision of a single arbitrator being a fellow of the Indian Institute of Architects to be agreed upon and appointed by both the parties or in case of disagreement as to the appointment of a single arbitrator to the arbitration of two arbitrators, both being fellows of the Indian Institute of Architects, one to be appointed by each party, which arbitrators shall before taking up on themselves the burden of reference appoint an umpire.

The arbitrator, the arbitrators or the umpire as the case may be shall have power to open up review and revise any certificate, opinion, decision, requisition or notice save in regard to the excepted matters referred to in clause 58 and to determine all matters in dispute which shall be submitted to him or them and of which notice shall have been given as aforesaid.

Upon every or any such reference the cost of and incidental to the reference and award respectively shall be in the direction of the arbitrator or arbitrators or the umpire a the case may be who may determine the amount thereof or direct the same to be taxed as between attorneys and client or as between party and party and shall direct by whom and to whom and in what matter the same shall be borne and paid. This submission shall be deemed to be a submission to arbitration within the meaning of the Indian Arbitration Act 1899 or any modification thereof for the time being in force. The award of the arbitrator or arbitrators or the umpire as the case may be shall be final and binding on the parties. Such reference except as to the withholding by the architect of any certificates under clause 49 to which the contractor claims to be entitled shall not be opened or entered upon until after the completion or alleged completion of the works or until after the practical cessation of the works arising from any cause unless within the written consent of the IITM and the contractor. Provided always that the IITM shall not withhold the payment of an interim certificate nor the contractor except with the consent in writing of the architect in any way delay the carrying out of the works by reason of any such matters, question or dispute being referred to arbitration but shall proceed with the work with all due diligence and shall,

until the decision of the arbitrator or arbitrators or the umpire as the case may be, given abide by the decision of the architect and no award of the arbitrator or the arbitrators or the umpire as the case may be shall relieve the contractor of his obligations to adhere strictly to architects instructions with regard to the actual carrying out the works, The IITM and the contractor hereby also agree that arbitration under this clause shall be a condition precedent to any right of action under the contract.

59.0 **Protection and Cleaning**

59.1 The contractor shall protect and preserve the work from all damage or accident providing any temporary roof, window and door coverings, boxing or other construction as required by the architect. This protection shall be provided for all property adjacent to the site as well as on the site.

59.2 The contractor shall properly clean the work as it progresses and shall remove all rubbish and debris from the site from time to time as is necessary and as directed. On completion the contractor shall ensure that the premises and/or site are clean surplus materials debris, sheds, etc. removed, areas under floors cleared of rubbish gutters and drains cleared, doors and sashes eased, locks and fastenings oiled, keys clearly labeled and handed to the PMC so that the whole is left fit for immediate occupation or use and to the satisfaction of the architect / PMC.

60.0 **Tolerance**

60.1 The contractor shall exercise every care to ensure that all structural members sufficiently plumb and true to dimensions called for all the drawings to receive pre-fabricated finishing elements such as doors windows, cabinet work, ceramic work, concrete, tiles, etc. Any variations may require rectification in the structural members or may involve remaking or replacing the finishing elements, fabricated to fit into the openings or spaces, as called for on the drawings.

In case of separate contract, the contractor whose work does not conform to dimensions called for, shall be liable for all the expenses which may have to be incurred for rectification or replacement as may be required by the architect for the proper installation of the finishing elements. The architect's decision in this respect shall be final and binding on the parties concerned.

APPENDIX HEREINBEFORE REFFERED TO

33.0	Period of honoring certificate	:	15 days
33.2	Value of work for interim certificate	:	One bill per month not less than 15% of order value

33.3	Retention percentage	:	05% of value of work done
33.4	Period of final measurement & valuation	:	One month.
33.6	Installment after virtual completion	:	Amount of work done Full retention to be released after defect liability Period
40	Defect liability period from date of taking over.	:	12=00(Twelve Months) months
40.1	Date of completion	:	30 days from issue of LOI
41	Agreed liquidated damages	:	1% per week delay in completion Subject to a maximum of 10% of balance work.

SECTION – VII

SPECIAL CONDITIONS OF CONTRACT

SECTION VII - SPECIAL CONDITIONS OF CONTRACT

(In case of discrepancy arisen between General Conditions of Contract and Special conditions of contract, Special conditions of contract will supersede the General conditions of contract)

1. Sealed tenders should be addressed to The Administrative Officer, Indian Institute Of Tropical Meteorology., Dr. Homi Bhaha Road, Pashan, Pune 411008.

2. No tender will be received after 12.30 hours on **17.01.2012** under any circumstances whatsoever.

3. Indian Institute of Tropical Meteorology, [referred to as "The IITM/The Client"] and/or the "Project Management Consultant" do not bind themselves to accept or reject any or all the tenders, either in whole or in part without assigning any reasons.

4. Within ten days of the receipt of intimation from the IITM of the acceptance of his/ their tender, the successful bidders shall be bound to implement the contract by signing an agreement in accordance with the draft agreement and the schedule of conditions, but the written acceptance by the IITM of a tender will constitute a binding agreement between the IITM and the person so tendering whether such formal contract is or is not subsequently entered into.

5. The successful bidders shall, within 10 days [ten days] of the receipt of letter of acceptance, furnish a Bank Guarantee from a Nationalized Bank, of an amount equal to five percent of the contract amount as a security deposit for the execution and this 5 % amount in form of Bank Guarantee shall form total Security deposit for the due fulfillment of the contract.

6. The successful bidders/contractor must not assign the contract, nor sublet any portion of the contract, except with the written consent of the architects.

7. Electric Power: The contractor shall make his own arrangement for electrical power by applying and taking temporary construction power from MSEDCo Ltd, It is the responsibility of the contractor to maintain the D,G. Set including cost of fuel, maintenance etc. complete.

8. Water: The IITM shall provide construction water at one location. The contractor shall take water from this location including conveying, all leads and lifts, transportation, storage by making temporary tanks, putting pumps for supply, electrical installation etc. complete at his own cost. In case of IITM is unable of supplying water due to any reason, contractor has to arrange water at his own.

9. The contractor shall carry out all work strictly in accordance with drawings, details and instructions of the architects and their structural consultants. If, in the opinion of the architect or the structural consultant, changes have to be made in the RCC design to achieve performance levels, the contractor shall carry out the same without any extra charge. The architects' decision in such cases shall be final and shall not be open to arbitration/litigation.

10. A schedule of probable quantities in respect of each work and specifications accompany these special conditions. The schedule of probable quantities is liable to alterations by omission, deductions or additions at the discretion of the architects. Each tender should contain not only the rates but also the cost of each item of work entered in a separate column and all the items should be totaled up in order to show the aggregate cost of the entire tender. All corrections in the tender schedule shall be attested by the initials of the bidderss. Corrections which are not attested may entail the rejection of the tender.

11. All items of works given in the schedule of quantities shall be executed in strict accordance with the relevant specifications read in conjunction with appropriate Indian Standard Specifications.

12. Special attention of the bidders is drawn to the alternative items, if any, in the schedule of probable quantities' the rates and amounts for these alternative items if any shall be duly filled in and the bidders is informed that his tender will not be considered unless the alternative rates are given for these items. The architect reserves to himself the right to adopt any of the alternative items, either in scrutinizing and deciding upon the tenders, or later when the works are being executed.

13. The bidders must obtain for himself, on his own responsibility, and. at his own expenses ail the information which may be necessary for the purpose of making a tender and for entering into a contract, and must examine the drawings and must consider and inspect the site of the work and acquaint himself with all local conditions, means of access to the work, nature of the work, and all matters appertaining thereto.

14. Successful completion of items specified in BOQs is inclusive of cost of material, labour, manpower, tools and plants. The tender should include all charges for double scaffoldings, centering materials, water and Electrical power charges, temporary plumbing, cost of cistern, hire for any tools and plants, sheds for materials, marking out and cleaning of site, and watering the concrete as mentioned in the specifications. The rates quoted by the bidders in the schedule of probable quantities will be deemed to be for the finished work to be measured in situ. The rates shall be inclusive of VAT, Service Tax, sales tax, general tax, Octroi duty, S.T, on W.C.T, E.S.I., P.F. etc. or any other duty levied by any government of

public bodies. The rates shall be firm and shall not be subject to exchange variations, inflation, market fluctuations, labour conditions or any conditions whatsoever.

15. The calculations made by the bidders should be based upon probable quantities of the several items of work, which are furnished for the bidderss convenience in the schedule of probable quantities. But it must be clearly understood that the contract is not a lump sum contract, that neither the probable quantities nor the cost of the individual items, nor the aggregate cost of the entire tender will form part of the contract and that the employer, does not in any way assure the bidders, or guarantee that the said probable quantities are correct, or that the work would correspond thereto.

16. Time shall be considered as of the essence of the contract. The entire construction must be completed within Ten months from the date of start, including all buildings, structural works, RCC work, sanitary water supply and drainage work and electrical installation, etc. The bidders must give bar chart & state the periods within which he proposes to complete the several stages. The attention of the bidders is drawn to Clause 43 pertaining to liquidated damages for delay of the General Conditions of Contract.

17. The main contractor shall give reasonable facilities to the other contractor and/or contractors appointed by the employer for the particular work and the main contractor will give intimation from time to time to the other contractors of different stages of work. The contractors other than the main contractor shall work in conjunction with the main contractor and to the advantage of the general progress of the work so as to avoid any delay in the agreed period for the completion of the contract.

18. The successful bidders is bound to carry out any and all items of work necessary for the completion of the job even though such items are not included in the quantities and rates. Schedule of instructions in respect of such additional items and their quantities will be issued in writing by the architect / PMC after approval of IITM.

19. The contractor shall strictly observe the rules and regulations as prescribed under Contract Labour [Regulation and Abolition] Rules in force and in accordance with the Contract Labour [Regulation and Abolition Act, 1970] and subsequent amendments if any. These will be periodically checked by the employer, and the bidders will be fully responsible for violations.

20. The contractor shall be paid solely on the basis of the rates quoted by him in the schedule/bill of quantities and rates, based on the joint measurements recorded of

work actually carried out at site, Rates of extra items of work shall be settled as Actual material price + Actual Labour price + 15% overheads and profit.

21. No escalation in rates, in any circumstances shall be allowed and paid.

22. Contractor shall submit his monthly running account bills in triplicate to Institute(client) the bill will be forwarded to PMC. PMC shall scrutinize and forward the bill along with his certification to Architect within Seven days. Architect shall forward bill along with his certification to IITM within three days and Client shall release the Payment within seven days after receipt of bill from Architect.

23. In spite of many request the contractors authorized person does not come for recording and signing the measurements, then the PMC can carry out the measurements alone and they will be deemed to have been accepted by the contractor.

24. Architect's/Project Management Consultant's Status and Decisions:

24.1 The Project Management Consultants shall be on behalf of IITM during the construction period. The architect shall weekly visit the site to familiarize himself generally with the progress and the quality of the work and determine in general, if the work is proceeding in accordance with the contract document. He or his representative shall visit the site at least once a week and carry out close supervision and ensure that the work is progressing as per the work order and contract document. During such visits and on the basis of his observations while at the site he shall keep the IITM informed of the progress of the work, and shall endeavor to guard the IITM against defects and deficiencies in the work of the contractor and he shall condemn work which fails to conform to the contract document. Architect/Project Management Consultant shall have authority to act on behalf of the IITM, only to the extent expressly provided in the contract document [or otherwise in writing which shall be shown to the contractor], Architect/Project Management Consultant shall have authority to stop the work whenever such stoppage maybe necessary in their opinion to ensure the proper execution of the contract.

24.2 Decision: The architect/project management consultant shall, within one week, make decisions on all claims of the contractor and all other matters relating to Ihe execution and progress of the work or the interpretation of the contract document.

The architect/project management consultant may, on approval of the IITM, from time to time issue further drawings. Details and/or written instructions, written directions and written explanations in regard to:

[a] Variation or modifications of the design,
[b] The quality or quantity of works or the additions or omission or substitution of any work.
[c] Any discrepancy in, or divergence between the drawings and/or specifications.
[d] The removal and/or re-execution of any works executed by the contractor.
[e] The dismissal from the works, of any persons employed thereon.
[f] The opening-up, for inspection of any work covered up.
[g] The amending and making good of any defects under the Defects Liability Period.
[h] The removal from the site of any materials, brought thereon, by the contractor and the substitution of any other material thereof.
[i] Assignment and sub-letting.
[j] Delay and extension time.
[k] The postponement of any work, to be executed under the provision of this contract.

24.3 Dismissal: The contractor shall, on the Instructions of the Architect/Project Management Consultant, after approval of IITM immediately dismiss from the works any person employed thereon by him who may; In the opinion of the architect, be incompetent or misconducts himself; and such person shall not be again employed on the work, without the permission of the architect.

25. Project Management Consultant: The term "Project Management Consultants" shall mean the person, appointed and paid by the IITM, acting under the orders of the IITM/Architects to inspect the works and coordinate the project on their behalf. The contractor shall afford such consultants every facility and assistance for inspecting the works and materials, and for checking and measuring time and materials.

The Project Management Consultants/Architects, or any representatives of the architect, after obtaining approval, shall have power to give notice to the contractor, or to his representative, the non-approval of any work or materials, and such work shall be suspended or the use of such materials shall be discontinued until the decision of the architect is obtained. The works will, from time to time, be examined by the architect, project management consultants or the architect's representative; but such examination shall not in any way exonerate the contractor from the obligation to remedy any defects which may be found to exist at any stage of the works or after the same is completed. Subject to the limitation of this clause,

the contractor shall take instructions only from the architect/project management consultant.

26. Any dispute between contractor and nominated subcontractor shall be referred to Architect/ PMC and Architect/ PMC shall take decision on such dispute within two weeks and such decision shall be binding on all parties.

    Any dispute between Consultant and contractor shall be refereed to Architect / PMC. And Architect/ PMC shall take decision on such dispute within one week, and such decision shall be binding on all parties.
    Any dispute between Architect/ PMC and contractor shall be referred to IITM and decision of IITM shall be final and binding on all parties.

Date: _____ _____
(Signature of Bidders)

Witness: _____ _____
Name and Address: (Seal of Bidders)

VII.TECHNICAL CONDITIONS OF CONTRACT

SECTION VII-A) SPECIFICATION OF CIVIL AND ALLIED WORKS

1.0 Management and Co-ordination

1.1 Contractor Field Organization and Equipment

[a] The contractor shall keep a qualified and competent engineer with 10-15 years of experience for site supervision assisted with adequate staff constantly on the work who will be responsible for the carrying out of the work to the true meaning of the drawings, specification and Schedule of Quantities, Architects/PMC. Any directions or instructions given to him in writing shall be held to have been given to the contractor officially, attention is called to the importance of requesting instruction from the architect before undertaking any work where architect's / PMC directions or such instruction will be liable to be removed.

[b] The contractor shall provide and install all necessary cranes, hoists, ladders, scaffolding, tools, tackles, plants, all transport for labour materials and plant necessary for the proper carring on, execution and completion of the work to the satisfaction of the architects, PMC and IITM.

[c] *Office Accommodation:* The contractor shall provide, erect and maintain, where directed, simple watertight office accommodation, of a temporary nature, for the site staff of IITM / Architect / PMC. This accommodation shall be well lighted and ventilated and provided with windows, doors with a lock. The office shall be a minimum 150 sq ft. and shall have a desk, chair and drawers for keeping drawings and tack board for displaying drawings. The contractor shall provide one telephone connection and drinking arrangements in this office. The accommodation is to be demolished when directed.

[d] *Watchmen*: The contractor shall provide watchmen to guard the site and premises at all times at his expense and shall be responsible for the watch and ward of the contractor's / Clients materials at site.

[e] *Storage of Materials*: The contractor shall provide, erect and maintain proper sheds for the storage and protection of the Contractor's own supplied and Client's supplied materials, etc. and also for execution of work, which may be prepared on the site. Any damage to client supplied material due to improper storage will be liability of contractor. Contractor shall provide, erect and maintain shed for storage of Radiant cooling Pex pipes supplied by Radiant cooling agency.

[f] *Sanitary Conveniences:* The contractor shall provide and erect all necessary sanitary conveniences for the site staff and the workmen, maintain them in a clean, orderly condition and clean and deodorize the ground after their removal.

[g] *Minors on Site*:

i] Mo minor, as described by the concerned labour laws, shall be permitted on the work site.

ii] It is the responsibility of the tendering contractor and not their labour contractors, to inforce all aspect of laws, rules and regulation that refer to minors.

Iii] The contractor shall arrange for a crèche on site to adequately accommodate the babies of labourers and staff. Should there be ten or more infants on site an organization like mobile crèches shall be engaged and paid for by the contractor. In any case a specific area must be designated where infants and a guardian will be and it will be seen that infants [and other minor] are not found any place where construction work is taking place.

[h] *Scaffolding, Staging, Guardrails*: The contractor shall provide scaffolding, staging, guardrails, temporary stairs which shall be required during construction. The supports for the scaffoldings, staging guardrails and temporary stairs shall be strong, adequate for the particular situation, tied together with horizontal pieces over which planks are securely fixed. The temporary access to the various parts of the building under construction shall be rigid and string enough to avoid any chance of mishaps. The arrangement proposed shall be subject to the approval of the architect / project manager.

1.2 Sub-Contractors

The contractor shall submit the list of the contractors which shall be subject to the approval by the architect / PMC.
No part of the work or contract shall be sub-let to other persons unless the written authority of the architect / project management consultant is first obtained. The contractor shall allow them the use of sanitary conveniences, storage facilities for storing materials, other amenities and affording them all reasonable facilities for carrying out their contracts.

1.3 Separate Contracts

The IITM reserves the right to award other contracts in connection with this work. The contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and co-ordinate his work theirs.
If any part of contractor's or sub-contractor's work depends for proper execution or result, upon the work of any other contractor or sub-contractor the contractor shall inspect and promptly report it unsuitable for such proper execution and result. His failure to so inspect and report shall constitute an acceptance of the work as fit and proper for the reception of this work, except as to defects which may develop in the other contractor's or sub–contractor's work after the executive of work.

1.4 Claim for Extra Payment

In case of any instructions or decisions given at site, involving extra payments, or whereby the contractor may plan to claim an extra payment, it is the responsibility of the contractor to inform the architect's/ projects management consultant's office at that time of the amount requested and get a written authorization before proceeding with the work involved.
Any site modification made for expedition or simplifying work at the request of the contractor or his representatives shall not be taken as a basis for claiming an extra payment. However, if such modifications should also involve an extra charge, the rate for such modification shall be settled in advance and an authorized obtained from the PMC/architect in writing before beginning the work involved. In the event no intimation is given , such modifications cannot be accepted as a bias for extra charges. Rates of extra items shall be calculated as per cost of material plus cost of labour plus 15% for profits and overheads.

1.5 Payments

[a] Certificate of Payment : The contractor shall be paid by the IITM from time to time by installments under certificates to be issued by the architect / project management consultant to the contractor on account of work executed, in accordance with the General Conditions of Contract [GCC], the Articles of Agreement and tender document.

1.6 Deduction for Uncorrected

If the Architect / PMC deems it expedient to correct work damaged or not done in accordance with the contract, an equitable deduction from the contract price shall be made therefore.

1.7 Materials and workmanship

[a] All materials and workmanship are to be of the best quality of the specified type, to the entire satisfaction of the architect. The contractor shall deliver/unload materials on site only after getting clearance from the Project Management Consultant. The contractor shal immediately remove from the premises materials and/or workmanship which, in the opinion of the architect/ PMC are defective or unsuitable and shall substitute proper material and/ or workmanship at his own cost. The term approval used in connection with this contract shall mean the approval of the architect / PMC.

[b] The contractor shall, if required, submit satisfactory evidence e as to the kind and quality of material used / supplied by him.

[c] Where special makes or brands are called for, they are mentioned as a standard. Others of equal quality may be used, provided approval is first obtained in writing from the Architect / PMC. Unless substitutions are requested in writing , and granted in writing no deviation from the specifications will be permitted. Failure to propose the substitution of any article within 30 days after the signing of the contract will be deemed sufficient cause for denial of the request for substitution.

[d] The contractor shall indicate and submit evidence in writing of those materials or articles called for in the specifications that are not obtainable. Failure to indicate the above, within 5 days after the signing of the contract, will be deemed sufficient cause for the denial of request for the extension of the contract time because of the same.

[e] All materials shall be delivered so as to ensure a speedy and uninterrupted progress of the work. These shall be stored so as not to cause obstruction and so as to prevent overloading of any portion of the structure, and the contractor shall be entirely responsible for damage or loss by weather or other cause.

[f] Within 15 days after signing the contract, the contractor shall submit, for approval of the Architect / PMC, a complete list of all materials he and his sub-contractors propose to use in the work, of definite (standard) brand or make, which differ in any respect from those specified, also the particular brand of any article where more than one is specified as a standard. He shall also list items not specifically mentioned in the specifications but which are reasonably inferred and necessary for the completion of the work.

1.8 Method of Measurement:

Generally the standard methods of measurement, in accordance with the rules laid down by the Indian Standards Institution, shall be adopted. In the event of any dispute with regard to the measurement of the work executed, the decision of the Architect / PMC / IITM shall be final and binding.

1.9 Time of Completion:

[a] Time shall be the essence of the contract and the contractor obligates himself to complete the whole of the work covered by this contract in accordance with the contract documents in the time set forth in the contract subject to any adjustment granted by the Architect / PMC in writing under the conditions of contract. He shall submit to the Architect / PMC periodic verified progress reports as required.

[b] As soon as feasible, (after the contract has been signed) the Architect / PMC will issue a notice to the contractor designating a starting date. The time for performance of the contract shall be computed from this date, and the contractor shall commence work on the date designated.

[c] If the contractor should be delayed at any time in the progress of work by any separate contractor employed by the IITM, or by changes ordered in the work, or by strikes, lockouts, fire, unavoidable casualities or any cause beyond the contractors; control, then the time of completion shall be extended for such reasonable time as the Architect / PMC may decide. Provided the contractor has in writing asked for extension of the time within 7 days of the cause of delay arising. The word "Architect" in this paragraph means Archivista Engineering Projects.Pvt.Ltd.

Supplementary drawings and / or detail will be issued by the Architects and his engineers and his services consultants from time to time as required. The contractor shall notify the Architect seven days before if such supplementary drawings / and or the information is required. If the site drawings and/ or the informations are not furnished within 4 days after demand, the time of completion shall be adjusted accordingly.

[d] In the event of the contractor failing to complete the job within stipulated time, the liquidated damages shall be applied as per the terms and conditions of contract.

1.10 Payments Withheld :

The Architect / PMC may withheld or on account of subsequently discovered evidence, nullify the whole or a part of any certificate of payment to such extent as may be necessary to protect the IITM from loss of account of :

a. Defective work not remedied.

b. Failure of the contractor to make payments properly to subcontractor (s) or for materials(s)or labour.

c. A reasonable doubt that the contract can be completed for the balance then unpaid. Here the Architect's / Project Management Consultants considered opinion shall be final and binding.

d. Damage to another contractor or sub contractor.

e. Liquidated Damages.

When the above grounds are removed, payments shall be made for amounts withheld because of them.

1.11 Co-Ordination of Work :

At the commencement of work, and from time to time, the contractor shall confer with the sub contractors' , persons engaged on separate contracts in connection with the work, and with the Architect / Project Manager for the purpose of the co-ordination and execution of the various phases of the work.

The contractor shall ascertain from the sub contractors and persons engaged on separate contracts, in connection with the works, the extent of all chasing, cutting and forming of all opening, holes, grooves, etc as may be required to accommodate the various services. The contractor shall ascertain the routes of all services networks and the positions of all floor outlets, traps etc in connection with the installation of plant and services and arrange for the construction of work accordingly. The breaking and cutting of completed work must be avoided.

1.12 Labour's Housing :

At the discretion of the employer, space free of cost may be provided for labourers' housing. Contractor will have to make necessary arrangements to erect sheds, drinking water for labour, power , transportation food etc. at no extra cost to the employer. The contractor has to clear the site and make it clean at the time of leaving the site after completion of work.

1.13 Protection of Trees, Shrubs and nearby Buildings :

Trees, shrubs and nearby buildings designated by the Architect / PMC shall be protected from damage during the course of the work and the earth level shall not be changed within one meter of such trees. Wherever necessary, such trees and shrubs shall be protected by means of temporary fencing and wherever necessary, transplantation be done as directed by Architect.

1.14 Protection of Cleaning :

[a] The contractor shall protect and preserve the works from any damage and / or accidents, providing any temporary roofs, window and door coverings, boxing or other construction as required. It is assumed the contractor has assessed this cost in quoting rates . If he does not provide such protection then the Architect may direct him to do so at his own cost. This protection shall be provided for all property adjacent to the site as well as on the site.

[b] The contractor shall properly clean the work as it progresses and shall remove all rubbish and debris from the site from time to time as is necessary and as directed. On completion, the contractor shall ensure that the premises and / or site are cleaned, surplus materials, debris, sheds etc removed, areas under floors cleared of rubbish, gutters and drains cleared doors and sashes eased, locks and fastenings oiled, keys clearly labeled and handed to the project management consultant, so that the whole is left fit for immediate occupation and / or use and to the satisfaction of the Architect / PMC.

1.15 Tolerance :

The contractor shall exercise every care to re-assure that all structural members are sufficiently plumb and true to the dimensions called for on the drawings, to receive prefabricated finishing elements such as doors, windows, cabinet work, concrete tiles, door and window frames etc. The details of finishing items are based upon allowing tolerance of three millimeters from the given dimensions. Any variation beyond this may require rectification in the structural members or may involve remaking or replacing the finishing elements, fabricated to fit into the opening or spaces, as called for on the drawing.

In case of separate contracts, the contractor whose work does not confirm to dimensions called for, shall be liable for all the expenses which may have to be incurred for rectification or replacement as may be required by the Architect / PMC's decision in this respect shall be final and binding on the parties concerned.

1.16 Progress Photographs .

At his own expense, the contractor shall supply Architect ? PMC, with triplicate copies of coloured photographs not less than 10"x8" of the works on glossy paper taken from approved positions at the following stages :

i. Plinth.

ii. Superstructure masonry in various stages upto slab level.

iii. Of the formwork and reinforcement in position, i.e. before casting the slab.

iv. After casting of slabs and deshuttering.

v. After completion of pointing in stone walls, stonecrete, external plaster etc.

vi. After finishing of interior plaster, flooring, tiling and painting.

1.17 Virtual Completion .

[a] The work shall not be considered as completed until the Architect has certified in writing that the work has been virtually completed and the Defect's Liability Period shall commence from the date of such certificate.

[b] Should it become necessary to occupy any portion of the road or building or to use any part of any equipment, before the contract is completed, the same shall not constitute an acceptance of any part of the work unless so stated in writing by the Architect.

1.18 Reference to Indian Standard Specifications.

Whenever an Indian Standard Specification / Government of Maharashtra, Public Works and Housing Department "Standard Specifications" Volume I and II covers a material or method of work involved in this contract, the latest ISI specification will hold good, together with up to date amendments.

2.00 TECHNICAL CONDITIONS OF CONTRACT

2.1 CIVIL WORK

2.1.1 INTENT

The intent of this document is to define the technical requirement and the quality standards of the materials to be incorporated in the works and the workmanship during the execution of the works.

2.1.2. GENERAL

All works shall be as per the relevant IS / CPWD specifications unless otherwise mentioned below:

Wherever in the specifications mention is made of any produce by name, make or catalogue number, it shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The contractor, in such cases, may use any product, which is equal to that name, provided prior written approval from the consultant is obtained.

Unless substitution are requested no deviation from the specification will be permitted. Failure to propose the substitution of any article within 30 days after signing of the contract or after specific details given by the consultant will be deemed sufficient cause for the denial of the request for substitution.

If any particular structural steel sections mentioned in the drawing and design are not available, and the employer and the consultant are convinced accordingly, the alternative sections are to be decided by the consultant at his discretion. If no extra charges have been specified for items involving work below or above ground level or above roof level for additional lifts, it should be presumed that rates for such items as shown in drawings and bill of quantities are inclusive of work at additional depths or lifts.

The contractor shall, without any extra charge, at all stages furnish any data required by the consultant such as levels, falls, slopes etc. to enable him to take suitable decisions required for proper execution of the work.

The consultant's decision in these respects shall be final and binding on the contractor.

2.1.3. SECRECY

Contractor shall not disclose any information furnished by the owner/consultants nor any drawings, reports and any other information prepared by the contractor for the project, without the prior written approval of the owner, except in so far as disclosure is necessary for the performance of contractors work and services under this contract.

2.1.4 TECHNICAL SPECIFICATIONS

The various items indicated in BOQ shall be read in conjunction with the technical specifications of the tender, and IS/CPWD specifications as applicable to such items. In the event of variance and /or ambiguity or incompleteness between Technical specifications, IS specifications, CPWD stipulations, and BOQ description, the following order shall prevail .

a) BOQ Description
b) Technical Specifications
c) IS specification
d) CPWD specifications

2.1.5. SETTING OUT AND LEVELING

The contractor shall set out and level the works and shall provide all instruments and attendance required by the Architect for checking the work.

The contractor shall all time maintain in good working condition a Dumpy Level Theodolite at site to enable the site engineers to check the line & levels of work.

2.1.6 EARTH WORK

The contractor shall carry out survey of the site before any earth work and set properly all the lines and establish levels for various works such as earth working excavation for grading, basement, foundations, plinth filling, road works and embankments, drains, cable trenches, pipelines etc. Such survey shall be carried out taking accurate cross sections of area perpendicular to established reference/ grid lines at intervals as specified by the engineer in charge based on the ground profile. These shall be checked by the engineer and thereafter properly recorded.

Clearing

Before commencement of excavation work the area shall be cleared off small trees (the trees not exceeding 15 cm girth at 1.2 m height from ground level), roots, heavy grass, logs, stumps, rubbish, slush etc. and other objectionable matter. The material so removed shall be burnt or disposed off as directed by the engineer. Where earth fill is intended the area shall be stripped off all loose and soft patches, and top soil containing objectionable matter before the earth fill commences. The trees other than the small trees (as defined above)
shall not be cut and shall be brought to the notice of Owner/Consultant if fouling within the construction area. Owner will take necessary permission to cut these big trees from concern

authorities. After getting approval from concern authority, cutting and dispatch of such trees is contractors responsibility.

Antiquities and Valuables Finds:

Any ancient carvings, relics, coins or other curiosities discovered during the excavation or other work remain the property of the IITM and shall be hand over to the architect/Project Manager as called for under relevant clause of condition of contract

2.1.6.1. EARTHWORK IN EXCAVATION

2.1.6.1.1 Classification

The earthwork will be classified under any of the following categories:

a) Hard or Dense Soil : Generally any soil which requires the close application of picks or jumpers or scarifies to loosen such as silt clay, gravel, cobble stones and boulders up to .03 cum in volume, hard shale, compact and hard murum, soft conglomerate. etc. This will also include hard core soling, macadam surfaces, tarmac, stone and brick masonry works.

b) Soft Rock: Rocks or boulders which may be quarried or split with crow bars. This will also include literate and hard conglomerate and PCC works.

c) Hard Rock : Any rock excluding the soft rock, or boulders for the excavation of which the blasting or chiseling is required. This also includes RCC works.

d) Hard rock (Blasting prohibited) Hard rock which requires blasting as described in (c) above, but where the blasting is prohibited for any reason and excavation has to be carried out by chiseling or by pneumatic implements.

2.1.6.1.2. Excavation to the correct profile

When the excavation work is carried out for road works, open drainage works or any other works other than foundation works, the profile shall be maintained as per the approved drawings.

2.1.6.2 EARTHWORK IN EMBANKMENT

All the fill material will be subject to consultants approval. If any material is rejected by consultant the contractor shall remove the same forthwith from the site at no extra cost to the owner. Surplus fill materials shall be deposited or disposed off as directed by the consultant after the fill work is completed. No earth fill shall commence until surface water discharges and the streams have been properly intercepted or otherwise dealt with as directed by engineer.

2.1.6.2.1. Allowance for Settlement

Work before being finally paid, shall be brought to the correct level. Final measurements will be made on allowing the filling works for settlement, for one complete monsoon. In the event the measurements are to be finalised before,

hand allowance shall have to be made by extra earthwork for which no payment will be made. Until the certified completion of the contract, all banks and cuttings are to be maintained by the contractor.

2.1.6.2.2. Preservation of Banks

The contractor shall make good all losses due to subsidence, wastage or guttering due to rain, wind, wear, or from any cause whatsoever and shall have no claims for extra works on this account.

2.1.6.2.3. Filling in layers

All the banks shall be made up in successive layers of not more than 30 cms in depth over the whole width between the toes of the slopes. Side slopes shall be carried out simultaneously with the rest of the work and not filled in afterwards. In setting up profiles due allowances for subsidence must be made and must be added to all the heights of the actual height of formation level.

Filling in pits and trenches around foundations of structures, walls etc.

As soon as the work in foundations has been accepted and measured the spaces around the foundations, structures, pits, trenches etc. shall be cleared off all debris, and filled with earth in layers not exceeding 15 cm., each layer being watered, rammed and properly consolidated, before the succeeding one is laid. Each layer shall be consolidated, to the satisfaction of engineer. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless engineer is satisfied that in some cases manual compaction by tampers cannot be Avoided. The final backfill surface shall be trimmed and leveled to proper profile as directed by engineer or indicated on the drawings.

2.1.6.3. Plinth Filling

Plinth filling shall be carried out with approved material as described herein before in layers not exceeding 15 cm., watered and compacted with mechanical compaction machines. Engineer may however permit manual compaction by hand tampers in case he is satisfied that mechanical compaction is not possible. 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. Where specified in the schedule of works, compaction of the plinth fill shall be carried out by means of 12 tone rollers smooth wheeled, sheep-foot or wobbly wheeled rollers. A smaller weight roller may be used only if permitted by Engineer. As a rolling proceeds water sprinkling shall be done to assist consolidation. Water shall not be sprinkled in case of sandy fill.

2.1.6.4 Applicable Codes

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the codes shall be referred to.

a) IS - 783 Code of Practice for Laying of

Concrete Pipes.

b) IS - 1200 Method of Measurement of Building Works

c) IS - 3764 Safety Code for Excavation Work

d) IS - 3385 Code of Practice for Measurement of Civil Engineering Works.

e) IS - 2720 Part-II Determination of Moisture Content.

Part-VII Determination of Moisture Content - Dry Density Relation Using Light Compaction.

Part-VIII Determination of Moisture Content - Dry Density Relation Using Heavy Compaction.

Part-XXVIII Determination of Dry Density of Soils, in-place, by the Sand Replacement Method.

Part-XXIX Determination of Dry Density of Soils, in-place, by the Core Cutter Method.

2.1.6.5. MODE OF MEASUREMENT

All the items shall be measured as per IS 1200 measurement code.

The excavation works shall be measured as under:

For measuring the excavation works for foundations & footings the plan size shall be considered by giving working space allowance of 150 mm on all sides, or the actual space left by the contractor whichever is less. The quantity of excavation shall be calculated by multiplying the plan area, as derived above,
by actual depth of excavation. The tenderer shall built in their rate the extra excavation required for allowing the slopes etc and no extra on this account shall be allowed. The excavation for piping works shall be measured as per relevant IS, if it is not included in the item itself.

2.1.7. CONCRETING

2.1.7.1 All the concrete in the works shall be controlled concrete as defined in IS:456 unless otherwise specified.

Water:

a) Water used for both mixing and curing shall be free from injurious amount and deleterious materials.

b) The suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS 456.

c) The PH value of water shall generally be not less than 6.0

2.1.7.2. Cement

Unless otherwise specified or called for by the Consultants/Owner cement shall be ordinary (43/53) or pozzolana Portland cement in 50 kg bags. Changing of brands or type of cement within the same structure or portions thereof shall be permitted only with the approval of consultant.

2.1.7.3. Aggregates

a) Aggregate in general designates both fine and coarse inert materials used in the manufacture of concrete.

b) Fine aggregate is aggregate most of which is through passed on 4.75 mm IS Sieve.

c) Coarse aggregate is aggregate most of which is retained on 4.75 mm IS Sieve.

d) All fine and course aggregate proposed for use in the work shall be subject to Engineer-in-charge/consultant's approval

e) Machine made/crushed sand shall be used, provided the constituent rock composition shall be sound, hard, dense, non organic, durable etc.

2.1.7.4. Reinforcement

2.1.7.5.a. Storage

The reinforcement shall not be kept in direct contact with the ground but stacked on top of an arrangement of timber sleepers or the like. Bars of different classification size and length should be stored separately.

If the reinforcing rods have to be stored for a long duration, they shall be coated with cement was before stacking and/or be kept under cover or stored as directed by the consultant. Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion and deterioration.

2.1.7.6. Concrete Grade

Concrete grade shall be as designated on drawings. In concrete grade M15, M20, etc. the number represents the specified characteristic compressive strength of 150 mm cube at 28 days, expressed in N/sq. mm as per IS:456.

2.1.7.7. Mix Design

It shall be contractor's sole responsibility to carry out the mix designs at his own cost. He shall furnish to consultants at least 10 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 IS:456.

Minimum compressive strength for the various grades of concrete are as specified under :

Grade of Concrete	Min. compressive strength after 7 days in N/sq.m	Min. compressive strength after 28 days in N/sq.mm
M15	10.0	15.0
M20	13.5	20.0
M25	17.0	25.0
M30	20.0	30.0

2.1.7.8. Conversion to volumetric proportion

On designing the mix the contractor shall be allowed to convert the same into volumetric proportion. The concreting at the site shall be allowed by using the volumetric proportion as derived from the mix design.

2.1.7.9. Testing

2.1.7.10.a. Slump Test

Slump tests shall be carried out as often as demanded by the consultant and invariably from the same batch of concrete from which the test cubes are made. Slump tests shall be done immediately after sampling.

2.1.7.10.b. Concrete Cube and other Ingredient Testing

All testing shall be done as per approved field quality plan. The field quality plan shall be prepared in line with IS:456. Contractor shall produce the test results of the cubes in time and shall maintain proper record of it.

Nominal Mix Concrete :
No mix design or preliminary tests are necessary for Nominal Mix Concrete . Nominal Mix Design shall be restricted to works of minor nature in which the strength of concrete

is not critical as decided by the Engineer-in–charge/consultant. Proportions for Nominal Mix Concrete shall be in accordance with IS 456.

2.1.7.11. Mixing of Concrete :

Concrete shall be mixed in a mechanical mixer. The mixer shall comply with IS 1791 . the mixing shall be continued until there is uniform distribution of the materials and the mass is uniform in colour and consistency. If there is segregation after unloading from the mixer , the concrete shall be remixed. For guidance , the mixing time may be 1 ½ to 2 minutes.
Workability of the concrete shall be controlled by direct measurement of water content . workability shall be checked at frequent intervals(See IS 1199).

2.1.7.12. CONSTRUCTION JOINTS

Construction joints shall be properly planned and shall be as per the consultant's instructions. They shall be made at right angles to the member, and shall be made against firm stop boards. The stop boards shall be removed as soon as possible after placing the concrete. The concrete shall be well brushed off with steel brush and be provided with a key for next lift. Before the next lift is over the joint shall be well scrubbed to remove all loose materials.

2.1.7.13 FORM WORK

All form work for RCC water retaining structures shall be either waterproof plywood or steel plates only. After each use form work should be thoroughly cleaned, checked for accuracy and damage. Damaged form work shall not be used. All the concrete of grade M20 and above, shall be fair face concrete. Extra care shall be taken to ensure proper cover to the reinforcement. Ready made plastic cover moulds or mortar cubes shall be used for all concrete work. A smooth finish shall be obtained with the use of lined or plywood forms having smooth and even surfaces. Upon removal of the forms the joint marks shall be smoothened off, and all blemishes, projections etc. shall be removed properly leaving the surface smooth.

2.1.7.14. Design of form work

The design and engineering of form work as well as its construction shall be the responsibility of contractor. If so instructed, the drawings and/or calculations for the design of form work shall be submitted to the consultants for their approval at no extra cost. Consultants approval however, shall not relieve the contractor of the full responsibility of the design and construction of form work.

2.1.7.15**. RCC WORKS**

Rates for all R.C.C. work are deemed to be inclusive of drip moulds at soffit as per design given by the Architect, wherever necessary, even if they are not expressly specified or shown on drawings. The rates of R.C.C. chajjas, canopies, parapets, retraining walls etc. include rainwater disposal arrangement by 25mm G. I. pipe spouts

as directed by the Architect. Any extra concrete, laid to adjust slopes for drainage, is to be paid in cubic meter basis as the rate for plan concrete work for templates etc. In case, tenders are invited involving R.C.C. work with rates for R.C.C. work inclusive of steel and only typical R.C.C. details are given, it should be noted that proportion of steel may vary for individual members. The tendered rates for R.C.C. work will hold good, even if the proportion of steel to concrete work varies for individual members, provided that over-all percentage of steel does not vary more than +/- 5 % .

2.1.7.16. **TOLERANCES IN CONCRETE WORK**

Tolerance is a specified permissible variation from lines, grade or dimensions given in drawings. No tolerances 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 shall be permitted :

a) Variation from plumb

i) 5 mm per 2.5 m or 25mm whichever is less.
ii) For exposed corner columns and other conspicuous lines in any bay or

iii) 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 soffit, and in arises	
In 2.5 m	5 mm
In any bay or 5 m maximum	8 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	10 mm

c) Variation from 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 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) Variations in steps

i) In the flight of stairs	
Rise	3 mm
Tread	5 mm
ii) In consecutive steps	
Rise	1.5 mm
Tread	3 mm

Tolerances in other types of structures shall generally conform to those given in Clause 2.4 of Recommended Practice for Concrete Form work (ACI 347).

Tolerances in fixing anchor bolts shall be as follows :

a) Anchor bolts without sleeves plan	(+/-) 1.5 mm in all directions.
b) Anchor bolts with sleeves Elev	(+/-) 5.0 mm in all directions.
(c) For bolts upto & including 28mm dia.	(+/-) 5 mm in all directions.
(d) For bolts 32 mm and above	(+/-) 3 mm in all directions.
(e) Embedded parts	(+/-) 5 mm in all directions.

2.1.8. BRICKWORK:

Bricks works using common burnt clay conventional building bricks,or fly ash bricks from approved supplier having crushing strength not less than 50 Kg/cm^{2,,} in foundation and plinth, in CM 1:4 (1 cement :4 find sand), including curing, scaffolding, etc. complete, as directed.

2.1.8.1 Workmanship:

Proportion: The proportion of the CM shall be 1:6 (1 cement:6 fine sand), by volume.

Soaking of bricks: The bricks required for masonry shall be thoroughly wetted with clean water for about 4 hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water is an indication of thorough wetting of bricks.

Laying:

Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete the bond; closer and in such case it shall be cut to required size and used near the ends of walls.

A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gently tapping with the handle of the trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of the course, the vertical joints shall be fully filled from the top, with mortar.

The walls shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in alternate courses shall generally be in one vertical plane. The thickness of brick course shall be kept uniform.

The bricks shall be laid with the frog facing upwards. A set of tools comprising of wooden straight edges, mason's spirit level, square half meter rub, pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

Both the faces of walls, having thickness greater than 23 cm. shall be kept in proper plumb. All the connected brick work shall be kept not more than 1 m. over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45^{O}.

All the fixtures, pipe outlets of water, holdfasts of doors and windows, etc. which are required to be built in the wall shall be embedded in CM, as per the drawings or as directed.

The relevant specifications of item no. 4.01 shall be followed except that the masonry work shall be carried out above plinth level upto floor two level i.e. for height as specified in the special conditions.

The frames of doors, windows, cupboards, etc. shall be housed into the brick work at the correct location and level, as directed. The heavy steel doors, windows frames, etc. shall be built in with brick work, but for ordinary steel doors and windows, required opening for frames, hold-fasts, etc. shall be left in the wall and frames shall be embedded later on in order to avoid damage to the frames.

Necessary scaffolding shall be provided by the Contractor. The supports of the scaffolding shall be sound and strong, tied together with horizontal pieces over which

the scaffolding planks shall be fixed. Normally simple scaffolding only shall be allowed. In this case horizontal pieces of the scaffolding shall rest in the holes, made in the header coarse only. Minimum number of holes shall be left in brick work for supporting horizontal member of the scaffolding.

The Contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

For the face of brick work, where plastering is to be done, joints shall be racked out to a depth not less than the thickness of the joints. The face of brick work shall be cleaned off of mortar dropping and other foreign matters at the end of day's work.

Joints :

Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exceed 12 mm. The face joints shall be raked out as directed by taking tools daily, during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to be done, subsequently.

The face of bricks shall be cleaned everyday on which the brick work is laid and all mortar dropping shall be removed.

At the end of day's work or on holidays the top of unfinished masonry shall be kept wet. If the mortar becomes dry, white or powdery, for want of curing, work shall be pulled down and re-built at Contractor's expense.

Curing : Fresh work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for minimum period of 7 days. The top of masonry work shall be kept well wetted at the end of the day's work.

Preparation of foundation bed : If the foundation is to be laid directly on the excavated bed, the bed shall be levelled, cleared off of all loose materials, cleaned and wetted before starting masonry work. If masonry is to be laid on concrete footing, the top of concrete shall be roughened, cleaned and moistened. The Contractor shall obtain approval of the Consultant/Engineer-in-charge for the foundation bed, before foundation masonry is started. When pucca flooring is to be provided flush with the top of the plinth, the inside of the plinth wall shall be lowered down having an offset of the same thickness of the flooring with respect to the outside plinth wall top or as directed.

2.1.8.1.1. Mode of Measurements and Payment :

The measurement of this item shall be taken for the brick masonry fully completed in foundation upto plinth. The limiting dimensions not exceeding those shown on the drawings or as directed shall be final. Battered, tapered and curved portions shall be measured net.

No deduction shall be made from the quantity of brick work, nor any extra payment shall be made for embedding in masonry or making holes in respect of following items :
(1) End of joists beams, posts, girders, rafters, purlins, trusses, corbel, steps etc. where cross sectional area does not exceed 500 cm^2.

(2) Architectural openings in walls, parapet and compound walls, not exceeding 1.0 m^2. area.
(3) Wall plates and bed plates, bearing of slabs, chajjas and the like whose thickness does not exceed 10 cm. and the bearing does not extend to the full thickness of wall.
(4) Drainage holes, recesses for cement concrete blocks to embed hold fasts for doors, windows etc., forming toothings, grooves etc. and providing cramps for holding stone lining.
(5) Iron fixtures, pipes upto 300 mm. dia.; holdfasts and doors and windows built into masonry and sanitary and water supply pipes, etc., for concealed electrical wiring and any other fixtures or inserts.
(6) Forming chases of section not exceeding 350 cm^2. in masonry.

The rate shall be for an unit of one m^3.

Brick work using common burnt clay conventional building bricks,or fly ash bricks having crushing strength not less than 50 Kg/cm^2., in super structure above plinth, for all floor levels, at any height and level, in any position, in CM 1:6, or 100x100mm rcc band at every 1.0m height including curing, scaffolding, etc. complete, as directed.

The masonry work above plinth level to floor two level shall be measured and paid under this item.

Brick work in parapet shall be measured in the corresponding masonry item of storey immediately below the floor above which the parapet is built.

No deduction shall be made from quantity of brick work, nor extra payment shall be made for embedding in masonry or making holes in respect of following items :
(1) Ends of joists, beams, posts, rafters, purlins trusses corbel, step etc. where cross sectional area does not exceed 500 cm^2.
(2) Architectural openings in walls, parapet and compound walls, not exceeding 1000 cm^2. area.
(3) Wall plate, sand bed plates, bearing of slab, chhajjas and like whose thickness does not exceed 10 cm. and the bearing does not extend the full thickness of wall.
(4) Drainage holes, recesses for cement concrete blocks to embed hold fasts for doors, windows, etc., forming toothings, grooves etc. and providing cramps for holding stone lining.
(5) Iron fixture, pipes upto 300 mm. dia hold fasts of doors, and windows built into masonry and sanitary and water supply pipes etc., for concealed electrical wiring and any other fixtures or inserts.
(6) Forming chases of section not exceeding 350 $cm^{2.}$ in masonry.
(7) Apertures for fire places, shall not be deducted nor shall extra labour required to make spraying of Jambs, throating and making trenches over the aperture be paid for separately. The rate shall include for work of any shape e.g. pillars, curved or tapered walls, drip courses, projections, parapets, load walls, sills, ottas, steps, tank walls, platform and counter walls, ducts, channels and architectural mouldings like corbelling, pattas, etc.

The rate shall be for an unit of one m^3.

2.1.8.2. Half brick, 4-$^1/_2$" thick masonry in common burnt clay conventional building bricks, having crushing strength not less than 50 Kg/cm^2., for all floors, at any height and level,

in any position, in CM 1:4 (1 cement : 4 coarse sand), with 2 nos. of 6 mm. dia. MS round bars after every 3 courses, embedded in CM, including curing, scaffolding, etc. complete, as directed.

Workmanship :

Relevant specifications of bricks, wetting and laying of brick, joints, curing, etc. shall conform to item no. 4.01 except that the brick work of half bricks, 90 mm. thick shall be carried out, in foundation and plinth.

Cement mortar used in masonry work shall be in proportion of 1 part of cement and 4 parts of sand, by volume.

All bricks shall be laid stretcher wise, breaking joints with those in the upper and lower courses. The wall shall be taken truly plumb. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. The bricks shall be laid with frogs upwards. A set of mason's tools shall be maintained on work site as required for frequent checking.

MS bars, 6 mm. dia., 2 nos. shall be provided at every 3rd course. The end of reinforcement shall be fully embedded in the main wall on both sides as directed. Reinforcement shall be placed on top of the bottom most course and then on every 3rd course. Lap shall be of 15 cm.Alternatively 100x100mm Rcc band at every 1m height shall be provided.

The joints in course where reinforcement is placed shall allow sufficient mortar cover to the reinforcement.

2.1.8.2.1 Mode of Measurements and Payment :

The half brick masonry work in foundation and plinth shall be measured under this item, the limiting dimensions shall not exceed those shown in the plan or as directed. Any work done extra over the specified dimensions shall not be measured and paid for.

The relevant specifications of item no. shall be followed. The length shall be measured nearest to one cm.

The rate shall be for an unit of m^2.inclusive of Reinforcement or RCC band.

2.1.9 PLASTER AND WATERPROOFING

Plastering Work

1.0 Providing and laying minimum 12 mm. thick cement plaster in double coat, in CM 1:4 with cement mala finish (finished with steel trowel)including scaffolding, curing, making grooves, forming pattas and drip mould, etc. when in any width in size. Complete as directed by consultant/engineer incharge. The plaster surface shall be rubbed with Iron plate till the surface become smooth. The work shall be in line and level.

2.0 Workmanship:

2.1 Scaffolding: Wooden ballies, bamboo, planks, trestles and other Steel scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster, which shall be independent of the walls.

2.2 Preparation of back ground:

2.2.1 The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be roughened by wire brushing if it is not hard and by dense hacking if it is concrete. In case of concrete surface, if a chemical retarder or shuttering oil has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles shall be cleaned off and care shall be taken that none of the retarder is left on the surface. Trimming of projections on brick/concrete surface wherever necessary shall be carried out to get an even surface.

2.2.2 Raking of joints in case of masonry wherever necessary shall be allowed to dry out for sufficient period before carrying out the plasterwork.

2.2.3 Scaffolding for carrying out plastering work shall be double scaffolding having two sets of vertical supports so that the scaffolding is independent of the walls.

2.3 Preparation of Surface:

2.3.1 All putlog holes in brickwork and junction between concrete and brickwork shall be properly filled in advance. Joints in brickwork shall be raked about 10 mm. and concrete surface shall be hacked to provide grip to the plaster. Projecting burrs of mortars formed due to gaps at joints in shuttering shall be removed. The surface shall be scrubbed clean with wire brush/coir brush to remove dirt, dust etc., and the surface thoroughly washed with clean water to remove efflorescence, grease and oil etc., and shall be kept wet for a minimum of two hours before application of plaster.

2.3.2 For external plaster, the plastering operation shall be started from the top floor and carried downwards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supporting ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

2.4 Applications of Plaster :

2.4.1 The plaster about 15 cm. x 15 cm., shall be first applied horizontally and vertically at not more than 2 m. intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true

surface by working a wooden straight edge reaching across the gauges with small upwards and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according to the texture, smooth or sandy granular, as may be required. Excessive Trowelling or over working the float shall be avoided. All corners, arises, angles and junctions etc. shall be carried out with proper templates to the size required.

2.4.2 Cement mortar shall be used within half an hour after addition of water. Any mortar or plaster which is partially set shall be rejected and removed from the site.

2.4.3 In suspending the work at the end of the day, the plaster shall be left out, clean to line both horizontally and vertically. While recommencing the plaster, the edges of the old work shall be scrapped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and shall not be nearer than 15 cm. to any corners or arises. Horizontal joints in plasterwork shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be patched up later on.

2.4.4 Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging mats or gunny bags on the outside of the plaster and by keeping them wet.

3.0 Mode of Measurements & Payment :

3.1 The rates shall include for work at any height, position, and floor and for all necessary scaffolding, etc. as may be required. The rates shall also include for hacking and/or bush hammering to form key for plaster and for spatter dash treatment, as specified, as and where necessary.

The rates shall also include for all work in narrow width, arises, rounded angles, chamfered external angles, drip moulds, grooves and for making good after all trades.

The rate shall also include for Chicken Mesh to be formed in plaster at junction of slab and beam and slab and brick without any extra charge. The rate shall also include for similar grooves in plaster at the junction of masonry and wood or steel door/window/ventilator frame or at bottom of beam/lintels as drip moulds without extra charge.

3.2 All plastering shall be measured in $m^{2.}$ Unless otherwise specified. Length, breadth or height shall be measured correct to a centimeter.

3.3 Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooved or open joints in brick work, stone work, etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm., at any point on the surface.

3.4 The measurement of wall plastering shall be taken between the walls or partitions (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

3.6 Soffits of stairs shall be measured as plastering on ceilings. Flowing/folding soffits shall be measured separately.

3.7 For jambs, soffits, sills, etc., openings exceeding 0.5 sqm and not exceeding 3.0 sqm, area deductions and additions shall be made in the following manner: -
(a) No deductions shall be made for end joints, beams, posts, etc. for openings not exceeding 0.5 sqm. each and no addition shall be made for reels, jambs, soffits, sills, etc. of these opening for finish to plaster around ends of joints, beams, posts, etc.

(b) Deduction for openings exceeds 0.5 sqm. but not exceeding 3.0 sqm. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills, etc. of these openings.

(i) When both faces of any wall are plastered with same plaster, deduction shall be made for one face only.

(ii) When two faces of any wall are plastered with different types of plasters or if one faces is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, windows, etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from area of plaster and/or pointing as the case may be.

3.8 For openings having door frames equal to projection beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

3.9 In case of openings having area above 3.0 m2. each, deduction shall be made for the opening but jambs, soffits, and sills shall be measured additionally.

3.10 The rate shall be for an unit of one $m^{2.}$

2.24.04 a Providing and laying 20 mm. thick Sand faced cement plaster on walls upto any height above ground level consisting of 12 mm. thick backing coat of CM 1:4 (1 cement: 4 sand) and 8 mm. thick finishing coat using sand, in CM 1:2 (1 cement: 2 sand), etc. complete. Including scaffolding, curing, making grooves, forming pattas and drip mould, etc. complete as directed.

1.0 Materials: Water used shall be free from injurious amounts and deleterious materials . PH value of water shall generally be not less than 6.0.

2.0 Workmanship :

2.1 The work shall be carried out in two coats. The backing coat (base coat) shall be in CM 1:4 and the relevant specifications of item no. 7.03.b shall be followed except that the thickness of the back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days

depending upon the weather conditions. The surface shall not be allowed to dry during this period.

2.2 The second coat shall be completed to average 8 mm. thickness in CM 1:2 as described above. The surface shall then be tapered to uniform grained texture by using sand only, as specified. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per the sample approved.

2.3 Curing: The curing shall be started overnight after finishing of the plaster work. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.

3.0 Mode of Measurements and Payment:

3.1 The relevant specifications of item No.7.03.b shall be followed.
3.2 The rate shall be for a unit of one m^2.

7.14 Providing cement vata, 10 cm. x 10 cm. size, quarter round in cement mortar 1:1 including neat cement finishing, watering, etc. complete.

2.0 Workmanship : The work of cement vata of 10 cm. x 10 cm. size shall be carried out at junctions of parapets and terraces as directed. The vata shall be finished in quarter round shape. The work shall be carried out in the best workman-like manner. The internal portion of rain water pipe shall be rounded off properly during constructing the vata. The work shall be cured for 7 days.

3.0 Mode of Measurement and Payment :

3.1 The work shall be measured for finished item in rmt.

3.2 The rate shall be for a unit of one rmt.

2.24 WATERPROOFING WORK –

Waterproofing roofs with bituminous felts:-

a) Preparation of surface and priming coat

1) In general, the work shall be carried out as per IS code of practice for waterproofing roofs with bitumen felts (IS 3146)
2) The surface to be treated shall have a minimum slope of 1 in 120. This grading shall be obtained with lime concrete, cement concrete or cement plaster with coarse sand, as specified, to the average thickness required and finished smooth and such grading shall be paid for separately.
3) Junction between the roof and the vertical faces of parapet walls, chimneys etc shall be eased by running triangular fillets of 3" size in cement concrete 1:@:4 cement :2 sand :4 stone ballast ¾" gauge). The provision of fillets shall be deemed to be covered by the item of waterproofing and shall not be measured and paid for separately.
4) Where the parapet wall exceeds 18"in height, the waterproofing felt shall be tucked into a horizontal groove of 3" x 3" cut in the wall at a height of not less than 6" from the graded roof surface. After tucking in of the felt, the groove shall be finished smooth with the

cement plaster 1:4 (1 cement 4: sand). Such cutting of the groove and its finishing smooth shall be deemed to be a part of the waterproofing item and shall not be measured or paid for separately. Where the height of the parapet wall is 18" or less, no groove will be required and the waterproofing treatment shall be carried over the top of the parapet wall to its full thickness.

5) The graded surface of the roof, concrete fillets and the faces of walls shall be thoroughly cleaned with wire brushes and all loose scales etc, removed. The surface shall then be dusted off. Any cracks in the roof shall be cut "V" section cleaned and filled up flush with cement mortar slurry 1:4 (1 cement 4 sand). Such cleaning of the surface or treating the cracks shall not be paid for separately.
6) A priming coat with a bituminous solution of suitable viscosity shall then be applied with brush on the roof and wall surface at the rate of 0.8 gallon/100 sft to assist adhesion of the bonding material (i.e. bitumen). Such application of primer shall not be measured and paid for separately

b) Waterproofing treatment

7) The waterproofing treatment shall consist of a four or six course treatment as specified in the description of the item, each layer of bonding material, self finished bituminous felt or stone grit being counted as a course. The primer cost shall not count against the number of courses specified.
8) A four course treatment shall consist of :
i) Initial layer of bonding material applied not at specified weight per unit area.
ii) Second layer of self finished bitumen felt of specified brand and manufacture confirming to the type and grade given in the description of the item.
iii) Third layer of bounding material.

iv) Fourth and final layer of stone grit or pea gravel spread at specified volume of material per unit area.
9) In a six course treatment, the first, second and third layers shall be the same as in the four course treatment. The fourth and fifth layers shall consist of self finished felt and bonding material respectively. The sixth layer shall consist of stone grit or sea gravel.
10) The bonding material (bitumen) shall be maximum phalt R85/25 or equivalent grade or as specified. This shall be heated to 350F or as recommended by the manufacturers for a particular grade and conveyed to the roof in buckets or pouring cans in weighed quantities. This shall be applied hot at the rate of 30 lbs / 100 sft in first and third layers of four course treatment. The quantity of bitumen to be applied for the first , third and fifth courses in six course treatment shall be 30,25 and 35 lbs respectively per 100 sft of area.
11) The self finished bituminous felt shall be Type 3 grade 1 (Hessian base) unless otherwise specified. This shall be of approved make and shall confirm to the requirements of IS:1322-1959. This shall be used in second course of four course treatment and second and fourth courses of six course treatment.
12) The felt shall be cut to required lengths and laid on the roof together with bounding material as per the procedure laid down by IS code of practice for waterproofing roofs with bituminous felts. Each strip shall overlap the preceding one by at least 3" at the longitudinal edges and 4" at the ends.
All overlaps shall be firmly bounded with hot bitumen. In a six course treatment, care shall be taken that the overlaps of felt in fourth layer are staggered from those in the second layer.

13) Stone grit shall confirm to specifications as described under Material coarse aggregates and shall be ¼" and down size. Where pea gravel is used, it shall be hard, round and free from dust, dirt etc. The stone grit or pea gravel shall be spread uniformly over the hot bonding material at 2 cft/100 sft in 4th layer of four course treatment and at 2.25 cft/100 sft in 6th layer of six course treatment and shall be pressed into hot bitumen with wooden roller. Stone grit or pea gravel shall not be spread over vertical and sloping faces of flashings, and at drain mouths. At those places, the surface shall be painted with two coats of bituminous emulsion.

14) Waterproofing of roofs with bitumen felts shall be measured in sqm . Measurements shall be taken over the entire exposed area of roofing and flashing treatment. Overlap and tucking into flashing grooves shall not be measured. The rate shall include the cost of all labour and materials involved in all the operations described above.

WATERPROOFING BY APPROVED AGENCY.

1) Basement waterproofing

The underground structures shall be treated by Box method 15 cms thick layer of 1:3:6 cement concrete using No.2 metal shall be laid with smooth surface finished .With trowel on well compacted soil or rubble soling or plum concrete in accordance with the soil strata. On this set proof, waterproof layer on cement base and about 7.5 cm thick shall be laid, using 1 layer of shahabad stone placed diagonally with cut joints. After the RCC raft is laid this treatment shall be carried along the outer surface of the wall and up to a height of 30 cm above ground level. The thickness of the treatment to vertical sides is about 4 cms.

2) Waterproofing of water storage tank, after the plumbing work is complete the outer surface of the walls is plastered by the surface methods to floor and walls including partition walls which includes the internal plaster finished smooth with trowel. The thickness of treatment of the floor shall be 6.5 cms and on the walls 2.5 cms and finished smooth with the help of trowel. The tank shall be filled immediately after the treatment is completed.

3) Lawn Terrace

The terrace shall be treated with surface method which after the slab shall be very through cleaned and brickbat coba with necessary gradient shall be laid for the easy flow of rain water. The coba shall be finally covered with set roof pointless waterproof plaster, finished smooth with trowel in cement colour with false marketing of 30 cms in the shape of a round wata. The average thickness of the treatment shall be 11.5 cms thickness and at the rain water outlet it shall be 7.5 cms

The treatment on the walls in this case will be for a height of 300mm above the final level.

4) Waterproofing to toilet blocks.

All toilet blocks shall be treated with waterproofing on floors including 12 cm brickbat coba, in lime mortar 1:2 laid to slope and upto 1m height of wall dado and shall be made properly watertight around all plumbing work.

5) Terrace waterproofing.

The terrace shall be first treated with waterproofed brick bat coba in cement mortar 1:3 laid to slope and of thickness as per the detailed drawings. The slopes properly graded for even flow of water towards the down take pipes. The junction of the slab and the parapet

wall shall be treated with waterproofing flashings or fillet. The treatment of waterproofing shall be carried over the parapet wall.

6) Guarantee for all waterproofing work .

The item of waterproofing shall be carried out by M/s. India Waterproofing Company or equivalent to be approved by the consultants and to their specifications.

A written guarantee in approved form shall be furnished to certify that the waterproofing shall be free from defects of materials and workmanship for period of 10 years. The leakage, failure to stay in place, splitting, pulling loose, illegatoring, tearing, undue expansion and contraction shall be judged as defective work.

7) Thermo Cole insulation on terrace

The terrace to be treated with Thermo Cole shall be free of dust and dirt and shall be in a reasonably level condition and free of lumps and similar exercesance. Brush one coat priming coat of bitumen emulsion no.1 (Shali kote 30 made by Shalimar Tar Products Ltd, or equivalent diluted with an equal volume of clean soft water and allow it to dry until tacky, ensure that the entire surface is fully covered up.

Apply later hot 2 (Industrial Bitumen 85/40 or 85/25 confirming to IS 702) latest edition at 20 kg / 10 sqm on the face and edge of the Thermo Cole slab with a mason's trowel. Set off thermo Cole on the roof and press it fairly into position, adjacent slabs must also be pressed together. All the joints to be then sealed with bitumen and then spread waterproof paper over the entire area.

Chicken mesh is then spread over it, which is covered with 2.5 cm thick cement mortar 1:4 metal no.1 and sand in the ratio of 1:3 . A fillet of 18cm x 12 cm is provided all along the junction of the slab and parapet wall.

FORM OF GUARANTEE FOR WATERPROOFING

Name of the project :

FREE MAINTAINANCE : WATERPROOFING WORK GUARANTEE

Name & Address of the
Waterproofing Agency

We hereby guarantee that the surface treated by us for waterproofing in the above work for general Civil contractors M/s……..shall remain entirely water tight. Should, however, due to any unforseen defects left out in the work carried out by us at the time of execution of the work, thereby any leakage from any surface treated by us during the period of **10 (TEN) YEARS from the date of completion of the work** i.e. from ……..the same shall be rectified by us without any extra cost.

However, we shall not be responsible in any way if our work is tempered with or if the body of the structure is damaged due to sinking, cracking and/or by other act of God beyond our control.

SIGNATURE OF THE AGENCY

Place :
Date :

SIGNATURE OF GENERAL CONTRACTOR

Place :
Date :

2.1.11 DADO/ FLOORING

Dado

2.01 Providing & laying in position, glazed tiles of any size of approved make & colour, of first quality, as per design, set in cement slurry or 1:1 cement sand mortar on wall with wired

plaster, over a minimum 12 mm. thick cement mortar 1:4 bedding or wired plaster on walls and laid to proper slope and level. Joints shall be filled with self matching colour (white cement plus pigment). Curing & cleaning with mild oxalic acid etc. complete to be done for flooring, dado or channel work, as directed by the Consultant/ Engineer-in-charge.

1.0 Materials: White or coloured glazed tiles and make such as Johnson and Johnson, Somany or Kajaria, first quality.

2.0 Workmanship:

2.1 Bedding:

2.1.1 The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface, as described above, tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and squat on it.

2.1.2 The white/coloured glazed tiles shall then be laid on the cement mortar bedding of 12 mm. thickness, in CM 1:4. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of the bedding. The base shall be cleaned and well wetted, before laying. The mortar shall then be spread in thickness not less than 10 mm. at any place and average 12 mm. thick. The proportion of the cement mortar shall be as specified in the item.

2.2 Fixing tiles:

2.2.1 The tiles before laying shall be soaked in water for atleast two hours. Neat grey cement grout at 3.3 Kg./Cement/$m^{2.}$ of honey-like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall then be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

2.2.2 The tiles shall not have staggered joints. The joints shall be true to center line both ways. The Nahani trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. After the tiles are laid, the joints shall be cleaned of grey cement grout with a wire brush to a depth of about 5 mm. and then grouted with white cement with or without pigment to match the shade of the topping of tiles. The same cement slurry shall then be spread over the whole surface in a thin coat to protect the surface from abrasive damage and to fill up pin holes that may exist on the surface. White cement with or without matching pigment shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to cure undisturbed for 7 days.

2.2.3 While laying, any chiselling which may be required for making the skirting or dado flush with the plaster and/or other finishes shall be done. Necessary grooves of required size in cm., between plaster and/or other finishes, dado or skirting (if required) shall be provided. Forming machine-cut/rounded edges, gutters, sills, platforms, channels, curbing, etc. if any, if required shall be provided as per the drawing and design.

2.2.4 In places where full tiles cannot be fixed, the tiles shall be cut to the size and smoothened at the edges to give straight and true joints.

2.2.5 All necessary slopes, gradients and levels shall be truly maintained as required and directed by the Consultant/Engineer-in-charge.

2.3 Cleaning :

2.3.1 The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed and cleaned by dilute acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

2.3.2 If any tile is disturbed or damaged it shall be refitted or replaced, properly jointed and polished.

3.0 Mode of Measurements and Payment :

3.1 The work done shall be measured in m^2. for the visible area of work done in floor and dado. The length and width of the flooring shall be measured between the faces of skirting or dado or plastered face of walls as the case may be. The paving under dado or skirting shall not be measured. No deduction shall be made nor extra paid for any opening in the floor of area upto 0.1 $m^{2.}$ Nothing extra shall be paid for laying the floors at different levels in the same room. The dado will be measured from the finish floor level to the top of tile fixed.

3.2 The rate shall include the cost of all materials (inclusive of all taxes, levies, and delivery at site), labour & sundry involved in all the operations, at all floors, at any height and level, as described above. It shall also include for breakage and wastage. Floating materials and margin of profit shall also be included. All material samples shall be got approved by the consultant/Engineer-in-charge before placing orders.

3.3 No extra shall be paid for any small quantities like narrow widths, mitred & returned ends, rounds & cutting, fixing and making good upto & around pipes, fittings and fixtures etc.

3.4 The rate shall include for fixing the flooring in composite pattern as per the drawings, using different materials and sizes. The measurements of the different materials shall be taken category-wise separately and paid accordingly.

3.5 The basic rate if at all provided or agreed upon includes cost of material, all taxes, levies & cost of delivery at site.

3.6 The rate shall be for a unit of one m^2.

6.02 Providing & laying average 25 mm. thick green polished kotah of approved quality, selected and sorted for uniform colour, in floor, otta, sill, skirting, dado etc., in required sizes upto 600 mm. and as per design with normal pattern (square, rectangular) as per drawings, including cement mortar 1:6 bedding of 35 mm thickness, joints & pointing as specified, three or more coats of polishing (with oxalic acid) up to mirror finish surfaces with different grades of Emery, curing, daily moping with water & kerosene as directed for atleast 15 days or upto the

satisfaction of the PMC & Engineer-in-charge, with selected brown kotah to form bands etc. complete. (NO WAXING WILL BE PERMITTED).

Flooring

Providing and laying approved quality and china granite 20 mm thick for flooring, treads & risers in line & level on a bed of 1:6 cement plaster including cement float, filling joints with matching colour cement slurry, curing, edge polishing, chamfering ,cleaning, etc. complete.

Granite slabs shall be of the best Indian granite of approved colour as specified in the item. They shall be hard, dense, uniform and homogeneous in texture. They shall have crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfectly plane surface on both sides and edges machine cut true to square or any other shape desired.

No slab shall be thinner than the specified thickness at its thinnest part. The sizes of the slabs shall be as specified in the respective items

2.0 Workmanship :

2.1 Dressing of slabs : Every shall be cut to required size and fine chisel dressed to give a smooth and even surface on all sides to the full depth. Chisel dressing shall also be done on both the surfaces to remove any waviness. The sides and top and bottom surfaces of marble slabs shall be machine rubbed or table rubbed with coarse sand before using. All angles and edges of slabs shall be true, square and free from chipping.All rounded or champhered edges of the slab shall be true to desired shape.

2.2 The thickness of shall be 20 mm. The allowable tolerance shall be 2 mm. allowable. The tolerance shall be 15 mm. in length and breadth.

2.5 Polishing : Hand polishing shall be done after the curing period to give a good polished appearance.

3.0 Mode of Measurements and Payment :

3.1 The rate shall be for an unit of m^2. and clear visible area shall be measured.

3.2 The rate shall include for all materials, labour and edge polishing , sundry involved in operation of the above specified item.

2.1.12 PAINTING

Painting

Oil bound washable distemper(3 coats) of approved manufacturer like Asian, Berger, Nerolac or equivalent and of required shade, on any surface to give an even shade, including a priming coat

with alkali resistant primer and applying two coats of putty after thoroughly brushing the surface free from mortar dropping and other foreign matter and also including preparing the surface even and sand papered smooth etc., after applying one coat of putty, complete, as directed.

1.0 Materials :

Oil bound washable distemper and cement primer if on plastered surfaces and woodorite, if on wood surfaces, shall be of approved brand and manufacture. The distemper shall be of required colour and shade and the same shall conform to IS : 428-1969.

Workmanship:

2.1 Scaffolding :

Where scaffolding is required, it shall be erected in such a way that as far as possible, no part of scaffolding shall rest against the surface to be distempered. A properly secured strong and well tied suspended platform (Zoola) may be used for distempering. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For distempering to ceiling, proper stage scaffolding shall be erected where necessary and the floor area shall be covered with plastic so that the flooring is not spoilt.

2.2 Preparation of surface :

The relevant specifiaction of item no. 11.01.a shall be adopted and in addition,

2.2.1 The undecorated surface to be distempered shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for atleast 2 months before applications of distemper or one coat of white wash with white cement shall be done prior to painting with distemper.

2.2.2 All unnecessary nails, hooks etc. shall be removed. Pitting in plaster shall be made good with plaster again and papered with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is applied. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with IS : 2395 (Part-1)-1966. Before applying distemper, any unevenness shall be made good by applying putty made out of plaster of paris mixed with water, on entire surface, including filling up the undulation and then sand papering the same after it has dried.

2.3 Priming coat :

2.3.1 A priming coat of cement primer of approved manufacture shall be applied over the papered surface in case of new work or undecorated surface. If the distemper priming is done after the plastered wall surface dries completely, the distemper primer shall be avoided.

2.3.2 Application of primer and putty shall be done as under :

The primer shall be applied with a brush on the clean, dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards.

This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. A coat of putty (lambi) shall be applied to the entire surface. Putty shall be used of readymade or brought of the company like Asian as directed by the consultant/Engineer-in-charge. The second coat of primer and putty shall then be applied and it shall thereafter be allowed to dry for atleast 48 hours before oil bound distemper or paint is applied.

2.3.3 Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

2.4. Preparation of oil bound distemper :

2.4.1 The distemper shall be diluted with mineral turpentine oil or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of distemper required for a day's work shall be prepared.

2.5 Application of Distemper coat :

2.5.1 On any surfaces, after the primer coat has dried for atleast 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between 2 consecutive coats to allow proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, distemper drops etc.

2.5.2 Sufficient quantity of distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room which cannot be completed on the same day.

2.5.3 15 cm. double bristled distemper brush shall be used. After a day's work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

2.6 Protective measure :

2.6.1 The surface of doors, windows, ventilators, floors, articles of furniture etc. and such other part of the buildings which are not to be distempered shall be protected from being splashed upon. Such surfaces shall be cleaned of distemper splashes, if any.

3.0 Mode of Measurements and Payment :

3.1 Priming coat of distemper primer, scraping of surface spoiled by smoke soot, removal of oil and grease spots, treatment for infection of efflorescence, mould, moss, fungi, algae and lichen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

3.2 All the work shall be measured net in this item as in place subject to the following limits unless otherwise stated here in after :

(a) Dimensions shall be measured to the nearest 0.01 m.
(b) Area in individual items shall be worked out to the nearest 0.01 m^2.

All work shall be measured in m^2. No deductions shall be made for ends of joints, beams, posts etc. and openings, not exceeding 0.5 m^2. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends of joints, beams posts etc.

3.3 Deductions of opening exceeding 0.5 $m^{2.}$ but not exceeding 3.0 $m^{2.}$ each shall be made as follows and net addition shall be made for reveals, jambs, soffits etc. of these openings :

(a) When both the faces of walls are provided with same finish, deductions shall be made for one face only.
(b) When each face of is provided with different finish, deduction shall be made for that side of frame for doors, windows etc. on which width of reveal is less than that of the other side but no deduction shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.
(c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

3.4 In case of opening of area exceeding 3.0 $m^{2.}$ each, deduction shall be made for openings but jambs, sills and soffits shall be measured.

3.5 No deductions shall be made for attachments such as casings, conduits, pipes, electric wiring and the like.

3.6 Corrugated surfaces shall be measured flat as fixed and not girth. The quantities measured shall be increased by the following percentage and the resultant shall be included with the general areas:

(a) Corrugated steel sheets	14%
(b) Corrugated A.C. Sheets	20%
(c) Semi corrugated A.C. Sheets	10%
(d) Nainital pattern roof (Plain sheeting with rolls)	10%
(e) Nainital pattern roof (with corrugated sheets)	25%

3.7 Cornices and other wall features, when they are picked out in a different finish/colour shall be girthed and included in the general area.

3.8 Item includes removing nails, making good holes, cracks, patches with materials similar in composition of distemper.

3.9 The rate includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above, carried out at all floor heights, in any position, at all levels. This shall also include conveyance, delivery, handling, unloading, storing work etc.

3.10 The rate shall be for an unit of one m^2.

Providing and applying plastic emulsion paint.

1.0 Materials : The plastic emulsion shall conform to IS : 5411-1969(Part-1).

2.0 Workmanship : The relevant specification of item no. 7.01 shall be followed except that plastic emulsion paint shall be applied on any surfaces. For flat and pearl luster (semi gloss) paint of same specification shall be followed except that the type of paint shall be changed as per the direction of PMC and Engineer-in-charge, to give the desired finish.

2.1 Scaffolding : The relevant specifications shall be followed.

2.2 Preparation of surface : The relevant specifications of item No. 7.01, para 2.2 shall be followed.

2.3 Preparation of Mix : This shall be done as per the manufacture's instructions. The thinning of emulsion is to be done with water and not with turpentine. The quantity of thinner to be added to shall be as per manufacturer's instructions.

2.4 Application :

2.4.1 Before pouring into small containers for use of applying, the paint shall be stirred thoroughly in its container. Also, the paint shall be continuously stirred in the smaller container, so that its consistency is kept uniform.

2.4.2 The paint shall be laid on evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat. No hair marks from the brush or clogging of paint puddles in the corners of panels, angles of moldings etc. shall be left on the work.

2.4.3 The paint shall be applied with brush for first two coats and final coat shall be done with roller only. The surface shall be treated with minimum one coat of alkali resistant primer and putty as specified in relevant specification of workmanship of item no.7.01 The second or subsequent coat shall not be started until the preceding coat has become sufficiently hard to resist marking of the brush being used.

2.4.4 The surface on finishing shall present a flat velvety smooth/pearl luster (semi gloss) finish, as specified in the item. It shall be even and uniform in shade without patches, brush marks, paint drops etc.

2.5 Precautions :

(a) Old brushes if they are to be used with emulsions paints, shall be completely dried of turpentine or oil paint by washing in warm soap water. Brushes shall be quickly washed in water immediately after use and shall be kept immersed in water during break periods to prevent the paint from hardening on the brush.
(b) In the preparation of walls for plastic emulsion painting, no oil base putties shall be used in filling cracks, holes etc.

(c) Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening.
(d) Washing of surfaces treated with emulsion paint shall not be done within 3 to 4 weeks of application.

2.6 Protective measures : The relevant specifications of item shall be followed.

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item No. 7.01 shall be followed.

3.2 The rate shall be for a unit of one m^2.

7.02 Providing & applying three coats (first two coats are with brush and final coat is with roller) of Glossy, flat, pearl lustre and Matt enamel paint of desired shade, of approved make, shade, brand and manufacture, on any surfaces, at all heights, to give an even shade, including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papering smooth. The paint shall be applied after applying a coat of primer and putty.

1.0 Materials : Glossy, Flat, Pearl Lustre and Matt enamel paint shall conform to IS : 1932-1964 and M-44B.

2.0 Workmanship :

2.1 General

2.1.1 The materials required for work of painting work shall be obtained directly from approved manufacturers or approved dealer and brought to the site in maker's drums, cage etc. with seal unbroken.

2.1.2 All materials not in actual use shall be kept properly protected, lid of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin. The materials which have become stale or flat due to improper and long storage shall not be used. The paint shall be stirred thoroughly in its container before pouring into small containers. While applying also, the paint shall be continuously stirred in smaller container. No left over paint shall be put back into stock tins when not in use. The paint shall be stirred thoroughly in its container before pouring into small containers.

2.1.3 If for any reasons, thinning is necessary, the brand of thinner recommended by the manufacturer shall be used.

2.1.4 The surface to be painted shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed parts of the work shall be carried out in wet, damp or otherwise unfavourable weather and all the surfaces shall be thoroughly dry before painting work is started.

2.1.5 For Glossy, Flat, Pearl lustre and Matt finish, painting of same specification shall be followed except that the type of paint shall be changed as per the direction of PMC and Engineer- in-charge, to give the desired finish.

2.2 Application :

2.2.1 Brushing operation are to be adjusted to the spreading capacity advised by the manufacturer of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

2.2.2 Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from PMC & Engineer-in-charge before next coat is started.

2.2.3 Each coat shall be lightly rubbed down with sand paper of fine pumice stone and cleaned off dust before the next coat is applied. No hair marks from the brush or clogging of paint puddles in the corners of panels angles of mouldings etc. shall be left on the work.

2.2.4 Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc.

2.2.5 Approved best quality brushes shall be used.

3.0 Mode of Measurements and Payment :

3.1 The new steel and other metal surface shall be measured under this item.

3.2 All the work shall be measured net, in the decimal system as executed, subject to the following limits unless otherwise stated herein after :
(a) Dimensions shall be measured to the nearest 0.01 m.
(b) Areas shall be worked out to the nearest 0.01 m^2.

3.3 No deductions shall be made for openings not exceeding 0.5 m^2 each and no addition shall be made for painting to beading, mouldings, edges, jambs, soffit etc. of such opening.

3.4 In case of fabricated structural steel and iron work, primer coat of oil paint shall be included with fabrication. In case of trusses, if measured in m^2, compound girders, stanchions, lattices, girder and similar work, actual area shall be measured in m^2 and no extra shall be paid for painting on bolts, heads, nuts, washers etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

3.5 The different surfaces shall be grouped into one general item, areas of uneven surface being converted into equivalent plain areas in accordance with the relevant I.S. code for payment.

3.6 The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. required for the above specified operation, at all floors, at any height, in any position. Scrapping of surface, washing etc. of surfaces spoiled by smoke, soot, removal of oil and grease spots, treatment for infection with efflorescence, moulds, moss, fungi, algae and lichen shall not be paid extra. This shall also include conveyance, delivery, handling, unloading, storing work etc.

3.6 The rate shall be for an unit of one m^2.

Providing and applying Silicone paint solvent base/water based over exposed concrete and brick surfaces and plastered surfaces, as directed with a minimum 5 years guarantee on stamp paper to the employer directly. (The Contractor should specify the % concentration of silicone while quoting the rate.)

1.0 Materials : Silicone paint shall be of approved quality like Repelin or equivalent (water repellent paint) as approved by the Consultant/ Engineer-in-charge.

2.0 Workmanship :

2.1 The silicone paint shall be diluted with water in proportion, 1 part of silicone to 8 parts of water. The paint shall be sprayed with spray gun as directed.

2.2 A guarantee bond on appropriately stamped paper shall be given by the Contractor to the Client in the manner form prescribed below :

3.0 Mode of Measurements and Payment :

3.1 The rates shall include for work at any height, position, and floor and for all necessary scaffolding, etc. as may be required. The rates shall also include for hacking and/or bush hammering to form key for plaster and for spatter dash treatment, as specified, as and where necessary.

The rates shall also include for all work in narrow width, arises, rounded angles, chamfered external angles, drip moulds, grooves and for making good after all trades.

The rate shall also include for groove with cement finish upto 12 mm. x 6 mm. to be formed in plaster at junction of slab and beam and slab and brick without any extra charge. The rate shall also include for similar grooves in plaster at the junction of masonry and wood or steel door/window/ventilator frame or at bottom of beam/lintels as drip moulds without extra charge.

3.2 All plastering shall be measured in $m^{2.}$, unless otherwise specified. Length, breadth or height shall be measured correct to a centimeter.

3.3 Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooved or open joints in brick work, stone work, etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm., at any point on the surface.

3.4 The measurement of wall plastering shall be taken between the walls or partitions (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

3.6 Soffits of stairs shall be measured as plastering on ceilings. Flowing/folding soffits shall be measured separately.

3.7 For jambs, soffits, sills, etc., openings exceeding 0.5 sqm and not exceeding 3.0 sqm, area deductions and additions shall be made in the following manner: -

(a) No deductions shall be made for end joints, beams, posts, etc. for openings not exceeding 0.5 sqm. each and no addition shall be made for reels, jambs, soffits, sills, etc. of these opening for finish to plaster around ends of joints, beams, posts, etc.
(b) Deduction for openings exceeds 0.5 sqm. but not exceeding 3.0 sqm. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills, etc. of these openings.
(i) When both faces of any wall are plastered with same plaster, deduction shall be made for one face only.
(ii) When two faces of any wall are plastered with different types of plasters or if one faces is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, windows, etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from area of plaster and/or pointing as the case may be.

3.8 For openings having door frames equal to projection beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

3.9 In case of openings having area above 3.0 m2. each, deduction shall be made for the opening but jambs, soffits, and sills shall be measured additionally.

3.10 The rate shall be for an unit of one $m^{2.}$

3.11 The deposit at the rate of 50% of the cost of this item from the running and final bills shall be recovered and retained for the first one year after completion of the work and 10% of shall be retained for the balance of defects liability period and shall be refunded only after the completion of the defects liability period.

Providing and applying cement paint two coats from Snowcem or equivalent on exterior surfaces, at all heights to give even shades, including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth etc. complete.

1.1 Cement water proofing paint shall conform to IS: 5410-1969, and shall be of approved shade. Contractor to get the Field approval by sample application.
1.2 Water shall be clean potable water with hardness not more than 40mg/lit.

2.0 Workmanship:

2.1 Scaffolding: The relevant specifications of item shall be followed.

2.2 Preparation of surface:

The relevant specifications of item no. 7.01 shall be followed except that the work oil bond distemper shall be substituted with water proofing cement paint. The surface shall be thoroughly wetted with clean water before cement water proofing paint is applied.

2.3 Preparation of paint: cement paint shall be prepared by adding paint powder to water and stirring to obtain a thick paste, which shall then be diluted to a brushable consistency. Generally, equal volumes of paint powder and water make a satisfactory paint. In all cases, the manufacture's instructions shall be followed. The paint shall be mixed in such

quantities as can be used up within an hour of mixing as otherwise the mixture will set and thicken, affecting flowing and finish. The lids of cement paint drums shall be kept tightly shut when not in use.

2.4 Application of Paint:

2.4.1 No painting shall be done when the paint is likely to be exposed to a temperature of below 7^0C within 48 hours after application.

2.4.2 When weather conditions are such as to cause damage, the work shall be carried out in shadow as far as possible. This helps the proper hardening of the paint film by keeping the surface moist for a longer period.

2.4.3 To maintain the uniform mixture and to prevent segregation, the paint shall be stirred frequently in the Container.

2.4.4 For undecorated surfaces, the surface shall be treated with minimum two coats of water proof cement paint. Not less than 24 hours shall be allowed between two consecutive coats. Next coat shall not be started until the proceeding coat has become sufficiently hard to resist marking by the brush being used. In hot dry weather, the preceding coat shall be slightly moistened before applying the subsequent coat.

2.4.5 The finished surface shall be even and uniform in shade, without patches, brush marks, paint drops etc.

2.4.6 The cement paint shall be applied with a brush with relatively short stiff hog or fibre bristles. The paint shall be brushed in uniform thickness and shall be free from excessively heavy brush marks. The lumps shall be well brushed out.

2.4.7 Water proof cement paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound varnishes, paint etc. It shall not be applied on gypsum, wood and metal surfaces.

2.5 Curing : Painted surfaces shall be sprinkled with water two or three times a day. This shall be done between coats and for atleast two days following the final coat. The curing shall be started as soon as the paint has hardened so as not to be damaged by the sprinkling of water say about 12 hours after the application.

2.6 Protection measures shall be taken as per item No. 7.01

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item shall be followed.

3.2 The rate shall be for a unit of one $m^{2.}$

7.05 Providing and applying, 100% Acrylic paint of approved shade,and make on any surface in (3 coats) after thoroughly brushing the surface to remove all dirt and remaining all loose powdered materials

1.0 Material

1.10 Paint shall be from Asian/jotun/or any other approved manufacturer only.

2.0 Workman ship
The shade shall be selected from the sample to applied on site by the contractor.

2.20 Each shade in the sample as will as the selected Final shade shall be procured by computerised mixing machines only.no handmixing stainer on the site shall be allowed.

2.30 all prepration shall be carried out as per 7.04

2.40 Complete external surface shall be thoroughly wetted first after cleaning,before basecoat is applied.

2.50 one Coat of approved make Cement paint of shade closer to the final selected shade shall be applied taking care as described in for 7.02/7.04.

3.00 Measurement

3.10This shall be as per 7.04.

1. The relevant specifications of item no. 7.04 shall be followed except that the word sandtex shall be substituted with Acrylic Paint water proof cement paint. The surface shall be thoroughly wetted with clean water before cement water proofing paint is applied.

2.0.13 <u>SPECIFICATIONS FOR DOORS AND WINDOWS:</u>

1. <u>Extend and Intent.</u>

   The contractor shall furnish all materials, labour, operations, equipment, tools , plant and incidentals necessary and required for completion of all metal work in connection with doors, windows and other glazing, railings, flashings and other items of metal work as called for in the drawings. The drawings and specifications cover the major requirements only. The supplying of additional fastenings, accessory feature and other items not mentioned specifically herein but which are necessary to make a complete installation shall be part of this contract.

2. General Description.

All metal work shall be free from defects impairing strength, durability and appearance and shall be of the best commercial quality for purposes specified, made with structural properties to withstand safety strains, stresses to which they shall be normally subjected.

3. Shop Drawings.

The contractor shall submit shop drawings and / or samples of each type of doors, windows, railings and other items of metal work to the Architect / PMC for his approval. The shop drawings shall show full size sections of doors, windows etc thickness of metal, details of constructions, hardwires as well as connection of all doors, windows and other metal work to, adjacent work ./ supports. Samples of all joints and methods of fastening and joining shall be submitted to the Architect / PMC for approval well in advance of commencing the work.

4. Samples.

Samples of all typical metal work, such as doors, windows, glazings, flashings, railings etc shall be fabricated , assembled and erected or submitted to the Architect / PMC as directed by him for is approval.

5. Approved Manufacturers.

All floors, windows, railings an other metal work shall be manufactured by an approved manufacture / fabricator. The entire work shall be carried out by workmen skilled in this kind of work in shop fully equipped to carry out all phases of fabrication in accordance with the best accepted practices.

6. Internal Doors .

Internal door frames , where called for shall be of pressed MS sheets (18 gauge) pressed to required profile and size as shown on drawings. The frame members shall be of one piece and the corners of the frames shall be mitered, electrically welded and ground smooth. They shall fit together to form a seat joint. Alternatively mechanical joining of members may be accepted subject to approval of the joining arrangement by the project manager / architect. The type and method of joining corners shall be structurally adequate and shall be approved by the project manager / Architect. Necessary provisions shall be made in the frames for receiving lock and latch tower belts, door closures etc. Slots for receiving lock and latch shall be shop punched and not made at site. The size and the locations of the slots shall match the type of lock specified type and size shall be fixed to the frames in the fabrication shop. The hinges shall be so fixed that the hinge flap is flush with the face of the frame
Holdfasts, where called for, shall be as mild steel fast of size as shown on the drawings and shall be welded to frames.
The frames shall be given a coat of red oxide primer after phosphating and preparation of surface and enamel painted after installation as specified under painting.
Base ties of mild steel angles shall be provided for all doors frames to retain the size and shape of the frames during transportation, handling and erection.

7. Steel Windows .

Steel windows and other similar items shall be fabricated from pressed mild steel section as shown on the drawings and approved by the Architect / PMC. The sections shall be of the size and thickness shown on the detailed drawings. The frame shall be of one piece, and corners shall be mitered, electrically welded and ground smooth. All corners shall be true right angles, and the completed frames shall be square and flat.
Where called for, windows, glazing etc, shall be provided with metal beading of size and shape as shown. Other fittings and accessories as called for on the drawings shall be provided as approved by the Project Manager / Architect . All steel surfaces shall be given a coat of red oxide primer after preparation of surface and phosphating as specified under "Painting" before the assembly of the different components.

8. Louvered Windows.

Lourvered windows where called for shall have pressed mild steel louvers fixed to framework of pressed mild steel sheets with approved special pivoting arrangements . Louvers and frames shall be pressed to correct sizes and profile out of 18 gauge MS sheets in a mechanical press of adequate capacity. The louvers are connected to a continuous operating rod, ending in a handle which when operated shall open / close the louvers. All fittings, accessories and fixing accessories required for the smooth and efficient operation of the louvers shall be provided as directed by and to the satisfaction of the PMC / Architect.
All louvers, frames etc shall be given two coats of red oxide paint after phosphating in the shop itself and enamel painted after installation as per specifications.

9. Fittings.

Hinges, locks, handles, stays , tower bolts, rubber buffers, door closers and other fittings shall be provided as called for in the schedule of hardware / drawings.

10. Fixing .

The contractor shall fix steel doors, windows etc in prepared openings. Steel door frames, wherever possible, shall be left for holdfasts. Breaking of partitions of walls for inserting holdfasts will not be permitted . Where the frames are to be fixed to column / wall faces they shall be fixed with rawl bolts / expansions bolts of approved make in approved manner. Special concrete blocks with cement concrete 1:2:4 (1 cement:2 coarse:4 stone aggregate 10mm nominal size) with 3mm thick MS plate 100x100mm shall be cast set at suitable places into the jambs of openings. Door and window frames shall be welded to the blocks with spaces in approved manner.
The contractor shall be responsible for assembling composites, bedding and pointing with mastic inside and outside at the mullions and transoms, fixing lugs to the frames, placing the door / windows in their respective opening and bedding with mastic. The contractor shall be responsible for all builders work including all cutting out and making good, forming fixing holes for inserting loose, lugs, bolts and clips and for stacking for window, doors adjacent to the opening for necessary hoisting, the contractor shall be responsible for the doors and windows being set straight, plumb and level and for their satisfactory operation after the fixing is complete.

11. Manufacturer's Attendance.

The manufacturer immediately prior to the commencement of glazing, shall adjust and set all windows and doors and accept responsibility for the satisfactory working of the opening

frames. The contractor shall give three days clear notice to the manufacturer, that glazing will commence.

12. Mastic Cement.

The gaps between frames and supports and also any gaps in the doors and window section shall be raked out as directed and filled with mastic cement of approved colour and make to ensure complete water tightness. The mastic cement shall be of such colour and composition that it would not stain the masonry / concrete work, shall receive paint without bleeding, will not sag or run and shall not set hard or dry out under any conditions of weather. The sample of mastic cement to be used for this purpose shall be got approved from the Architect / PMC before its actual use.

13. Railing .

a. Mild steel and other types of railing, called for, on the drawings shall be executed by craftsmen specifically trained in the trade in a shop fully equipped to carry out all phases of fabrication in accordance with the best accepted practices and a shown on the drawings. All work, as far as possible, shall be shop fabricated and brought on site for erection. The railings shall be assembled squre true to proper plan or curved to the radius shown on the drawings. Joining methods shall be flush type designed to produce an adequate strong joint for a particular application, and approved by the Architect / PMC.

b. Welding shall be executed from the non exposed side, as far as possible and in each case the welds shall be ground smooth and finished with a texture matching the parent metal. All welds shall be finished smooth and square.

14. Metal Flashing.

Metal flashing at gutters, around rain water and other pipes in roof and other locations where called for shall be 18 gauge lead sheet. The sheet shall be cut and fabricated to the required shape and profile called for in the drawings. All joints shall be welded as approved. The flashings shall be fixed to steel, concrete or other members as called for in the drawings and as directed. Where so called for the grooves in which the flashing is fixed shall be caulked and finished neat with approved mastic compound. The fabricated piece shall be installed in position around hoods, pipes etc as shown on drawings. The complete installation shall be absolutely waterproof.

15. Painting.

All doors, windows, louvers, railings etc shall be phosphate and given two coats of red oxide primer in the shop before dispatch and shall be enamel painted as per specifications after installation.

2.0.14 SPECIFICATIONS FOR GLASS AND GLAZING :

1. Extend and Intent.

   The contractor shall furnish all materials, labour, tools appliances, equipment and incidentals required to complete the installation of all glass and related items.

2. General Description.

   All glass shall be of the type, quality and substance specified . All glass shall be first class in every respect shall confirm to IS:1761-1960. The glass shall be free from blisters, stains scratches amd bubbles so as not to disturb the visibility through the glass.

3. Glass Sizes .

   The contractor shall cut glass sizes by field measurements or dimensionally approved shop drawings. The responsibility for correct glass sizes shall rest with the contractor. No cracked, chipped or disfigured glass shall be accepted.

4. Glass Breakage.

   The contractor shall replace all broken, damaged and disfigured glass caused in executing the work or by faulty installation, before acceptance of the building , without cost to the IITM.

5. Materials.

   Glass for all glazing work shall be plain float / toughened glass as called for in the drawings and schedules. Float glass for windows shall be 5mm/ 6 mm thick special selected quality glass as called for, manufactured by M/s. Trieni Glass, Mofi Float or other equivalent approved by the PMC / Architect.
   Toughened Glass : The toughening of the glass, where called for shall be carried out by reputed and approved agency.

6. Glazing Compound.

   Glazing putty for setting glass shall be of approved quality (Shalimar or approved equivalent) suitable for use of metal windows and conforming to IS:420-1953. Setting blocks shall be of Neoprene of approved quality and make.

7. Preparation of Frames & Glass.

   Before installation the contractor shall ensure that :
   a. All glazing rebates are square, plumb and true in plane, clear dry and dust free :

   b. All frame adjustments are made prior to glazing:

   c. All glass edges are clean cut to exact sizes, allowing expansion tolerance as recommended by the glass manufacturer:

   d. All sashes shall be glazed in the closed position and shall not be opened until the compound is set.:

   e. All materials are used in strict accordance with the manufacturer’s instructions.

   f. Glass shall not be forced into place.

8. Installation .

   The glass shall be set on neoprene glazing blocks on all sides (atleast two per side) as directed. Glass shall be bedded back and face glazed and so installed as to achieve a completely water tight and rattle free installation. The obscure glass where called for shall be set with smooth surface outside.

9. Completion.

   Upon the completion of the work all glass shall be thoroughly cleaned, paint marks or other marks removed. Any cracked, scratched, chipped or other defective glass shall be removed and replaced without cost to IITM. Any loose glass shall be set to the satisfaction of the project management / architect.

10. Rates .

    Glazing beads are measured with the frames. Prices for glazing are to include for setting blocks, neoprene tapes, putty and all glazing labour.

2.0.15 SPECIFICATION FOR CARPENTRY AND JOINERY

1. Extent and Intent

   It is the intent of this specification to include all carpentry and joinery work in connection with doors, windows, glazing, partitions, ceilings, paneling, cabinets and flooring and other items of wood work, called for, in the drawings.

2. General Description

   The carpentry and joinery work shall include the furnishing of all labour, materials, equipment, incidentals and appliances required to complete the work including the provisions and installation of fastening devices and hardware in accordance with the drawings and the attached hardware schedule.

3. Timber

   Teakwood where called for, shall be of selected best quality Indian teakwood. All timber shall be uniform in texture, free from large, loose, dead or cluster knots, wanes, rot decay discoloration, soft or spongy spots, hollow pockets, sap wood pith or centre heart and all other defects and blemishes.

4. Samples and Shop Drawings

   The contractor shall, before proceeding with the work, submit to the Architect/ PMC t for his approval complete samples of the various materials including hardware and fastening devices and shop drawings and large-scale details covering all joinery work.

5. Rough Carpentry

Materials unless otherwise called for, all framing and other concealed wood members shall be of first class Indian teakwood and shall be seasoned to a moisture content of not less than 10 per cent or more than 15 per cent. Wood of greater moisture content shall not be used in any part of the structure.

6. Workmanship

All carpenter's work shall be done by skilled workmen using proper tools. All joints shall, as far as possible, be mortised and tenoned and glued with best quality approved waterproof glue. Where mortise-tenon joints are not possible, the joints shall be securely nailed with the longest nails that may be used without splitting the wood. Wherever it is necessary or an adequate joint cannot be formed by nailing,
the members shall be lapped or jointed by GI straps or extra wood blocks. All joints shall be done with neatness and as approved and directed by the project manager/architect. Cross bracing, solid blocking and bracing shall be provided according to best practice.

7. Joinery

Materials: Finished woodwork and joinery in teakwood, where called for shall be surfaced with straight grained best quality Indian teakwood free from knots and other blemishes and imperfections. All finished woodwork and joinery shall be seasoned to not less than 10 per cent or more than 12 1/2 percent moisture content. All finished woodwork and joinery shall be wrought and planned smooth to the correct dimensions and profiles called for in the drawings.

All joinery work shall be securely mortised and tenoned and glued with best quality waterproof glue. For all joinery work use of nails shall not be permitted and wood screws of appropriate size and of approved make shall be used. Wherever practicable, means of fastening the various parts together shall be concealed. All work [both carpentry and joinery] shall be to the dimensions shown on the drawings.
All interior wood finish, doors and cabinet work shall be smoothly treated and Sanded at the building after erection until all defects are entirely removed. Any material showing splits, saw, sand paper or other defacing marks or other defects shall be rejected. All exposed wood and plywood shall be straight grained of matched grain and colour and shall be approved by PMC/architect before being fabricated.

Installation doors, windows, partitions and cabinetwork shall be installed in position after the plaster in the section for which it is intended is sufficiently dry. All interior and exterior doors, partitions, glazing cabinetwork and other fixed wooden equipment shall be properly installed, level, plumb and true. But joints shall be avoided wherever possible, if unavoidable the joins shall be beveled. All exterior angles shall be mitered. Adjoining interior wood members shall match and harmonize.

8. Interior Door Shutters

Interior wood door shutters, unless otherwise noted or specified, shall be 38 mm.

thick solid core phenol formaldehyde resin bonded, flush shutters, commercial ply faced on both faces. Specification IS: 2202 [Part-I] - 1966.
Shutters shall be ordered on the manufacturer to sizes as called for and shall be provided with first class teakwood edging, glued and nailed on the edges of the shutter, as shown on drawings.

9. Block Board and Ply

Block board and ply for partitions, cupboards and all other cabinet work shall be solid core, phenol formaldehyde resin bonded of approved make as called for. Unless otherwise shown all block boards and ply shall be commercial ply veneered on both faces. Samples of flush doors, ply, block boards, etc. shall be submitted to

the project manager/architect for his approval and all shutters, boards, etc. to be used in the work shall conform to the approved sample in all respects.

10. Partitions and Cabinet Work

Genera/: Partitions, cabinets, etc. shall be fabricated and assembled in the workshop as far as practicable and then brought inside the building ready to set in place. The various members shall be worked in the best manner known to the trade, mortised and tenoned, doweled, blocked and glued together so as to avoid the use of nails as far as possible. The details shall be closely followed, molding clearly cut and miters accurately made. Free edged of shutters, shelves, partitions, sides etc. shall be provided with first class teakwood edging, glued and nailed in approved manner. Shelves, where shown fixed, shall be supported on aluminum or other cleats or in other manner as approved by the project manager/architect. Adjustable shelves shall have brass sockets and pins as detailed on drawings.

Drawer bottoms shall be of 6-mm. commercial ply, unless otherwise shown. Drawer front, sides and back shall be of first class teakwood. The drawers shall slide on wooden bearers as shown on drawings.
Timber, skirting where called for shall be of first class teakwood, cut to required sizes, planned smooth on visible faces and fixed in position in approved manner.
Cutouts, openings, etc. shall be provided in the counters and cabinets to accommodate sinks, wash basins, cooking ranges, pipes etc., as shown on drawings and as required at site.

11. Hardware Fittings

Hinges, handles, knobs, locks, ball catches, adjustable, shelf fittings and other hardware fittings for doors and cabinet work shall be of the best quality and specified make as approved by the project manager/ architect. The number, size, etc. shall be as per the hardware schedule and as shown on drawings.

12. Preservative Treatment

All wood work in contact with masonry shall be painted with approved asphalt or bitumen paint before placing. Care shall be taken to keep exposed surfaces clear from tar, etc. felt shall be used to isolate wood from masonry wherever practicable. All concealed wood etc. shall be treated fully and liberally with solignum before placing in position.

13. AC Grilles

AC grilles wherever shown on drawings shall be of first class, fully seasoned, Indian teak wood and of sizes and shapes as shown on drawings. The grilles fixed to teakwood framework as shown shall be installed in position true to line and level. Wherever so required, the grille openings shall be blocked by block boards/soft board painted mat black and placed at the rear of the grill as shown. The grille and the frames shall be wax polished as specified under 'paint' Alternatively AC
grilles may be rectangular fixed bar type Anodized aluminum grilles as approved by the Architect/ PMC.

14. Painting and Polishing

All exposed teak faces of partitions, glazing, doors, cabinet work etc. shall be painted/polished/oiled to approved finish. Door shutters, internal faces of cupboards and cabinets etc. shall be enamel painted to approved finish. Drawer bottoms, sides of drawers etc. oiling, etc. shall be carried out as specified under 'painting.'

15. Protection of Work

The contractor shall be responsible for the temporary doors and closing of openings necessary for the protection of the work during progress. He shall also provide and maintain any other temporary covering required for the protection of finished woodwork that may be damaged during the progress of the work if left unprotected.

16. Alternative Woods

At the desecration of the project manager/architect alternatives for teak may be considered.

2.0.16 SPECIFICATION FOR HARDWARE

1. Extent and Intent

The intention of the contract is that the building as shown shall be completely equipped with required hardware. Any required item not noted or listed shall be finished in a grade equal to and in harmony with similar item listed.

The contractor shall furnish all labour, materials, tools, appliances and incidentals required to complete the hardware work specified herein or listed in the schedule of hardware; or as may be required by the actual conditions at the building, including the necessary screws, special screws, bolts expansion bolts and other devices necessary which shall be of sufficient size to securely and permanently fix the hardware in place. No steel or iron screws shall be used. Special screws shall match material and finish of article being fastened.

2. General Description

All hardware shall be of the best quality of its type and strictly in conformity with the materials and finish described in schedule of hardware. If called upon to do so the contractor shall arrange to get hardware specially manufactured to the design, requirements and standards laid down by the project manager/architect.

3. Samples

Samples of each different item of hardware including screws or any particular item of hardware shall be submitted to the project manager/ architect for approval.

4. Quality

All hardware shall be of perfect fit, uniform in finish and free from imperfections that affect serviceability or mar the appearance.

5. Installation

All hardware shall be installed by skilled workmen, equipped with proper and adequate tools. The hardware shall be installed true, plumb and square in accordance with the hardware schedule and the manufacturer's instructions.

6. Protection

Hardware shall not be installed earlier than necessary and it shall be the responsibility of the contractor to protect all hardware, removing some when necessary for protection and deliver all in good working order and unblemished. Any defective or marred items shall be made good to the satisfaction of the project manager/architect without additional cost to the IITM

7. Guarantee

The contractor shall be responsible for the proper working of all hardware, for a period of one year from the date of completion and acceptance of the building.

ADDITIONAL SPECIFICATIONS

Exposed Concrete

Note: Only those faces of concrete that have been indicated on the drawing as exposed must be finished as exposed concrete surfaces.

1. Form Materials: Form work shall be in steel plates. "Striking Pieces" and "Residue" shall be in steel sheet/laminated ply fixed on timber planks or shuttering ply.
Form plates shall be framed and stiffened with MS angles to provide strength, stiffness and adequate resistance to deformation during handling and concrete laying and compaction and heavy vibration and tamping.

2. Sizes: This should be as per details of the architect. The principal sizes of plates will be as follows, and shall be discussed with the contractor and decided upon.

    1. For columns: 1100 mm. x 1445 mm.
    831 mm. X 1445 mm.

410 mm. X 1445 mm.
900 mm. X 1445 mm.

2] For Beams: 640 mm. X 1800 mm.
750 mm. X 1800 mm.

3] For slabs 900 mm. X 1600 mm.

The thickness of the plates shall be preferably 18 gauge spot welded to the frame. However, it shall be noted here that the plate thickness and design of frame and stiffeners and design of supports to the plates shall be a function of overall size of the plates. Residue and striking pieces shall be 18 gauge steel sheets on timber planks and shuttering ply. The acceptance criteria shall be the maximum resistance to deformation and indentation during handling and heavy vibration and tamping.

3. Erection: Forms shall be arranged in grade and pattern as per Architect's design and shall be approved prior to insertion of "Residue" and "Striking Pieces." Any form showing deformation and indentation shall be removed.
Residue and striking pieces shall be inserted in position. Application of colorless oil and removal and excess oil to the point that the surface just shines up shall be carried out.

Watering of the surface an hour before laying the concrete shall be done. Cement slurry should be sprinkled uniformly just prior to laying concrete. Concrete shall then be poured and compacted to design sizes. Form shall be struck as late as possible preferably not earlier than 48 hours in any case.

4. A sample of exposed concrete surface shall be made and the same approved by the architect, prior to actual construction, by the contractor at no extra cost.

5. On completion of the exposed concrete work, in part or full the surfaces shall be inspected and approved by the architect/PMC.

6. Patching up of the concrete work, after striking of formwork, to repair edges and other defects using special pre-packaged "patch-up" mortars, as directed by the architect/PMC and to his satisfaction, only after prior inspection and approval by him.

SPECIFICATIONS FOR STEEL REINFORCEMENT .

1. General Description :

1.1 This section covers the requirements for providing, fabricating, delivering and placing of steel reinforcement for all types of concrete work.

1.2 Related Work Specified Elsewhere : Cash-in-place reinforced concrete.

1.3 Applicable Codes and Standards : The Codes and Standards generally applicable to the work of this section are listed hereinafter .

IS 280	Mild steel wire for general engineering purposes.
IS 432	Part I – mild steel and medium tensile steel bars. Part II hard drawn steel wire.
IS 456	Code of Practice for plain and reinforced concrete.
IS 814	Part I and Part II electrodes for metal arc welding of structural steel.
IS 816	Code of Practice for use of metal arc welding for general construction in mild steel.
IS 1566	Hard drawn steel wire fabric for concrete reinforcement. Specification for high strength deformed steel bars and wires for concrete reinforcement.
IS 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement..
IS 2502	Code of practice for bending and fixing of bars for concrete reinforcement.
IS 2629	Recommend practice for hot dip galvanizing of iron and steel.
IS 4759	Hot dip zinc coating on structural steel and other allied products.
IS 2751	Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction.
IS 9417	Recommendations for welding cold worked steel bars for reinforced concrete construction

The following clauses are intended to amplify the requirements of the reference documents listed above and the contractor shall comply with these clauses.

2. Submittals :

2.1 Material Report : Prior to start of delivery of reinforcement steel required, the contractor shall submit the following to the Architect / PMC for review.

a) Certified copies of mill test reports including chemical analysis and physical properties as required by the applicable Indian Standards for each consignment of steel.

b) Where such bill certificates are not available or if the Architect / PMC feels to substantiate conformance of the mill test reports, the contractor shall employ on approved testing to perform the required test and chemical at his own cost.

2.2 Bar Bending Schedule :

Before commencement of fabrication of any steel reinforcement, the contractor shall submit the bar bending schedule to the Architect / PMC for his approval.

3 Materials :

3.1 Steel Reinforcement .

a. Steel reinforcement used shall be either of the following types :

1. Mild steel of Grade – I tested quality conforminig to IS :432 – Part I.

2. High strength deformed steel bars of tested quality conforming to IS 1786.

3. Hard drawn steel wire fabric conforming to IS : 1566

4. Where galvanized reinforcement is specified in the drawings, the bar of mesh shall not be hot dip galvanized, after bending generally in accordance with IS:2629 and IS:4759. Galvanised reinforcement shall be coated with a layer of zinc nowhere less than 0.05 mm in thickness.

b. All steel shall be procured from original producers and no re-rolled steel shall be incorporated in the work unless permitted by the Architect / PMC.

c. Only new steel shall be delivered to the site and shall be free from mill scale, loose rust, grease, oil, paint or any other deleterious materials, which reduce or destroy bond . Every bar shall be inspected before assembling on the work and any defective, brittle or burnt bar shall be discarded. Cracked ends of bars shall be discarded

d. Tight rust and mill scale or surface irregularities shall be acceptable, provided the weight and the dimensions including height or deformations and tensile properties of a test specimen which has been wire brushed with hand are not less than those required by the applicable Indian Codes and Standards.

3.2 Binding Wire:

Binding wire shall be black annealed steel wire conforming to IS:280 and minimum 18 gauge, except of galvanized reinforcement for which the wire shall be of galvanized steel.

3.3 Welding Electrodes :
Electrodes used for welding of steel bars shall be ordinary mild steel grade electrodes conforming to IS : 814 and shall be of the best quality approved by the Architect / PMC. The work shall be carried out strictly as per IS:2751 and IS:9417.

4. Storage:

a. Reinforcement steel shall be handled and stored in a manner such that bending or distortion of the bars is avoided and contamination of steel is prevented.

b. All reinforcement shall be stored horizontally above ground level on platforms, skids or other approved supports, clear of any running or standing water. Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion.

c. Bars of different classification and diameters shall be stored separately.

d. A record shall be kept of the batch numbers of reinforcement deliveries in such a form that the part of the works in which particular reinforcement is used can be readily identified.

e. Welding electrodes shall be stored in a moisture, controlled environment in accordance with the manufacturer's specifications.

5. Fabrication:

a. Reinforcement steel shall be carefully and accurately cut ,bent or formed to the dimensions and configurations shown on the drawings and bar bending schedules.

b. All reinforcement shall be bent cold using appropriate pin sizes. Bars may be preheated only on approval of the Architect / PMC. Hot bars shall not be cooled by quenching. Bends shall be in accordance with IS : 2502.

c. It shall be ensured that the bars are not bent or straightened in any manner that will injure the material. Any bars incorrectly bent shall be used only if means for straightening and re-bending be such as not effect adversely the material. Reinforcement shall not be re-bent or straightened without prior review by the Architect / PMC. No reinforcement shall be bent when in position on the works without approval of the Architect / PMC whether or not it is partially embedded ion hardened concrete.

d. Reinforcement steel having a reduced section, visible transverse cracks in bends, or otherwise damaged in any way shall not be used.

e. Spiral reinforcement shall be accurately fabricated to the diameter and pitch shown on the drawings. One and one half finishing turns shall be provided at both top and bottom unless shown otherwise.

f. Cut ends of galvanized rods shall be given a protective coat of an approved zinc paint immediately after cutting.

6. Lapping:

a. Laps shall be provided away from points of high stress and only at positions shown on the drawings

or as agreed to by the Architect / PMC.

b. Not more than one third of the bars or as specified in the drawings shall be lapped at one section.

c. Reinforcement bars shall not be welded unless shown on the drawings or instructed by the Architect/ PMC.

7. Placement.

a. All reinforcement shall be placed accurately and maintained in the position indicated on the drawings.

b. The contractor shall provide approved type of supports for maintaining the bars in position and ensuring required spacing and correct cover of concrete to the reinforcement as called in the drawings .Precast cement concrete blocks of required shape and size, M.S. chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. Precast concrete blocks shall be cast well in advance and shall be at least equal in quality and strength to the class of concrete specified in the relevant work.

c. All intersections of the reinforcement shall be securely tied with two strands of binding wire twisted tight to make the skeleton or network rigid so that the reinforcement is not displaced during placing of concrete.

   Tack welding of crossing bars shall not be done except as authorized or directed by the Architect / PMC. Nothing extra will be paid for tack welding.

d. The contractor shall take all reasonable precautions to ensure that when handling or erecting reinforcement no damage shall be done to finished concrete. Bars that are partially embedded in concrete shall not be field bent unless concurrence has been obtained from the Architect / PMC.

e. Walkways and borrow runs for placing and compacting the concrete shall be independent of the reinforcement

f. Loose binding wire and other extraneous metal shall be removed from inside the formwork prior to concrete placing.

g. Without reliving the contractor of the responsibilities for the correctness thereof, the reinforcement shall be inspected and approved by the Architect / PMC in writing before any concrete is placed and the contractor shall allow sufficient time for such inspection and any subsequent remedial action to be carried out.

h. No part of the reinforcement shall be used for conducting electrical currents.

8. Cover to Reinforcement:

a. Care shall be taken to maintain the correct cover to reinforcement as indicated in the drawings.

b. The maximum cover for reinforcement shall be no greater than that shown on the drawings plus 5mm.

c. Exposed reinforcement intended for binding with future extensions shall be protected from corrosion as shown on the drwings plus 5mm.

9. Cleaning:

a. After placing, the reinforcement shall be maintained in a clean condition until the concrete is placed. On no account the bars shall be oiled or painted or mould oil used on the formwork to be allowed to come in contact with the bars.

b. Before concreting is commenced, the bars shall be thoroughly cleaned with dry gunny bags if they are coated lightly with rust or other impurities.

10. Welded Laps:

a. Wherever specified in the drawings or instructed by the Architect / PMC welded laps shall be provided and paid for separately unless specifically included in the item of work.

b. The welding of bars shall be done in accordance with Is : 816 A, IS :2751, IS: 9417 and as specified on the drawings and instructions. But welding between the ends of bars in line wherby the stress is transferred across the weld will not be permitted. No welding shall be done at the bend in a bar.

c. Following sizes of electrodes shall be used for lap with longitudinal beads :

Bar Diameter (MM)	6	10	20	32	40
Electrode Size (MM)	2	2.5	3.5	5	5

d. The thickness of weld shall be 0.2 diameter of the said smaller diameter bar unless otherwise specified in the drawings. The length of longitudinal bead to weld cold twisted deformed bars shall be 12 diameters of the bar of which not more than half the length shall be permitted for a continuous bead in any case.

e. The contractor shall employ only a qualified and tested welder specifically trained and experienced in welding of reinforcement bars to execute the welding of laps to the complete satisfaction of the Architect / PMC.

f. Before doing the welding of bars at site the contractor shall make minimum three joints and get them tested in a approved laboratory (including X-ray testing of welds if required.) at his own cost. The contractor shall be permitted to do the welding only after the satisfactory test certificate from the laboratory is obtained. Whenever the welder changes similar tests shall be carried out again.

g. The following precautions must be taken for welds laps :

    a. If the cold twisted deformed bar to be lapped has an untwisted end at the lapping point, the same portion shall be cut off prior to welding upto a length of atleast 10 cms from such end.

    b. Bars shall be free from rust at the joints to be welded.

    c. Bars shall be aligned and kept in proper axis in order to minimize crookedness in the bar after welding.

    d. Slag produced in welding after alternative run should be chipped and removed by brush.

e. Electrode should not be lighted by touching the hot bar.

STRUCTURAL STEEL WORKS –

1. Indian Standard Codes;

Unless otherwise specified herein, materials and workmanship or the work shall conform to the latest editions of the following standards or their approved equivalents.

Indian Code of Practice for General Construction in steel, Indian Standard Institute IS : 800.

Code of Practice Use of Metal Arc Welding for General Construction in Mild Steel, Indian Standard Institute IS 816.

Speen for Structural Steel IS : 226 and when specified IS 2062.

Specification for Black Hexagonal Bolts and Nuts IS 1363.

Specification for Precision and Semi-precision Hexagonal Bolts and Nuts IS 1364.

Specification for covered Electrodes for Metal and Welding of Mild Steel IS : 8114.

2. Fabrication :-

All structural steel work shall be in accordance with IS : 800 All materials shall be finished straight and shall be machined true and square where so specified material at the fabrication shop shall be kept clean and protected from weather. All holes and edges shall be free from burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished.

3. Straightening :-

All steel materials, before being worked shall be straight and free from bends or twists. If the sections are distorted or twisted they shall be straightened and flattened by methods that will not injure the material. (Heating and forging is not allowed). Contractors lumps price shall be inclusive of the cost of all these operations involved in straightening as stated above.

4. Cutting and edge planeing: -

Cutting may be done by shearing, cropping, sawing, or mechanically controlled gas cutting torch as permitted by the Engineer-in-charge. All re-entrant corners shall be shaped notch free to a radius of atleast 12mm. Sheared or cropped edges shall be dressed to a neat finish and shall be free from distortion and burrs. Hand frame cutting shall be undertaken only if so permitted by the Engineer-in-charge and shall only be carried out by an expert in such work. Hand frame cut edges shall be ground smooth and straight Edge planning of sheared edge is not intended unless

the sheared edges are such as to warrant it or specifically called for, by Engineer-in-charge whose decision shall be final and binding. Edges of cropped or gas cut edges shall be planned as directed by Engineer-in-charge.

5. Grinding :-

All the edges cut by flames shall be grounded before these are welded. Ends of all bearing stiffeners shall be ground to fit tightly at both top and bottom. In case of gantry girders, the bottom of the knife-edge support shall be accurately ground to provide effective bearing on the column bracket with a clearance not exceeding 0.1 mm locally at any place. The top surface of column bracket, struts and compression members shall be accurately ground and closely butted over the whole section with tolerance not exceeding 0.1 mm locally at any place. Notwithstanding the above full loads shall be transferred through welds. Column ends resting on bases shall be ground smooth and true to ensure minimum 85 % contact area with local gap not exceeding 0.1 mm.

The base plate shall be similarly ground over the bearing surfaces and shall have effective contact with the end ofB the shaft. The bearing face which is to be grouted direct to a foundation need not be ground if such face is true and parallel to the upper face. To facilitate grouting and escape or air holes shall be provided wherever necessary in column bases.

6. Bending :-

The bending of plates and sections to specially required shapes shall be done either on appropriate machine or by angles smithy and black smithy process.

7. Rolling and framing :-

Plates for chutes, hoppers etc shall be accurately laid off and rolled or formed to required profile shape as called for on the drawings. Adjacent sections shall be matched for facilitating accurate assembly , welding and erection in the field.

8. Drilling and Punching :-

Holes through more than one thickness of material for members such as compound stanchion and girders flanges shall, where possible, be drilled after the members are assembled and tightly clamped or bolted together sub punching may be permitted, by assembly provided the holes are punched 3 mm less in diameter than the required size and reamed after assembly to the full size . Punching shall not be adopted where the thickness of the materials to be punched together exceeds 16 mm.
Matching holes for black bolts shall register with each other so that a gauge of 1.0 mm lesser in diameter than the diameter of the hole will pass freely through the assembled members in a direction right angle to such members. Finished holes shall not be more than 1.5 mm or 2.0 mm (as the case may be depending upon the diameter of the bolt is less than or more than 25mm) larger in diameter than the diameter on the black bolt passing through them. Unless otherwise specified by the Engineer-in-charge.
Holes for bolts shall not be formed by gas cutting process.
Where reamed members are taken apart for shipping or handling the respective pieces reamed together shall also be marked that they may be re-assembled in the final setting up. No interchange of reamed parts will be permitted. Poor matching, over drilling and ovality in holes shall be a cause for rejection.

Burrs shall be removed after drilling holes, there ever horizontal member is likely to collect water, suitable holes for drainage shall be provided.

9. Notches :-

The ends of all joints, beams and girders shall be cut truly square unless required otherwise and joint flanges shall be neatly cut away or notched away wherever necessary, the notches being kept as small as possible. corners of such notches in flanges shall be shaped to a radius of 50 mm.

10. Assembly :-

The component parts shall assembled in such a manner that they are neither twisted nor otherwise damaged and shall be so prepared that the specified chamfer, if any is provided. In order to minimize distortion in a member, the component parts shall be positioned by clamps, jigs and other suitable means and fasteners. If the individual components are to be bolted, parallels and tapered drifts shall be used to align the parts so that the bolts can be accurately positioned. Items like roof trusses etc. shall be assembled keeping in view the actual site conditions, prior to dispatch to site of erection, so that they can conveniently pre-assembled during erection. Necessary match marks shall be made on these components before disassembling in the shop and dispatching.

11. Connections :-

The contractor shall plan out the work right from the preparation of fabrication drawings stage to have shop connections as well as field connections effected either by welding, or by black bolts as shown on the design / fabrication drawings or as specified.

12. Bolted Connections :-

Bolts, nuts and washers and other fastening material shall be stored in racks off the ground with coating of suitable protective oil.

Bolts shall be inserted in such a way that they may remain in position under gravity even before fixing the nut.

The length of the bolt shall be such that at least one thread of the bolt projects beyond nut. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials. When assembled, all joint surface including those adjacent to the washers, shall be free of scales except tight mill scales. They shall be free of dirt, loose scales, burrs and other defects that would prevent solid seating of the parts. Contact surface shall be free of oil, paint, lacquer or galvanizing. Wherever necessary tapered washers or flat washers or spring washers shall be used under the nut so that no part of the treaded portion of the bolt is within the thickness of the parts bolted together.
Flat washers shall be circular of a diameter two and a half (2-1/2) times that of bolt and of suitable thickness. Where bolts head / nuts bear upon the be-leveled surfaces they shall be provided with square tapered washers of suitable thickness to afford a seating square with the axis of the belt. Flat washers shall be circular. All the bolts and nuts shall be of steel with well-formed hexagonal heads unless specified otherwise, forged from the solid and shall be dipped in hot linseed oil as soon as they are made.

Not withstanding anything to the contrary contained in IS : 1363, IS : 1364, and IS : 1367, the unthreaded length of the bolt shall be equal to total thickness of

metal being bolted together plus 2 mm. The threaded length shall be equal to at least the diameter of the bolt plus 6mm.

Not more than one shop splice shall be provided to make up the full length of member. This splice shall be within full strength butt weld.

13. Welded Connections :-

Manual arc welding shall be used, except in case of continuous welds, use of automatic welding machine shall be necessary for ensuring satisfactory qualify of fabrication. Welding must be done by experienced and tested welders in proper sequence using necessary jigs and fixtures.
Welding shall be done by experts in the field who have been qualified by tests as specified in this specification. Surfaces to be welded shall be free from loose scales, slag, rust, grease, paint and any other foreign materials.
The members to be joined by fillet welding shall be brought and held as close together as possible and in no event shall be separated by more than 3mm. If the separation is 1.5 mm or greater, the fillet weld size shall be increased by the amount of separation. This shall only apply if the surfaces are completely sealed by welds.
Before commencing fabrication of members in which welding is likely to result in distortion or locked up stresses a complete program of fabrication, assembly and welding shall be made and submitted to the Engineer for approval.
Web to flags connections shall be welded by continuous double fillet welds by automatic or semi-automatic electric are welding process. All welds shall be free from defects like blow-holes, lack of penetration, slag and inclusions etc. All fillet welds shall be inspected for flaws.
Butt welding in flange plates or web plates shall be complete before the flanges and webs are welded together.
All main butt welds shall have complete penetration unless noted otherwise.
The contractor shall give timely notice to the engineer-in-charge before welding is taken up at the site. Approval of engineer-in-charge shall be undertaken in written before welding field connections.

14. Electrodes :-

The electrodes used for welding shall be of suitable type and size depending upon the specifications of the parent material, the method of welding , the position of the welding and the quality of welds, desired e.g. normal penetration welds or deep penetration welds and shall conform to IS : 814, IS : 1395 or IS: 1442 (latest edition) as per requirements.

Only those electrode which give radiographic quality welds shall be used. Suitable electrodes of Advani Oerlikon, Indian Oxygen or Philips or any approved make shall be used for the work. Specific approval of the Consultant/Engineer-in-charge shall be taken by the contractor for the various electrodes proposed to be used on the work before any welding is started.

Were bare electrodes are used these shall correspond in specification to the parent material. The flux used for submerged are welding should be specifically manufactured for the purposes and should have such a composition which does not evolve any appreciable quantity of gases. The

electrodes shall be stored in an oven strictly in accordance with the manufacturer's requirements as stipulated.

15. Welding :-

No welding shall be done when the surface of the member is wet nor during high winds unless the welding operator and the work are properly protected.

All welds shall be free from defects like blow holes slag inclusion, lack of penetration, under cutting, cracks etc. All welds shall be cleaned of slag or flux and show uniform sections, smoothness of weld metal, feather edges without overlap, freedom from porosity. The ends of the welds shall have full throat thickness. This shall be obtained on all main welds by the use of extension pieces adequately secured on either side of the main plates. Additional metal remaining after the removal of extension pieces shall be removed by matching or by other approved means and the ends and surface of the welds shall be smoothly finished.
The sequence of welding shall be carefully chosen to ensure that the components assembled by welding are free from distortion and large residual stresses are not developed. The distortion should be effectively controlled either by a counter effect or by counter distortion. The direction of welding should be away from the point of restraint and towards the point of maximum freedom

Each case shall be carefully studied before finally following a particular sequence of the welding.

Butt welds in flange plates and or web plates shall be completed before the flange and webs are welded together.

The beams and columns stiffeners shall preferably be welded to the webs before the webs and flanges are assembled, unless the web and flanges of the beam or column are assembled by automatic welding process.

Approval of welding sequence and the procedure shall not relieve the contractor of the responsibility for the correct welding and for minimizing the distortion in the finished structure which in no case shall exceed that laid down in Indian Standard.

All the welds shall be furnished full and made with correct number of runs, the welds being kept free from slag and other inclusion, all adhering slag being removed from exposed faces immediately after such run welding procedure, current voltage etc. shall be as per electrodes manufacturer's instructions.

All main butt welds shall have complete penetration and except where it is impracticable they shall be welded from both side. Back surface of the weld should be gauged and cleaned before first run of the weld is given from back to back.

Butt welds shall be terminated at the end of joint in a manner that will ensure soundness. Where abutting parts 20mm or more in thickness run on and run off plates with similar edge preparation and having a width not less than the thickness of the thicker part jointed shall be used. These extension pieces shall be removed upon completion of the weld and the ends of the welds made smooth and flush with the abutting parts by machining or by other approved means. Where the abutting parts are thinner than 20mm the extension pieces may be omitted but the ends of the butt welds shall then be chipped or gouged out to sound metal and side welded to fill up the ends to the required reinforcement.

16. Inspection and Testing :

The contractor provide at his cost all testing and inspection services and facilities to the engineer-in-charge. The cost of these tests shall be borne by the contractor. The contractor shall also give sufficient advance notice to the engineer-in-charge for inspection of materials or workmanship. The material rejected on inspection shall be promptly removed and replaced by materials approved by the engineer-in-charge.

The acceptance of test certificates or shop inspection by engineer does not relieve the contractor from the responsibility of providing materials conforming to specification requirements nor does it invalidate final rejection at the site by the engineer-in-charge unless otherwise stated. At all stages of fabrication and assembly, the structural steel members shall be inspected to check whether the dimensions, tolerances, alignment, painting and surface finish are within areas specified. The same standard of supervision and quality control as for shop work shall be maintained for field fabrication work inspection and tests on structural steel members shall be carried out as follows:-

17. Inspection Of Welds :-

The contractor shall in routine check execution of established technological processes or general technological instructions. All welds shall be visually examined and measured for external dimensions by appropriate gauges. Profile of the weld shall be inform. In case of butt and corner welds the profile shall be convex and in case of submerge are fillet weld it shall be slightly concave. He shall also conduct selective examination of welds by ultrasonic and radiographic method.

The number of these tests are specified in Clause 6.03. However, welded joints in doubt examined by ultrasonic method would be re-examined by x-ray although this may be beyond the number of such tests specified. The contractor shall arrange for examination by ultrasonic, radiographic for welded joints for high quality control and in areas of doubtful welding as directed by engineer-in-charge.

18. Quantum of Tests :-

Visual examination	Hundred percent (100 %) of welded joints.
Dye penetration test	As and when directed by the Consultant
Ultrasonic	Hundred percent for butt welds.

19. Rectification Of Defective Welding Work :-

Whenever defects like improper penetration, presence of blow holes, under cuts, cracking, slag inclusion are noticed, the welds in such location shall be removed by gauging process. The joints shall be prepared again by cleaning the burrs and residual matters with the wire brushes and grinding, if necessary and re welded. The gauting shall be done using gouging electrodes. All defects shall be rectified, at no extra cost as per direction of the engineer-in-charge and tests shall be conducted again for such cases.

20. Acceptance Of Welded Structures :-

The acceptance of the welded work shall depend upon correct dimensions and alignment, absence of distortion in structure, satisfactory results from the examination and testing of the

joints and the test specimens as per IS soundness of weld and upon general workmanship being good. Decision of engineer-in-charge shall be final and binding.

21. Tolerance :-

The dimensional and weight tolerance for rolled shapes supplied by the contractor shall be in accordance with IS : 1852 and / or ASTM A6.

No rolled or fabricated members shall deviate from straightness by more than 1 / 1000 of the axial length or 10mm whichever is smaller. The length of members with both ends finished for contact shall have a tolerance of (+) or 9-0 mm.

Members without ends finished for contact bearing shall have a tolerance of (+) or (-) 1.5 mm for members length and a tolerance of (+) or (-) 3mm for members over 10 meters in length.

Lateral deviation between centre line of web plate and centre line of flange plate at contact surface in the case of built up sections shall not exceed 3mm. The combined warping and tilt of flanges in welded built up section shall not exceed 1/200 Th of the flange width or 3mm whichever is smaller.

The deviation from flatness of welded plate girder web in the length between stiffeners or a length equal to the depth of the girder shall not exceed 1 1/50th of such length.

Deviations from the specified depth of welded girders measured at the centre line of the web shall not exceed (+) or (-) 3mm upto a depth of 1000mm, (+) or (-) 5mm for depths above 1000mm and upto 2000 mm and (+) 18 mm and (-) 5mm for depths over 2000 mm.

22. Shop Matching :-

Some steel work , particularly columns, along with the tie beams / bracings, roof trusses etc. may have to be shop assembled to ensure satisfactory fabrication, obtaining of adequate bearing, areas etc., if so desired by the engineer at no extra cost to the purchaser.

23. Marking of Members :-

23.1. Before any steel work leaves the contractor's fabrication it shall be suitably marked in accordance with the approved drawings.
23.2. The erection marks assigned to various components of the structural steel work excepting cross-beams shall also contain an erection sequence number indicating the sequence in which the various components are to be erected.
23.3. Erection marks shall be clearly painted on the work, each piece being marked in at least two places . Each piece shall also have its weight marked thereon.

23.4. The centre line of all column bases and girder hearings and important levels shall be marked on the sections with the utmost care to ensure proper alignment and assembly of the pieces at the site.
23.5. A separate column code should be adopted for parts (if any) fabricated out steel supplied by the contractor . Weight of these parts shall also be marked.

24. Drilling holes for other works :-

Holes in members (included in this scope) required for installing equipment or structures fabricated by other contractor shall be drilled by the contractor. Effort shall be made to supply information for these holes by consultants / engineer-in-charge before fabrication. However these may be required to be drilled even after erection.

25. Shop painting :-

After all inspections and tests have been conducted to the satisfaction of the engineer-in-charge, the steel surface to be painted or otherwise treated, shall be dried and thoroughly cleaned as per IS : 1477 part I. All steel work shall be

given one (1) coat of approved metal protection except where encased in concrete. The metal protection of approved shade and of ICI or British paints or Jenson Nicholson or Shalimar Paints shall be used for the work.
Surfaces not in contact but in accessible after shop assembly shall receive two (2) different coats of shop paint. Surfaces to be welded shall not be painted or metal coated, within 50mm of the edge where welding is to be done since this may impair the quality of weld. Machined edges and contact surfaces shall be cleaned effectively nut not painted Machine finished edges shall be protected against corrosion by a suitable coating.
Red oxide shall be used for shop painting with primer applied by brushing. The instructions of the manufacturers shall be followed in applying the paint.

26. Erection :-

The contractor shall complete all preliminary works at site like transporting fabricated materials, derricks, unloading gantry etc. so as to start erection work as per schedule. The contractor shall furnish at its' own cost necessary inflammable staging and hoisting materials or equipment for erection work. The contractor shall also provide necessary passage ways, fences, safety belts, helmets, lights and other fittings to the engineer's satisfaction.

All assembling shall be carried out on a level platform. No dragging of steel shall be permitted.

The contractor shall ascertain the correctness of the foundations and carry in cleaning of foundation at his own cost. Welding shall be done in accordance with IS: 816. Code of practice for use of metal are welding for general construction on mild steel and IS : 823 code of procedure for manual arc welding of mild steel. The contractor shall work in co-ordination with the other agencies at site. The engineer shall have free access to inspect any part of the work, during erection and all erection shall be subject to his approval. In case of faulty erection all such dismantling and re-erection required will be at contractor's cost.

No paint shall be applied to field welds or bolts until these have been approved by the engineer-in-charge.

No welding or final bolting shall be done until the structures has been properly alligned and has the approval of the engineer-in-charge.

The contractor shall examine the site conditions and transportation clearances before deciding whether the building columns are to be fabricated in one piece or more than one piece. Maximum number of erection joints permitted in column shall be two i.e., no column shall be

fabricated and erected in more than 3 pieces. Proper splice material shall be provided at the erection joints and as indicated in fabrication drawings. When erection joints are provided in column, their location shall invariably be above floor level and will be as per approval of the engineer-in-charge.

Nothing extra shall be payable for fabrication / erecting columns in one piece or more than one piece. The splice material shall however, be detailed in the fabrication drawings and shall be part of supply, fabrication and erection of structural steel.

27. Tolerance for erection :-

The tolerance limits during erection shall be as follows :-

The shift of column base from the marked axis shall not exceed 5mm.
All column tiers shall be plumb within a tolerance of 1 in 500 and the structure as a whole plumb within a tolerance or 1 in 1000.
The displacement from plumb of a note that the deviations given elsewhere other than in the format as mentioned above shall be Null & Void (not acceptable) and all the conditions of the tender except for which the deviation column tiers shall not exceed 10mm and the total displacement of the structure as a whole should not exceed 25 mm for structures upto 50m an additional displacement of 1 mm for every 2.5 m additional height shall be permitted subject to maximum displacement of 50mm.

The actual levels of supports of trusses roller beams, roofing beams, purlins etc. shall not vary by more than 20mm from their marked levels.

The sweep of trusses, beams etc. in the horizontal plane shall not exceed 1 / 1500 of their span subject to a maximum of 10 mm.

The deviation of the upper chord of trusses from vertical plane through centers of supports shall be within 1 / 250th of the truss height . Deviation in spacing of purlins shall be within 5 mm.

28. Stability :-

28.1. The contractor shall be responsible for the stability at all stages of its erection at site and shall take all, necessary measures by the additions of temporary bracings and guying to ensure adequate resistance to wind and also to loads due to erection equipment and their operation. Guying and bracing shall be done in such a way that it does not interfere with the movement of working of other agencies working in the area. For the purpose of guying the contractor

28.2. shall not use the structures which are likely to be damaged by the guy. Any damage caused by the contractor shall be rectified by him entirely at his own cost to the satisfaction of the purchaser / engineer-in-charge.

28.2 The lumpsum supply, fabrication and erection of structural steel work shall include provision of such temporary bracings and their removal. Such temporary bracings used shall be the property or the contractor and may be removed by him at the end of the job from the site of work.

28.3 If work has to be carried out adjacent to switchyards or electrical installations which are live. Contractor must ensure suitable safety precautions in consultations with the engineer-in-charge.

28.4. If a portion of the work or project area can not be made available to contractor for his activities due to operations being carried out by other contractors, he shall suitably modify his sequence of operations as to continue work without interruption.

29. Defective work :-

Any error in work which prevents proper assembling and fitting of parts in the field by moderate use of drift pins or moderate amount of remaining shall be classified by engineer-in-charge as defective work. No gas cutting or punching of holes shall be permitted for erection.

All defective work shall be replaced / rectified as the case may be by the contractor at his own cost. Any charges incurred by purchaser either directly or indirectly because of defective workmanship will be deducted from the amount due to contractor before payment is made.

30. Grouting :-

Fresh Conbextra- GP 2 or equivalent make shall be used for grouting of column bases and foundation bolts in pockets and block outs provided in foundation by other contractor. Contractor shall be responsible for bringing the top of concrete foundation to the desired level by chipping. In case the foundation is cast at lower than the desired level, the contractor make up the difference by providing additional height without extra payment for any such work or material. Top surface of foundation shall be chipped with a chisel to ensure proper bound between grout and the foundation concrete and shall be thoroughly cleaned.

31. Painting :-

After all inspection and tests have been conducted to the satisfaction of the engineer-in-charge, the steel surface to be painted or otherwise treated, shall be dried and thoroughly cleaned as per IS : 1477 part - 1. All steel work shall be given one protective coat of red oxide except where encased in concrete. The metal protection of approved shed and of ICI or British Paints or Jenson Nicholson or Shalimar paints shall be used for the work. The instructions of the manufacturers shall be followed in applying the paint.

following limits unless otherwise stated herein after :

(a) Dimensions shall be measured to the nearest 0.01 m.
(b) Areas shall be worked out to the nearest 0.01 m^2.

3.3 No deductions shall be made for openings not exceeding 0.5 m^2 each and no addition shall be made for painting to beading, mouldings, edges, jambs, soffit etc. of such opening.

3.4 In case of fabricated structural steel and iron work, primer coat of oil paint shall be included with fabrication. In case of trusses, if measured in m^2, compound girders, stanchions, lattices, girder and similar work, actual area shall be measured in m^2 and no extra shall be paid

for painting on bolts, heads, nuts, washers etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

3.5 The different surfaces shall be grouped into one general item, areas of uneven surface being converted into equivalent plain areas in accordance with the relevant I.S. code for payment.

3.6 The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. required for the above specified operation, at all floors, at any height, in any position. Scrapping of surface, washing etc. of surfaces spoiled by smoke, soot, removal of oil and grease spots, treatment for infection with efflorescence, moulds, moss, fungi, algae and lichen shall not be paid extra. This shall also include conveyance, delivery, handling, unloading, storing work etc.

3.6 The rate shall be for an unit of one m^2.

H) Structural Steel	
1. IS 816	Use of Metal Arc Welding for General Construction in Mild Steel.
2. IS 226 and IS 2062	Speen for structural steel
3. IS 1363	Specification for Black Hexagonal Bolts & Nuts.
4. IS 1364	Specification for Precision and semi-precision Hexagonal Bolts & Nuts
5. IS 8114	Specification for covered Electrodes for Metal and welding of Mild steel.

L. SANITATION AND PLUMBING –

SPECIFICATIONS OF PLUMBING WORKS

Technical Specifications For Plumbing Works

1.1 IS Codes And Reference Standards.

1.2 Codes and reference standards referred to in the contract shall be understood to form a part of the contract.

1.3 The contractor shall be responsible for adherence to reference standard requirements by subcontractors and suppliers.

1.4 The specified reference standards are INDIAN STANDARD CODES (BIS) and are intended to establish the minimum quality of materials and workmanship required for the works. Reference standards published in other countries may also be acceptable providing that the Contractor furnishes sufficient data for the Owner's Consultant to determine if the quality of materials and workmanship at least equals or exceeds all tests prescribed by the specified reference Indian Standards codes.

Such other reference standards published by the following will be considered

BSI : British Standards Institute

AFNOR: Association Francaise de Normalisation
(French Standards Institute)
DIN Deutsche Industries Norman (German Standards)
ANSI : American National Standards Institute
ASTM American Society for Testing and Materials

1.5 Should regulatory requirements or the contract conflict with specified reference standards or specifications, the more stringent in each case shall govern.

1.6 Contractor shall obtain copies of codes applying to the Work, manufacturer's directions and reference standards referred to in the contract within 30 days of signing the contract.

1.7 Contractor shall submit a copy of each code, reference standard and specification, manufacturer's directions, instructions and specifications, to which reference is made in the specification to the- Owner's Authorized Representative's.

1.8 In addition to National Building Code (NBC), a reference is also made to Uniform Plumbing Code - India (UPC-1) published by Indian Plumbing Association for installation standards.

1.9 Standards, specifications, associations, and regulatory bodies are generally referred to throughout the specifications by their abbreviated designations. The materials workmanship shall be in accordance with the requirement of the appropriate IS code wherever applicable together with any building regulations or bye-laws governing the works.

General Requirements

1.1 Scope of work

1.1.1 The form of Contract shall be according to the "Conditions of Contract". The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor.

1.1.2 Work under this Contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the plumbing and other specialized services as described hereinafter and as specified in the schedule of quantities and/or shown on the plumbing drawings.
Without restricting to the generality of the foregoing, the sanitary installations shall include the following:-

A. Plumbing works

i) Sanitary Fixtures
ii) Soil, Waste & Vent and Rainwater Pipes & Fittings
iii) Water Supply System
iv) Sewerage & Storm Water Drainage

Specifications

1.1.3 Work under this Contract shall be carried out strictly in accordance with specifications attached with the tender.

1.1.4 In case of items not covered under these specifications due to any ambiguity or misprints, or additional works, the work shall be carried out as per specifications of the latest Central Public Works Department.

1.2 Execution of work

1.2.1 The work shall be carried out in conformity with the Plumbing drawings and within the requirements of architectural, HVAC, electrical, structural, landscaping and other specialized services drawings.

1.2.2 The Contractor shall cooperate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule.

1.3 Drawings

1.3.1. Plumbing drawings are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the architectural and other services drawings.

1.3.2 Architectural drawings shall take precedence over plumbing or other services drawings as to all dimensions.

1.3.3 Contractor shall verify all dimensions at site and bring to the notice of the Project Manager all discrepancies or deviations noticed. Decision of the Project Manager shall be final.

1.3.4 Large size details and manufacturers dimensions shall take precedence over small scale drawings.

1.4 Inspection and testing of materials

1.4.1 Contractor shall be required, if requested, to produce manufacturer's test certificate for the particular batch of materials supplied to him.The tests carried out shall be as per the relevant Indian Standards.

1.4.2 For examination and testing of materials and works at the site Contractor shall provide all testing and gauging equipment necessary to conduct test of materials on site and test the work done.

1.4.3 All such equipment shall be tested for calibration at any approved laboratory, if required by the Project Manager.

1.5 Reference drawings

1.5.1 The Contractor shall maintain one set of all drawings issued to him as

reference drawings. These shall not be used on site. All important drawings shall be mounted on boards and placed in racks indexed. No drawings shall be rolled.

1.5.2 All corrections, deviations and changes made on the site shall be shown on these reference drawings for final incorporations in the completion 'as built' drawings. All changes to be made shall be initialed by the Project Manager or Architects.

1.6 Shop drawings

1.6.1 The Contractor shall submit to the Project Manager two copies of the final accepted shop drawings. Contractor shall ensure that shop drawing shall be prepared for specific areas solely on the basis of the latest architectural drawings. Project Managers will arrange issue of these drawings to the contractor to ensure that changes and equipment layout are planned within available space allotted for the particular equipment.

1.6.2 No shop drawings are to be submitted for general plumbing work if it is being executed as per the plumbing drawings issued by the owners or their consultants

1.6.3 Shop drawings shall be submitted under following conditions:-
a) Showing any changes in layout in the plumbing drawings.
b) Equipment layout, piping and wiring diagram.
c) Manufacturer's or Contractor's fabrication drawings for any materials or equipment supplied by him.

1.7 Completion drawings

1.7.1 On completion of work, Contractor shall submit "as built" drawings to the Project Manager, in the manner prescribed earlier, incorporating the changes recorded in the 'Reference Drawings'. These drawings shall have the following information.

a) Run of all piping, pipe diameters on all floors, vertical stacks
b) Layout plans of external services showing ground and invert levels of all drainage pipes together with location of all manholes and connections up to outfall.
c) Run of all water supply lines with diameters, locations of control valves, access panels.
d) Location of all mechanical equipment with layout and piping connections.
e) System diagrams to indicate the system in its totality.

1.7.2 No completion certificate shall be issued unless the above drawings are submitted.

1.7.3 Contractor shall provide four sets of catalogues, service manuals manufacturer's drawings, performance data and list of spare parts together with the name and address of the manufacturer for all electrical and mechanical equipment provided by him.

1.7.4 All "warranty cards" given by the manufacturers shall be handed over to the Project Manager.

1.8 Testing

1.8.1 Piping and drainage works shall be tested as specified under the relevant clauses of the specifications.

1.8.2 Tests shall be performed in presence of the Project Managers or their authorized representatives.

1.8.3 All materials and equipment found defective shall be replaced and whole work tested to meet the requirements of the specifications.

1.8.4 Contractor shall provide all labour, equipment and materials for the performance of the tests.

1.9 **Site clearance and cleanup**

1.9.1 The Contractor shall, from time to time, clear away all debris and excess materials accumulated at the site.

1.9.2 After the fixtures, equipment and appliances have been installed and commissioned, Contractor shall clean-up the same and remove all plaster, paints, stains, stickers and other foreign matter or discoloration leaving the same in a ready to use condition.

1.10 **Cutting of Water Proofing Membrane**
No walls terraces shall be cut for making and opening after water proofing has been done without written approval of Project Manager/Architects.

1.11 **Cutting of structural members**
No structural member shall be chased or cut without the written permission of the Project Manager.

1.12 **Materials**

1.12.1 Unless otherwise specified and expressly approved in writing by the Project Manager, only materials of makes and specification as mentioned in the list of approved makes attached with the specifications shall be used.

1.12.2 If required, the Contractor shall submit samples of materials proposed to be used in the works. Approved samples shall be kept in the office of the Project Manager and returned to the Contractor at the appropriate time.

2. SANITARY FIXTURES

2.1. Scope of work

2.1.1. Work under this section shall consist of furnishing all labour and miscellaneous material necessary and required to completely install all sanitary fixtures, chromium plated fittings and accessories as required by the drawings specified hereinafter and given in the Schedule of Quantities.

2.1.2. Without restricting to the generality of the foregoing the sanitary fixtures shall include the following:-
a) Sanitary fixtures
b) Chromium plated fittings
c) Porcelain or stainless steel sinks

2.1.3. Accessories such as towel rods, toilet paper holders, soap dish, towel rack, coat hooks, Mirrors etc are not considered under the scope of this contract.

2.1.3 Whether specifically mentioned or not, the rates quoted for the installation of all fixtures and appliances shall be provided with all fixing devices, nuts, bolts, screws, hangers as required.

2.2 General requirements

2.2.1 Sanitary fixtures shall be of the best quality approved by the Project Manager. Wherever particular makes are mentioned, the choice of selection shall remain with the Project Manager.

2.2.2 All fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition. Accessories shall include proper fixing arrangement, brackets, nuts, bolts, screws and required connection pieces.

2.2.3 Fixing screws shall be half round head chromium plated brass screws with C.P. washers where necessary. Iron screws rust and will not be permitted.

2.2.4 Contractor shall furnish without cost all such accessories and fixing devices that are necessary and required but not supplied along with the Plumbing Fixtures & CP Fittings by the manufacturers as a part of the original and standard supply.

2.2.5 All fittings and fixtures shall be fixed in a neat workmanlike manner true to level and heights shown on the drawings and in accordance with the manufacturer's recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor, tiling or terrace shall be made good at Contractor's cost.

2.2.6 Contractor shall seal all fixtures fixed near wall, marble and edges with an approved type of poly-sulphide sealant.

2.3 European W.C

2.3.1 European W.C. shall be siphon type floor or wall mounted set with exposed dual flush tank . Framework, walling and finishing will not form a part of the contractor's work.

2.3.2 The flush pipe (32mm dia) shall be Chromium plated when exposed inside the bathroom and GI (IS 1238 C class) when concealed. Where applicable flush pipe/ bend shall be connected to the W.C. by means of a suitable rubber adapter.

2.3.3 Wall hung W.C. shall be supported by C.I. floor mounted chair.

2.3.4 Each W.C. set shall be provided with a plastic seat shall be with rubber buffers and chromium plated hinges. Plastic seat shall be so fixed that it remains

absolutely stationary in vertical position without falling down on the W.C.

2.4 **Urinals**

2.4.1 Urinals shall be white glazed vitreous china of size, shape and type specified in the Schedule of Quantities.

2.4.2 Half stall urinals shall be provided with 15mm dia C.P. spreader,32 mm dia stainless steel domical waste and C.P. cast p trap with pipe and wall flange, and shall be fixed to wall by C.I. brackets and C.I. wall clips as recommended by manufacturers complete as directed by Project Manager

2.4.3 Half stall urinals shall be fixed with C.P. brass screws and shall be provided with 32 mm dia domical waste leading to urinal's trap.

2.4.4 Flush pipes shall be C class G.I. pipes concealed in wall chase but with chromium plated bends at inlet and outlet or as given in Schedule of Quantities.

2.4.5 Urinals shall be flushed by means of fully automatic no-touch flush valve with solenoid valves.

2.5 **Urinal partitions**

2.5.1 Urinal partitions shall be white glazed vitreous china , marble , granite or any other material selected by the Owners. The same shall be fixed by contractor executing the finishing work. The exact location shall however be co oriented by the Plumbing Contractor.

2.5.2 Urinal partitions shall be fixed at proper heights with C.P. brass bolts, anchor fasteners and M.S. clips as recommended by the manufacturer and directed by Project Manager..

2.6 Wash Basins

2.6.1 Wash basins shall be white glazed vitreous china of any size, shape and wall mounted / counter type.

2.6.2 Each basin shall be supported on MS galvanized or Cl brackets (to be enamel painted) and clips and the basin securely fixed to wall or on the counter. Placing of basins over the brackets without secure fixing shall not be accepted.

2.6.3 Each basin shall be provided with 32 mm dia C.P. waste with overflow, pop-up waste or rubber plug and chain as specified in the Bill of Quantities, C.P. brass 'P' trap with C.P pipe to wall and flange.

2.7 Sinks

2.7.1 Sinks shall be stainless steel as specified in the Schedule of Quantities.

2.7.2 Each sink shall be securely fixed. Counter top sinks shall be fixed as recommended

by the manufacturer. Each sink shall be provided with 40 mm dia C.P. waste with plug and a 'P' trap as given in the Schedule of Quantities. Fixing shall be done as directed by Project Manager.

2.7.3 Supply fittings for sinks shall be mixing fittings or C.P. taps with approved type of swan neck spout as specified in the Schedule of Quantities.

2.8 Toilets for the Disabled

2.8.1 Washroom and toilet facilities for the disabled along with special accessories shall be installed as shown in the drawings.

2.8.2 Accessories such as grab bars, for concealed or exposed mounting with non-slip gripping surface shall also be installed as shown on the drawings.

2.9 Shower Set

2.9.1 Shower set shall comprise of two CP brass concealed stop cocks, four/five way auto-diverter, adjustable type over-head shower with CP shower arm , all with CP wall flanges of approved quality all as specified in the Schedule of Quantities. Bath spout, hand showers and pop up wastes shall also be provided wherever, specified.
Wall flanges shall be kept clear off the finished wall. Wall flanges embedded in the finishing shall not be accepted.

2.10 Flow Control Device

Approved / rated flow control fitment in brass body, chrome outer cover, rated for flow / discharge of the fixture.

2.11 Toilet Paper Holder

1. Toilet paper holder shall be white glazed vitreous china or chrome plated of size, shape and type specified in the Schedule of Quantities.
2. Porcelain toilet paper holder shall be fixed in walls and set in cement mortar 1:2 (1 cement : 2 coarse sand) and fixed in relation to the tiling work.
3. The latter (chrome) shall be fixed by means of screws/capping having finish similar to the toilet paper holder in wall/temper partitions with raw I plugs or nylon sleeves. When fixed on timber partition, it shall be fixed on a solid wooden base member provided by the Engineer-in-charge.

2.12 Towel Rail

1. Towel rail shall be chromium plated brass or of stainless steel or powder coated brass of size, shape and type specified in the Schedule of Quantities.
2. Towel rail shall be fixed with screws/capping having finish similar to the towel rail in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or directed by the Engineer-in-charge.

2.13 Janitor's Sink

1. Janitor's sink shall be stainless steel, single bowl type of size as called for in the Schedule of Quantities, provided with painted R.S. or Cl brackets and clips and securely fixed. Each sink shall be provided with 40mm dia CP waste. Fixing shall be as directed by the Engineer-in-charge.
2. The supply fittings for Janitor's sink shall be wall mounted type of size as mentioned in Schedule of Quantities.
3. Drinking Water Fountain
4. Drinking water fountain shall be well mounting type made of vitreous china, stainless steel or any other material as given in the Schedule of Quantities.
5. The drinking water fountain shall be with anti-squirt bubble less, self closing valve type with automatic volume regulator.
6. The drinking water fountain shall be provided with an anti-splash back and integral strainer with 32mm or 40mm cast brass trap.

2.14 Liquid Soap Dispenser

1. Liquid Soap Dispenser shall be wall/counter mounted suitable for dispensing liquid soaps, lotions, detergents. The cover shall lock to body with concealed locking arrangement, opened only be key provided.
2. Liquid soap dispenser body and shank shall be of high impact resistance material. The piston and spout shall be stainless steel with 1 litre capacity polyethylene container.
3. The valve shall operate with less than 2.27 Kg (5 Ibs) of force.

2.15 Hand Drier

1. The hand drier shall be no touch operating type with solid state time delay to allow user to keep hand in any position.
2. The hand drier shall be fully hygienic, rated for continuous repeat use (CRU).
3. The rating of hand drier shall be such that time required to dry a pair of hands up to wrists is approximately 30 seconds.
4. The hand drier shall be of wall mounting type suitable for 230 V, single phase, 50 Hz, AC power supply.

2.16 TOILETS FOR THE DISABLED

1.Where specified, in washroom facilities designed to accommodate physically disabled, accessories shall be provided as directed by the Engineer-in-charge.

2. Stainless steel garb brass of required size suitable for concealed or exposed mounting and opened non-slip gripping surface shall be provided in all washroom. The flushing cistern/valve shall be provided with chromium plated long handles.

2.17MOCKUP AND TRIAL ASSEMBLY

1. The installation of the Sanitary fixtures and %A I fittings shall be as per the shop drawings approved by the Engineer-in-charge/Consultant.
2. The contractor shall have to assemble at least one set of each type of sanitary fixtures and fittings in order to determine precisely the required supply and disposal connections. Relevant instructions from manufacturers shall be followed as applicable. This trial assembly shall be developed to determine the location of puncture holes, holding devices etc. which will be required for final installation of all sanitary fixtures and fittings. The above assembly shall be subject to final approval by the Engineer-in-charge / Interior Designer.
3. The fixtures in the trial assembly can be re-used for final installation without any additional payments for fixing or dismantling of the fixtures.

2.18 SUPPORTING AND FIXING DEVICES

1. The contractor shall provide all the necessary supporting and fixing devices to install the sanitary fixtures and fittings securely in position. The fixing devices shall be rigidly anchored into the building structure. The devices shall be rust resistant and shall be so fixed that they do not present an unsightly appearance in the final assembly. Where the location demands, the Engineer-in-charge may instruct the contractor to provide chromium plated or other similarly finished fixing devices. In such circumstances the contractor shall arrange to supply the fixing devices and shall be installed complete with appropriate vibration isolating pads, washers and gaskets.

2.19 FINAL INSTALLATION

1. The contractor shall install all sanitary fixtures and fittings in their final position in accordance with approved trial assemblies and as shown on drawings. The installation shall be complete with all supply and waste connections. The connection between building and piping system and the sanitary fixtures shall be through proper unions and flanges to facilitate removal/replacement of sanitary fixtures without disturbing the built in piping system. All unions and flanges shall match in appearance with other exposed fittings.
2. Fixtures shall be mounted rigid, plumb and to alignment. The outlets of water closet pans and similar appliances shall be examined to ensure that outlet ends are butting on the receiving pipes before making the joints. It shall be ensured that the receiving pipes are clear of obstruction. When fixtures are being mounted, attention shall be paid to the possibility of movement and settlement by other causes. Overflows shall be made to ensure that necessary anchoring devices have been provided for supporting water closets, wash basins, sinks and other appliances.

INSTALLATION OF SANITARY APPLIANCES AND FITTINGS:

1.0 SCOPE:

1.1 This section shall cover installation of sanitary appliances, fittings and ancillaries.

2.0 SPECIFICATIONS:

2.1 The appliances and accessories and fittings shall be installed to match the interior and tile pattern heights and properly leveled.

2.2 The screws shall be fixed to the wall be providing wooden rawal plugs or anchor fasteners in wall depending upon the weight.All screws shall be ss.

2.3 All brackets, clamps shall be finished with two coats of synthetic enamel paint of approved colour.

2.4 The water supply and drainage pipe connections to the fittings and assemblies shall be made of approved leak proof joints.

2.5 The Indian and Orissa W C shall be set in bk. bat conc.1: 2:4. The wall hung EWC shall be supported by C.I. floor mounted chairs.

2.6 The urinals shall be fixed to wall by C.I. bracket and two CI wall clips. Cistern shall be fixed to wall with C.I. or RS brackets.

2.7 The urinal partitions shall be fixed to wall with s.s. clips.

2.8 The semi-circular white glazed earthen ware channels shall be laid in perfect slope and fixed in C.M.1:2 with white cement joints.

2.9 The towel rods, towel rings, robe hooks shall be fixed to walls / doors as per tiling pattern.

2.10 WC flush assembly shall consist of 32mm dia flush valve, regulating valve, flushing pipe, bend or elbow with wall flanges.

2.11 The wash basin water supply assembly shall consists of pillar tap, angle stop cock, CP flexible connector. The waste assembly shall consists of 32 mm waste coupling, bottle trap with extension piece and 32 mm dia GI ‘C’ class pipe concealed in wall and in floor upto the nearest nahani trap (Approximate pipe length 1200 mm).

2.12 The sink water supply assembly shall be wall or sink mounted with swan neck spout, hot and cold mixer, pair of angle valve with flexible pipe. The sink waste assembly shall consist of 40mm waste pipe with extension pipe and wall flange and 40mm dia GI C class pipe concealed in wall floor upto the nearest nahani trap (Approximate pipe length 1200 mm).

2.20 PROTECTION AGAINST DAMAGE

1. The contractor shall take every precaution to protect all sanitary fixtures against damage, misuse, cracking, staining, breakage and pilferage by providing proper wrapping and locking arrangement till the completion of the installation. At the time of handing over, the contractor shall clean, disinfect and polish all the fixtures and fittings. Any fixtures and fittings found damaged, cracked chipped stained or scratched

shall be removed and new fixtures and fittings free from defects shall be installed at his own cost to complete the work.

2.21 TESTING

1. All appliances, fixtures and fittings shall be tested before and after installation. Water seals of all appliances shall be tested. The contractor shall block the ends of waste and ventilation pipes and shall conduct an air test.

2.22 MEASUREMENT

1. Rate for fixing only of sanitary fixtures accessories, CP fittings shall etc. include all items, and operations stated in the respective specifications and bill of quantities and nothing extra is payable.

2. Rates for all items under specifications Para above shall be inclusive of cutting holes and chases and making good the same, CP screws, nuts, bolts and any fixing arrangements required and recommended by manufacturers, testing and commissioning and making good to the satisfaction of the Engineer-in-charge.

MODE OF MEASUREMENT:

1.0 GENERAL:

1.1 The supply items shall include the main items specified, standard accessories and fittings.

1.2 Installation:

1.2.1 The installation rates shall include the installation, testing and commissioning of the individual items as well as the testing and commissioning of the entire system. The rate shall include all fixing materials, accessories, consumables, tools and instruments required for installation, testing and commissioning. The rates shall also include supports and fasteners, anti-corrosion treatment, painting and identification marks, flow direction indication, Chasing and subsequent covering in masonry ,anticorrosive bitumen impregnated wrapping of concealed pipes excavations for under ground pipes, subsequent covering them back, bedding of sand or gravel up to the Trenches for under ground pipes.
. All measurements for piping shall be at the centerline of the piping work.

1.2.2 Cutting and chasing in concrete shall be excluded.

1.2.3 The installation of the material supplied by the owner shall include taking delivery and transporting of the material to the site.

	MODE OF MEASUREMENT	**ITEM INCLUDED**	**ITEM EXLUDED**
2.0	PUMPS: Each pump shall be measured as one unit.	Pump, motor, base frame, vibration mounts,	Foundation and electrical work.

		Pump cover, fixing materials and accessories.	
3.0	STORAGE TANKS: Each storage tank shall be measured as one unit	Tank, flanged inlet, outlet, drain and overflow nozzles, fixing materials and accessories.	Foundation.

4.0 SANITARY APPLIENCES AND FITTINGS:

Supply and installation of each sanitary appliance shall be measured as one unit and shall include all fixing materials and accessories.

4.1 WC PANS (EURAPEN/INDIAN/ORISSA):

	ITEM NAME	**INCLUDES**	**EXCLUDES**
4.1.1	Wall hung EWC	WC, seat, seat cover, chair, 100 mm dia CI connector upto external face of the wall, 15 mm dia angle stopcock (1 No.), 15 mm dia copper CP flexible tube (1 No.) 32 mm dia GI flush pipe concealed in wall.Flush tank assembly.	**Nil**
	ITEM NAME	**INCLUDES**	**EXCLUDES**
4.1.2	Floor mounted EWC	WC, seat, seat cover, P/S trap, 15 mm dia angle stopcock (1No.), 15 mm dia copper CP flexible tube (1No.). 32mm dia GI flush pipe concealed in wall.And Flush tank.	Nil
4.1.3	Orissa Pan WC	WC pan, P/S trap, Bk masonry seat around, GI flush pipe concealed in wall.	Nil

4.2 FLUSHING TANK:

	ITEM NAME	**INCLUDES**	**EXCLUDES**
4.2.1	Flushing Tank	Flushing cistern/tank, flush pipe supporting bracket.	Nil

4.3 SANITARY CP BRASS FITTINGS:

The sanitary fittings shall be individually measured or as an assembly as indicated in the schedule of materials.

	ITEM NAME	**INCLUDES**	**EXCLUDES**

4.3.1	Flush Valve Assembly	Flush valve with flanges, concealed flushing pipe, CP bend/elbow.	Nil
4.3.2	Wash Basin Assembly	Pillar cock with or without mixer as specified, angle stopcocks with flange, CP connectors, waste coupling, bottle trap assembly etc.	Nil
4.3.3	Shower Assembly	Bath spout, mixer assembly with flange, shower diversion arm and head.	Nil
4.3.4	Bib Cock	Bib cock with wall flange.	Nil
4.3.5	Sink Assembly (Each sink assembly shall be measured as one unit)	Sink with drain board, wall spout with mixer as specified, waste bottle trap assembly, bracket, concealed outlet pipe upto 1200 mm length.	Nil
4.3.6	Geyser/Boiler Assembly (Each Geyser/Boiler assembly shall be measured as one unit)	Geyser with thermostatic control, pressure and vacuum release valve NRV, angle stop cock, CP flexible pipe connections (2 Nos.) CP angle stop cock with wall flange (2 Nos.).	**Nil**

4.3.7 CP Brass/S.S. Accessories: Each accessory shall be measured as one unit with fixing materials.

5.0 GI PIPING:

	ITEM NAME	**INCLUDES**	**EXCLUDES**
5.1	GI piping (Shall be measured on the basis of unit length).	Pipes, fittings, clamps, supports and wrapping of hessian cloth. Anti corrosive bituminous paint for hot water and cold water pipes. Cutting holes and chasing in walls and floors and making good the same.	Nil
5.3	Valves (Each valve shall be measured as one unit and shall be classified based on the type, size and material.	Valves, flanged joints for the flanged valves.	Nil

6.0 EXCAVATION:

	ITEM NAME	**INCLUDES**	**EXCLUDES**

	Excavation and back filling (It shall be measured on the basis of unit volume unless specified in the specifications)	Cutting by hand, by excavator or by breaker. Refilling, compaction, carting away the surplus soil as directed.	Nil

7.0 EXTERNAL PIPING:

7.1 The external drainage piping shall be measured on the basis of unit length (metre) and shall be classified based on the size of the pipe.

7.2 It shall include the pipe, fittings, inspection windows, fixing materials, brackets, hangers and clamps etc.

8.0 DRAINAGE ANCILLARIES:

	ITEM NAME	**INCLUDES**	**EXCLUDES**
8.1	Gully Trap (Each gully trap shall be measured as one unit)	Salt glazed stoneware gully trap, PCC base, masonry chambers, GI/RCC covers, excavation and refilling.	Nil
8.2	Inspection Chambers (IC):	PCC base, hunching masonry /concrete chamber, CI/RCC covers with frames, external CM plaster (sand faced), internal CM plaster (smooth finished), waterproofing excavation, refilling, carting away the surplus.	Nil
8.3	Circular Manholes (each manhole shall be measured as one unit).	PCC base, hunching masonry /concrete/chamber, CI/RCC covers with frames, external CM plaster (sand faced), internal CM plaster (smooth finished), waterproofing excavation, refilling, carting away the surplus, CI foot steps at 300 mm c/c.	Nil

9.0 SUPPORT STRUCTURES:

	ITEM NAME	**INCLUDES**	**EXCLUDES**
9.1	Structural Supports, hangers etc. shall form the part of the item supported and hence no additional payments.	Structural Supports, grouting, final 2 coats of enamel paint of approved shed.	Nil

2.23 PRESSUPRE PIPES AND FITTINGS:

1.0 SCOPE: This section covers the details and specifications of pipes, pipe fittings for pressure piping.

2.0 SPECIFICATIONS:

2.1 The pipes and pipe fittings shall confirm to the relevant IS specifications.

3.0 GENERAL REQUIREMENTS:

3.1 The pipes and pipe fittings shall be one of the recommended makes and of the best quality without any
defects. The inside and outside surfaces shall be smooth with uniform wall thickness. The pipes and the pipe fittings shall bear the manufacturer's name and the ISI mark and must be supplied along with the manufacturer's test certificates.
3.2 The size indicated shall be clear inside diameter unless otherwise specified. The pipes should withstand the test pressure for the various types and classes of pipes indicated in the relevant IS specifications.

3.3 The pipes shall be suitable for the fluid it carries, the temperature and the pressure of the fluid and the system.

4.0 PIPING MATERIALS:

4.1 The piping material for the various utilities shall be as shown in the 'Schedule of Materials and Rates'.

5.0 GI PIPES:

5.1 The GI pipes shall be medium or heavy class with screwed ends as indicated in the schedule of work.

5.2 The fittings shall be of heavy quality of 'R' brand or with ISI mark and shall include couplings, tees, bends, reducers, nipples and plugs.

5.3 The fittings shall be forged steel, of heavy quality, hot deep, galvanised and with screwed ends.

6.0 STONEWARE PIPES:

6.1 The stoneware pipes and fittings shall confirm to the following:

a)	IS: 651	Salt glazed stoneware pipes and fittings.
b)	IS: 3006	Chemically resistant glazed stoneware pipes and fittings.

6.2 The stoneware pipes and fittings shall be Socket and Spigot type.
6.3 The stoneware pipes shall be thoroughly and evenly burnt and shall be free from cracks, air bubbles, fiber blisters etc. The pipe shall give a sharp clear tone when struck lightly by a hammer.
6.4 The pipes shall be minimum 600mm long. The wall thickness and the weight shall confirm to IS: 651.

7.0 CAST IRON PIPES:

7.1 The cast iron pipes and fittings shall be of 'Neco Centri' make, confirming to IS specifications.

7.2 For fixing the pipes use MS 25mm x 6mm strap saddle clamps painted with 2 coats of enamel on one coat of primer.

7.3 Nahani traps shall be of CI with deep seal. with SS Grating cover.

7.4 All vertical pipes shall be clear off the finishing surface of the wall by min 25mm.

7.5 All Exposed Fixing clamps shall be epoxy painted to avoid rusting.

8.0 VALVES:

8.1The valves for the various sizes shall be as indicated below:

			MATERIALS OF CONSTRUCTION FOR	
No.	Pipe Diameter	Valve Type	Body	Internal
1	Up to 50mm	Ball Valve	Gun Metal	Bronze
2	65 mm and Above	Butterfly Valve	Cast Iron	SS 316, SG Iron

9.0 STOP VALVES:

9.1 The stop valves shall be 'gate' or 'butterfly' as indicated in the drawing and the schedule of materials, and shall be confirming to IS: 778 and IS: 780. The stop valves shall be capable of complete stoppage of flow, shall be handled with solid wedge, split wedge or parallel double disc type.

9.2 The butterfly valves shall be with circular or lens type disc pivoted in the body by two unions. The operating handle shall be provided with locking facility and shall have flow indication.

10.0 CHECK VALVES:

10.1 The check valves/ NR valves shall be of unidirectional flow, allowing the normal flow in one direction and completely stop the flow in the reverse direction. The check valves or the reflex valves shall be suitable for horizontal as well as vertical installation and shall be with circular disc hinged at one end.

11.0 FOOT VALVES:

11.1 The foot valves shall be made up of Brass and shall be suitable for the pump suction. The foot valves shall be accompanied with NR valve and strainer.

12.0 SCREWED GI PIPE ASSEMBLY:

12.1 The GI pipe assembly shall be done using screwed fittings.

12.2 The pipe ends shall be filed using round files to remove burrs. Threading of proper length and size shall be made confirming to IS: 554, so that the joint is lick proof with adequate strength. Care shall be taken that no excess threading is exposed.

12.3 Shali kote or Teflon tapes shall be applied on the entire length of threading before assembling.

12.4 Union connections shall be provided at the equipment connections and at intervals up to 30 meters on straight length.

13.0 ANTICORROSION TREATMENT:

13.1 The pipe assembly shall be provided with outer coating to prevent the corrosion of the pipes.

13.2 The pipes laid above ground shall be provided with the following type of anticorrosion coating:

a) Two coats of paint of approved colour over one coat of red oxide primer.
b) Two coats of paint of approved colour for GI piping.

13.3 The pipes laid under ground or concealed in the building structure shall be provided with one coats of bituminous paint and wrapped with Hessian cloth strips. And again one coat of bituminous paint shall be applied. if the wrapping cloth is bitumen impregnated the second coat of bitumen is not necessary.

14.0 UNDER GROUND PIPING:

14.1 The pipes laid under the ground shall be laid in trenches having a minimum cover of 600mm and a sand cushion of 150mm above the pipe.

14.2 The GI/PP/PVC pipes crossing roads, pavements etc. shall be taken through 150mm dia RCC NP-3 pipes.

14.3 The drainage and sewage under ground pipes in trenches shall be min 600mmdeep below ground & shall be laid with 200mm sand crushed grit cover4 all around.

15.0 VALVES:

15.1 The valves shall be incorporated in the piping system as shown on the drawings and shall be installed at such locations and levels so that they are easily accessible for operation, maintenance and replacement.

15.2 The screwed valves wherever provided shall be easily removable for repairs or replacements.

15.3 Check valves/NR valves shall be incorporated as indicated on the drawings to counter the reverse flow. These are to be installed generally at the following places:

a) Discharge points of centrifugal pumps.
b) Outlet points of boilers.
c) Outlets of equipments, which are prone to damages due to reverse flow and higher static heads.

15.4 Air release valves shall be incorporated at places subject to air locks, height points in the piping circuit and at the outlets of heat exchangers. Isolation (closing) valves are to be provided before the air release valves.

15.5 supports shall be provided for the pipes at the each end of the valve to relieve pressure on the valve joint. In addition to this, additional supports are to be provided for the pipes fixed above ground/floor at 3 meters interval.

16.0 TESTING:

16.1 All the piping shall be pressure tested by filling water, removing air locks and applying pressure of 10 kg/cm^2 using hand or hydraulic pest pumps unless otherwise specified.

16.2 The pressure shall be maintained for a minimum period of 2 hours and achieve pressure drop within 0.5 kg/cm^2.

16.3 The testing shall be carried in a section by blocking both the ends or closing the valves, if provided. After completion of the entire installation and connecting to the mains or pumping system, the installation shall be once again tested and flaws, if any, shall be rectified or replace the defective material or workmanship.

16.4 Sewage and waste water pipes under floor/plinth and under ground shall be tasted by smoke test before refilling the trenches.

16.5 After commissioning the system, each valve shall be tested for effective working by opening and closing for a number of times. All the testing shall be carried out in the presence of owner/site engineer, owner/consultants and test register shall be maintained. Water, labour, equipments and register required for the testing shall be the responsibility of the contractor and to remove water resulting from the testing, and bare the costs for the same.

M.ASSEMBLING AND LAYING VERTICAL AND UNDER GROUND PIPES:

1.0 SCOPE:

1.1 This section shall cover the assembly and laying of gravity pipes and the connected ancillary items of work for drainage system.

2.0 STANDARDS:

2.1 All the materials shall confirm to the respective IS specifications.

3.0 GENERAL REQUIREMENTS:

3.1 The assembly and laying of drainage pipes shall confirm to all the safety codes and measures required for the various type of work involved and shall be carried out to achieve smooth flow with lick proof joints. The piping work shall confirm to relevant standard specifications and shall be easily accessible for repairs and maintenance.

3.2 The pipes and fittings shall be cleaned and thoroughly inspected for cracks and any other damages before assembling. The damaged pipes and fittings shall be stored separately and shall be taken away from the site.

3.3 The pipe assembly and laying shall be carried out in lines and levels as specified and indicated on the drawings with proper slope to obtain smooth flow. The branch

connections to the stack [vertical pipe(s)] shall be made using 'Y' junctions with clean out plugs.

3.4 The pipe assembly shall be supported at close intervals to avoid sagging of pipes by providing supports on both the sides of the joints.

3.5 Pipes laid under ground shall be provided with anti corrosion coating and shall be laid on properly leveled and compacted bed with a minimum sand cushion of 150 mm thick. The pipes crossing roads, pavements etc. shall be taken through 150mm dia RCC NP-3 pipes to enable easy repairs and maintenance, without cutting and damaging the road. The slope shall be set out

with boning rods and sight rails. The pipes laid under ground shall have a minimum cover of 600mm above the pipes.

3.6 The excavation for the trenches shall be carried out only after the preparatory work for laying t he pipes is completed and a stage has been arrived that laying of pipes and refilling the trenches can be undertaken immediately.

3.7 The pipes laid under floor shall be encased in PCC 1:2:4. The pipes laid above floor slabs shall be supported on concrete pedestals.

3.8 The storm water drains and sewers shall be laid in straight lines and to alignment and slope as shown on drawings/design sheets. Suitable boning rods and sight rails fixed at intervals not exceeding 15metres. Leveling instruments shall be provided to check and maintain the invert levels. Additional sight rails and other suitable level checking instruments shall be provided at bends and at all the changes in the line's direction. The reference levels, boning rods and sight rails shall be accurate and shall not be tampered once installed and verified.

4.0 CI PIPE ASSEMBLY:

4.1 The CI pipes shall be tested for their soundness using hammer and thoroughly cleaned and washed before laying and assembling. The jointing shall be carried out with molten pig lead confirming to IS: 782 for pipes encased in masonry and CM 1:1 for pipes fixed exposed.

4.2 At least one lap of clean white hemp spun yarn shall be driven into the bottom of the socket and the spigot of the pipe forced into the pipe and centered. Laps of tarred yarn is forced into the joint and caulked tight leaving sufficient space for the lead. Sufficient quantity of molten lead is filled into the joint in one running and caulked tight after cooling, using caulking tool and 2 kg hammer. The lead should project to a length of 3mm beyond the socket and shall become flush with the socket surface after caulking making the joint neat and smooth.

4.3 In flanged joint, both the faces of the flanges shall be properly painted with red lead and bolted after inserting 3 ply rubber gasket of minimum 3mm thickness. The joints shall be finished with a thin fiber of lead wool to make it watertight. The pipes' interiors shall be cleaned using brush disk plate.

4.4 The CI pipes shall be carefully laid in trenches using shear legs, chain and pulleys and other tackles to prevent the entry of sand, earth or other materials. The pipes are to be laid aligned, to the levels and slopes as shown on the drawings/design sheets. Cuts in trenches shall be made for the sockets to seat into them. The pipe ends shall be closed with wooden plugs to prevent the entry of dirt, foreign materials and rodents. The pipe jointing, testing and closing of trenches shall be carried out soon after laying the pipes to avoid damages to the pipes.

5.0 STONE WARE PIPING:

5.1 The joints of SW pipes shall be with 1:1 CM. The barrels, spigot and sockets shall be cleaned, scrapped and brushed properly. Moist yarn shall be paved around the joint and strains of yarn is added and rammed before the mortar is placed caulked tightly.

5.2 The depth of yarn and mortar shall be as follows:

No.	Pipe Size (mm)	Socket Depth (mm)	Yarn Depth (mm)	Mortar Depth (mm)
1	100	50	22	28
2	150	60	28	28
3	250	65	32	32

6.0 RCC PIPING:

6.1 The RCC pipes shall be assembled by butting together and fitting the dowel with 1:1 CM. Loose collar with rough inside surface shall be brought to the joint and the space between the pipe and the collar is caulked with bitumen soaked hemp yarn for 100mm to 150mm width at the center of the joint and collar. The balance space is caulked with CM 1:1 and finished smooth at 45^0.

7.0 TESTING:

7.1 All the pipes shall be inspected for manufacturing defects and damages during transport and storage. The CI pipes shall be tested before laying by keeping filled with water for at least 10 minutes and struck with hammer.

7.2 The CI drain pipes shall be tested by filling up the stack by water after plugging up all the openings and connections. The total head in the stack shall however not exceed 3 meters. The drain and the vent pipes shall be tested by smoke test and rendered leak proof.

7.3 All the pressure pipes shall be pressure tested by filling water, removing airlocks and applying pressure of 10 kg/cm^2 using hand or hydraulic test pumps. The pressure shall be maintained for at least 2 hours and achieve pressure drop within 0.5 kg/cm^2. The testing shall be carried in a section by blocking both the ends or closing the valves, if provided. After completion of the entire installation and connecting to the mains or pumping system, the installation shall be once again tested and flows, if any, shall be rectified or replace the defective material or workmanship. After commissioning the system, each valve shall be tested for effective working by opening and closing for a number of times.

7.4 All the testing shall be carried out in the presence of owner/site engineer, owner/consultants and test register shall be maintained. Water, labour, equipments and register required for the testing shall be the responsibility of the contractor and to remove water resulting from the testing, and bare the costs for the same. The material found defective during the test shall be replaced. Any damages to the building, furnishing and fittings, and open burst of pipes shall be rectified free of cost.

7.5 All the testing shall be carried out in the presence of owner/site engineer, owner/consultants and test register shall be maintained. Water, labour, equipments and register required for the testing shall be the responsibility of the contractor and to remove water resulting from the testing, and bare the costs for the same.

N] DRAINAGE ANCILIARIES:

1.0 SCOPE:

1.1 This section covers miscellaneous items and ancillary structures for the drainage system as floor trap, floor gratings, manholes, drop connections etc. All the materials used shall confirm to the respective IS specifications.

2.0 FLOOR TRAPS:

2.1 Floor traps of CI inlet hopper with necessary inlets shall be provided wherever indicated or required. The joint between hopper inlet sockets and shall be lead caulked. The hopper connections with p or s trap shall be with minimum 50mm seal. The floor trap and inlet hoppers shall be set in PCC 1:2:4.

3.0 FLOOR GRATINGS:

3.1 The floor and urinal traps shall be provided with 100mm or 150mm square or round Brass CP or Stainless Steel grating with minimum 5mm thickness and of approved sizes.

4.0 MANHOLES AND INSPECTION CHAMBERS:

4.1 Manholes and inspection chambers shall be provided as shown on the drawings. Additional requirements, due to site conditions or modifications in the design during the progress of the work, if any, shall be carried out.

4.2 The flooring shall be of PCC 1:2:4 with drain channels. These channels shall be of semi-circular bottom of the diameter same as that of the pipe and walls of height equal to the radius of the pipe. The channels shall maintain the same slope as that of the mains. The branch channels shall also follow the same slope and construction. A minimum fall of 40mm shall be given at the junction of branch channels meeting the main channel. The fall shall be suitably curved to direct the flow in the main channel. The channels shall be given a smooth finish in CM 1:2 plaster.

4.3 The MH walls shall be of brick masonry or Concrete as Specified with both sides plastered in CM 1:1 and rendered watertight. Relieving arches shall be provided on the wall to prevent load on the pipe embedded in the wall.

4.4 CI footsteps shall be provided inside the manhole of depth more than 1200mm, weighing not less than 3 kg each. The footsteps shall be spaced 400mm horizontally and 400mm vertically. The distance between the lowest footstep and the benching shall not be more than 300mm. The distance between the top most foot step and the man hole cover shall not be more than 4500mm.

4.5 The manhole covers shall be of CI double sealed pattern confirming to IS: 1762. The covers shall be of best foundry gray metal and tough. The frame shall be embedded in PCC1:2:4 to correct levels and alignment and made water tight.

4.6 Concrete covers Heavy Duty type of approved quality shall be used as specified for Storm water chambers and manholes and shall fit over rubber gasket fixed to the frame.

4.7 Drainage Chamber in concrete roads shall have concrete covers with cir holes min 75mmdia.

4.8 all concrete covers shall be of m35-m40 grade.

4.9 All concrete and cast iron covers in lawn area shall be painted with epoxy colour green.

5.0 DROP CONNECTOINS:

5.1 The drop connection of required size and length shall be provided for the main sewer in step grounds and inside man holes where the difference in the invert level of pipes exceeds 450mm and shall be as per the drawings.

MATERIALS:

a)	WATER SUPPLY PIPING: i)Underground and concealed ii)Open	 GI C Class TATA, ZENITH GI C Class TATA, ZENITH
b)	WATER SUPPLY VALVES: i) Upto 40 mm ii) 40 mm and above	 Ball valve with SS 304 internals Butterfly
c)	SEWAGE PIPING: i) Branch piping ii) Ceiling suspended headers and vertical drainage iii) External under ground drainage	 100 mm salt glazed, stone ware. CI Neco Centri. RCC NP2 and NP3.

MAKES OF MATERIALS:

SCOPE:

1.1 This section covers the recommended makes of the materials, equipments and components. The final choice of the materials shall be indicated at the time of finalizing the order.

1.2 The makes of the materials offered by the contractor shall be indicated at the space provided, for the proper evaluation of the offer and shall be one of the recommended makes. In the absence of such indication, the decision rests with the consultants/clients.

2.0 MAKES RECOMMENDED:

NO.	ITEM	MAKE RECOMMENDED	MAKE OFFERED
1	Sanitary Appliances	kohler, Duravit,	
2	Sanitary Fittings (Taps showers etc.)	Drip less, Jaguar	
3	Flush Valves	Nelson, RA	
4	**Pressure Pipes** GI GI Fittings	 Tata, Zenith, ISI 'R', ISI	
5	Gravity Pipes: PVC CI Pipes and Fittings	 Prince, Supreme Neco Centri	
6	Valves	Leader,Audco	
7	Storage Tanks	Sintex	
8	Kitchen Sink	Diamond, Nirali, Frankee	
9	Geyser and Boilers	Racold, Spherehot	
10	Chamber Covers and Gratings	CI make 'ASHOK', Neco, RCC make 'PRATIBHA'	

3.0 Where specified make and model nos. are indicated in the schedule of material, the bidders should quote for the same items. In case of acceptance of other make/model the rate shall be arrived at by adding/subtracting the difference in basic cost of material to/from the rate quoted.

RELEVENT IS CODES –

6.30 MATERIALS

6.30.1. Cement

1	IS 269	Ordinary and low heat portland cement
3	IS 8041	Rapid hardening Portland cement
4	IS 1489	Portland Pozzolana Cement

6.30.1.a Testing of Cement

1	IS 4031	Testing of Cement
2	IS 650	Physical Tests of Hydraulic Cement Standard Sand for

6.30.2.Aggregates	
1 IS 383	Coarse & fine aggregates from natural
	sources for concrete. IS 2386 Methods
	of Tests - Part I to VIII) for aggregates
	for concrete.

6.30.3. Concrete	
1 IS 1199	Methods of sampling and analysis
2 IS 516	Methods of test for strength of concrete
3 IS 1881 (Part VI)	Analysis of hardened concrete
6.30.4. Water	
1 IS 3025	Method of sampling and test for water used in

	industry

6.30.5. Steel	
1 IS 432	Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.
2 IS 1139,	Hot rolled mild steel ,medium tensile steel and high yield strength steel deformed bars for concrete reinforcement.
3 IS 1786	Cold twisted steel bars for concrete reinforcement
4 IS 1566	Hard drawn steel wire fabric for concrete reinforcement
5 IS 226/IS 2062	Structural Steel
6.30.6. Admixtures	
1 IS 2645	Integral cement waterproofing compound
2 IS 9103	Admixtures for concrete

6.30.7.Light Metal and Alloys	
1 IS 1285	Wrought Aluminium & Aluminium alloys extruded round tube and hollow sections
2 IS 737	Wrought Aluminium & Aluminium Alloys Sheet and Strips.
6.30.8.Blocks Pre-cast Concrete	
1 IS 2185	Specification for glazed earthenware tiles
6.30.9.Waterproofing and Damp-proofing Materials	
1 IS 3384	Specification for bitumen primer for use in waterproofing and damp proofing.
6.30.10.Builders Hardware	
1 IS 204	Specification for tower bolts (2nd Rev).
2 IS 205	Specification for nonferrous metal butt hinges (2nd Rev.)
3 IS 1341	Specification for steel butt hinges (Revised)
4 IS 1823	Specification for floor door stoppers

	(first revision)
5 IS 3847	Specification for mortise night 1966 latches
6.30.11.Wood Products Plywood	
1 IS 1328	Specification for veneered decorative plywood
2 IS 1659	Specification for block boards
3 IS 4990	Specification for plywood for concrete shuttering work

6.30.12.Particle Boards and Fiber Boards	
1 IS 3087	Specification for wood particle boards (Medium density) for general purpose
2 IS 3097	Specification for veneered particle boards
IS 3478	Specification for high density wood particle boards.
6.30.13.Doors and Windows	
Wooden door & window frame and shutters	
1 IS 2191	Specification for wooden flush door shutters (cellular and hollow core type)
2 IS 2202	Specification for wooden flush doors shutters (solid core type)
6.30.14.Metal Doors & Window Frames	
1. IS 1038	Specification for steel doors, windows & ventilators(1st revision)
2. IS 1948	Specification for Aluminium doors, windows and ventilators
IS 4351-1967	Specification for steel door frames
6.30.15. Water Based Paints	
1 IS 5410 .	Specification for cement paint colour as required
6.30.16.Masonry	
1 IS 1077	Specification for common burnt clay building bricks
2 IS 3952	Specification for burnt clay hollow blocks

	for walls and partitions
3 IS 1597-1967	Part-I - Rubble stone masonry

6.30.17 Constructional Practices and Safety

A) Foundations 1 IS 2911	Code of Practice for Design and Construction of Pile Foundation.
B) Masonry 1 IS 1597	Code of practice for construction of stone masonry
2 IS 1597-1967	Part-1 Rubble stone masonry (Part-1)
3 IS 1597-1967	Part-2 Ashlar masonry (Part – II)
4 IS 2212	Code of Practice for brick work
5 IS 2572	Code of Practice for construction of hollow concrete block masonry.
C) Roofing	
1 IS 3007	Code of Practice for laying of asbestos cement sheets
2 IS 3007-1964	Part-1 Corrugated Sheets (Part-I)
3 IS 3007-1965	Part-2 Semi Corrugated Sheets (Part-II)
D) Flooring and Finishing	
1 IS 2114	Code of Practice for laying in situ terrazzo floor finish.
2 IS 3036	Code of Practice for laying lime concrete for a waterproofed roof finish
3 IS 3140 .	Code of Practice for painting asbestos cement building products

E) Water Supply	
1 IS 4985	Specification for un-elasticized pipes PVC pipes for potable water supply
2 IS 3114 -1965	Code of practice for laying of cast iron pipes
F) Steel/Concrete	
1 IS 3370	Code of Practice for concrete structures (Part-I to IV)
2 IS 2751	Code of Practice for welding of mild steel bars used for reinforced concrete construction
3 IS 2502	Code of Practice for bending and fixing of bars

	for concrete reinforcement
4 IS 4014	Code of Practice for steel tubular Scaffolding (Part-I & Part-II)
5 IS 3414	Code of Practice for design and installation of joints in building
6 IS 2750	Specifications for Steel Scaffolding
G) Construction Safety	
1 IS 3696	Safety Code for Scaffolds and Ladders (Part-I & Part-II)

H) Structural Steel	
1. IS 816	Use of Metal Arc Welding for General Construction in Mild Steel.
2. IS 226 and IS 2062	Specification for structural steel
3. IS 1363	Specification for Black Hexagonal Bolts & Nuts.
4. IS 1364	Specification for Precision and semi-precision Hexagonal Bolts & Nuts
5. IS 8114	Specification for covered Electrodes for Metal and welding of Mild steel.

6.31 SPECIFIC MATERIAL AND AGENCY REFERANCE GUIDE –

Acrylic/ Apex exterior paint	Ashian/ Nerolac / Jotun/ Dulux
Synthetic Enamel Paint	ICI Dulux/ Shalimar / British Berger / Asian Paint – Apcolite / Jotun.
Oil Bound Paint	Asian Paints / Nerolac / Jotun
Textured Finished Paint,	Tartaruga of Berger Paints Armour Quartz of JN
Anti Termite -	Wood-guard Castrol, Colourless "Bison", Chlortyrithol (As per I.S. 6313 Pare (II)1981-20% E.C.
G I Pipes	Tata / Zenith / Surya
Sanitary ware	Hindustan / Parryware / CERA
Glass	Saint Goben / Triveni / Modi Float / Ashani Float.
Welding Rod	Advani Oerlikon ,EWS
PVC Pipes, Plumbing	Supreme / Prince
Tile Adhesives	Zentrival PL of MC / Forsook

Tile Joint Filler	Terragroat, Rofftile J6 116, Fosroc /
Integral Waterproofing Powder Liquid	 MC.Special DM / Asko Rock MC.Special DM / Asko Rock/Hardcrete/ Fosroc / STP.
Waterproof Plywood / Flush Doors	Anchor / Swastik / Merino / Tower
Vitrified Tiles	Kajaria /RAK
Ceramic Tiles	Naveen / Kajaria / Bell / Spartek
Aluminium Sections for doors & windows	Jindal / Indal / Hindalco
Sealants	GE / Hindustan Minaral / Choksy Chemicals / Fosroc.
Expansion Joint Fillers	Chemettal rai
Hardtop	Fosroc/ sika / mcbosheme
Reinforcement steel	Tor40/ TMT
Structural steel	Tata/ zindal
CRF sections	Pennar/ tiger/ zindal
Bricks	
Siporex fins	Shirke
Epoxy paint	Berger / Asian
Taps	Metro / Plumber / L & K

Structural Steel	
1. IS 816	Use of Metal Arc Welding for General Construction in Mild Steel.
2. IS 226 and IS 2062	Speen for structural steel
3. IS 1363	Specification for Black Hexagonal Bolts & Nuts.
4. IS 1364	Specification for Precision and semi-precision Hexagonal Bolts & Nuts
5. IS 8114	Specification for covered Electrodes for Metal and welding of Mild steel.

ELECTRICAL

DETAILED SCOPE OF WORK:

1. This Specification covers the requirements of Supply, Installation, Testing and Commissioning (SITC) of electrical equipment and accessories mentioned as here under and the attached Bill of Quantities for the various items described therein. This also covers the procedure to be adopted for Inspection, Testing and Commissioning for all electrical equipments at site. The works shall be carried out strictly in accordance to the Tender conditions.

2. The scope of contract is explained below.

Inspector for approval of Drawings, TAC (if required), etc.
Supply, laying, testing & commissioning of 1100V grade LT XLPE/PVC, power/control cables underground and End termination of cables from the available feeder from Existing main LT panel to DB in the Multi Training Facility Building Panel room and Cabling/wiring in the Multi Training Facility Building including allied lighting Cabling.
Supply and erection of Cable trays, supports/ MS sections fabrication.
Supply & erection of DBs, power sockets, point wiring in MS/PVC conduits, junction boxes/accessories for light, fan, exhaust fan, call bell, 5A, 15A points & 1100V grade Mains wiring for power outlets for machine load & convenience power etc.
Supply & installation of lighting fixtures & fans.
Supply & installation of Bollard/ Flood Light poles / high mast with accessories.
Supply, erection, & testing of Earthing system including earth conductors, earth leads, earth electrodes with test facility
Supply & installation of Aluminium Raceways, PVC/M.S. conduit in Security Cabin area for UPS/Raw mains wiring, data, telephone wiring.
Supply, laying, testing commissioning of mains wiring for computer, power & telephone wire/cable, data cabling related to switch cabinets, workstations etc
Supply, fabrication, erection & painting of M.S. supports for various panels/Equipments, and misc. work like civil work related to Electrical trench excavation, refilling etc.

3. Quantities as estimated or approximated are as mentioned in schedule of quantities. Contractor shall however ascertain the exact quantity required at site and supply and install the materials accordingly, for which quantity based rates shall be payable.

4. Supply of the Materials shall be to the Specification of this Tender document and installation shall be as described, as per drawings approved, instructions issued by consultant and/or the purchase from time to time. Certain jobs shall be as per prevailing practices of Maharashtra state Electricity Board (MSEDCL) & IE codes.

5. The Contractor shall take into account prevailing ambient temperature/ weather conditions at site while designing the equipment. Any de-rating factors related to ambient temperature shall be considered as per relevant IS specs.

6. This scope shall be generally as per Contract Agreement and shall include additional jobs or additional quantities as may be required to be carried out for the completion of the electrical installation work in the opinion of the Director IITM Pune/ Consultant. Any other jobs/ items required to be carried out shall be evaluated on the basis of similar item rates under the Contract. Where such similar items do not exist the Contractor shall submit cost analysis to arrive at the item rates for the approval of Director IITM Pune/ Consultant.(Actual invoice / price list & discount, tax details shall be submitted along with rate analysis for each extra item.) Maximum 10 % overheads, profit, etc. shall be allowed to the contractor on landed cost accepted by Director IITM Pune/ Consultant.

GENERAL SCOPE:

Scope shall include testing and commissioning of all items installed by contractor. Necessary support by manufacturer can / shall be provided.
Scope also includes unloading of all items at site, & storing of these items.
Contractor's person can accompany client's representatives for shop inspection if necessary for above items.
Contractor has to carry out all works as per respective IS standards & I.E.C. All required tools & tackles, testing kits, measuring instruments, safety equipment's shall be provided by contractor with skilled manpower required.

SECTION-F
TECHNICAL SPECIFICATIONS

1. This specification covers in brief the requirements for the installation, related LT power & control Cable works, earthing, Transformer installation and the downstream installation. It is not the intent to specify herein all the details of material, equipment, installation, testing and commissioning; however the same shall be of high standard of engineering and shall comply to all currently applicable Standards, Regulations and Safety Codes, Maharashtra State Electricity state Board practices. Also it is not possible to specify the quantity of every item, but it is Bidders' responsibility to execute the job with recommended engineering practices in best workable manner. Material specification for major equipment such as HT Panel, LT Panels, Transformer, DG, UPS, LT Panels, Cables etc. shall be issued separately provided these are part of contractor's scope of supply. The same shall be confirmed by contractor in writing with client/ consultant prior to material procurement.

2. Necessary clearances such as- horizontal clearances from structures/live conductors/building, vertical Clearances from ground, span, sag etc. as per I.E.

rules and other statutory Requirements shall be followed. The drawing furnished along with tender is indicative and contractor to prepare working details.

3. Necessary correction in 'tender Bill Of Quantities' and rates thereof shall be carried out as the final arrangement is decided, in such cases rates shall be derived from unit rates quoted or as per 'rate analysis' submitted by contractor and evaluated by CONSULTANT / DIRECTOR IITM PUNE.

4. LT Switchgear Panels, Power and Lighting DB and Control Panel.

5. This shall be applicable to switchgear panels, power and light distribution boards, instrument distribution boards, DCDB, control panel, etc. Manufacturer's instructions, drawings and instructions of the Engineer-in-Charge should be studied and strictly followed during handling, erection, testing and commissioning of the switchgear. The panels should be handled with care, avoiding impact to the equipment, by the experienced riggers under the guidance of a competent supervisor. Dragging of the panels should be avoided and use of a crane and trailer should be made for the handling purpose while transporting to various sites. The panels should be properly supported on the truck or trailer by means of ropes to avoid any chances of damage or tilting due to heavy vibrations. The panels should be lifted by making use of lifting eye-bolts only, fully tightened after ensuring that panel supports, nuts and bolts are all intact and tightened. When lifting panels, utmost care should be taken to avoid any damage to insulators, bushings, metering and protective equipment. The panels should be preferably kept inside the cases till foundations are ready.

6. The panels should be taken out from the packed cases and moved one by one to the proper place. All the panels should be assembled, aligned and levelled and it should be ensured that panel to panel coupling bolts, busbar links fit properly without any strain on any part. It should also be checked-up that lowering, lifting, racking in and out operation of the breaker and all other motions are free from any obstruction. The fixing bolts should be grouted only after satisfying all these requirements. All Switchgear of any other equipment supplied & installed by contractor shall be tagged with engraved name-plate indicating device no & the source of supply panel.

7. The panel erection will consist of the following:

   Placing the panels on the foundation, aligning and grouting / tak welding to supporting structure wherever possible. Levelling shall be within ± 1 mm with respect to the level specified. The panels shall be made vermin and dustproof with M-Seal for Interpanel joints as directed by CONSULTANT/Client. Checking the equipment for any apparent damages and informing the Director IITM Pune. Measuring the insulation resistance value and improving the same, if required by approved methods.

   Checking the control circuit for operation, interlock, indication with only control supply 'ON' and all control connections made.
   Checking the name-plate details of the feeders as per drawings.
   Checking the bimetal relay ranges for the motors and setting the relay at full load current stated on the motor name-plate.
   Dressing and clamping of cables inside the equipment.
   Cleaning the equipment with vacuum cleaner before energising.
   Pre-commissioning tests like continuity checking, megger, interlock checking, direction of rotation of motor, operation of motors from various control points.
   Painting the cable numbers on the respective compartments (near terminal block)
   Tightening the busbar / link connection and checking connections at terminal block. Draw out modules shall be taken out if required.

Pasting the vendor wiring diagram reference on compartment door (inside).
Checking the mechanical operation of all switches, circuit breaker and similar items and the door interlocking arrangement.
Connecting the earth busbar of the equipment to the main earthing ring and painting the same green for easy identification.
Checking the measuring and indicating instruments for operation.
Plugging the unused cut-outs for cable glands in the equipment after completing the cable connections.
Touch-up painting of panels, wherever required.
Checking of all Components in Feeders with respect to vendor SLD and Bill of Material.
Prior to Panel hand-over, all feeder Nos. & description shall be provided on new engraved name plates in place of old ones.

CABLES

Cables shall comply with the latest editions of following standard, as applicable,
BIS : 1554 Part 1 PVC insulated electric cables (Heavy duty)
BIS: 7098 Part 2 Cross- Linked Polyethylene Insulated PVC sheathed cables
BIS : 8130 Conductors for insulated electric cables and flexible cables
1.1 KV grade cables: All LT power cables shall be 660/1100V grade, with aluminium conductor for size 10 Sq.MM and above. Power cables of sizes up to 6 Sq.mm. shall be with copper conductors

Construction

- Conductor – Shall be solid up to and including 6 Sq.mm. and stranded above 6 Sq.mm.Conductor shall be as below –

  a) Copper conductor – Stranded, class2, as per IS 8130
- AL conductor - Stranded, grade H4, class 2 as per IS 8130
- Insulation- Conductor insulation shall be of extruded PVC compound type
- Inner Sheath –extruded, black, PVC compound type ST-1
- Armour - made up of Al. strip / or single G.I. strip / G.I. wire
- Outer sheath- extruded, black, PVC compound type ST-1

Cable Accessories

- Manufacturer shall include in his offer, the equipment and materials required for making cable splice and cable terminals. Full details of the splicing and terminating procedures shall be given by the manufacturer.
- The total creepage distance of the outdoor porcelain insulators of cable sealing ends shall be suitable for heavily polluted saline atmosphere and shall in any case not be less than 25 mm per KV of highest line to line voltage. The protected creepage distance shall be half of the total creepage distance. The insulators shall be washable under live conditions by hot line washing equipment**.**

Information to be given by manufacturer

In addition to the standard information, the manufacturer shall provide the following information with the offer.
Detailed drawings with dimensions of the cable and all accessories including
Cross sectional view of cable, indicating the material used in each type of construction.

Splices, straight joints and trifurcating boxes.
Terminations, showing mounting arrangement
Complete specifications of covering used to protect sheath and reinforcing tapes from corrosion.

Describing information regarding cable and accessories and test of installations of similar cables now in service with description, cable performance, and outages suffered and cause of outages.

Recommended method for locating conductor faults, apparatus required for locating the faults and their price.

Transporting the cables from stores to place of installation. The drums under the custody of the contractor shall be neatly arranged in the yard near his site office. The drum shall not be rolled for transportation more than 10m Truck / Trailer shall be used for transportation for distance more than 10m.

The cables shall be rolled out for equipment and cutting shall be as per site requirement. Cable jacks and cable rollers shall be used during laying of cable.
Electrical Contractor shall cut all cable length by actual measurement at site as per final route determined. Cable lengths indicated in Cable Schedules shall be used only to get an idea of length involved.
The cables shall be tested for insulation value before laying.
Drum Schedule to be prepared by contractor.
The Cables shall be laid in trenches, trays, along walls or structural support as per the requirement. The cables shall be neatly laid and clamped. The crossing of cables shall be avoided.
The arrangement of cables on the tray / trench shall be decided based on the cable schedule and layout drawings and shall be approved by the CONSULTANT/Client.
Clamping of cable shall be done by 18 SWG thick aluminium clamps at an interval of 0.5 mtr. for vertical run and 1 mtr. for horizontal run. When cables are cleated on wall / structures, the spacer and saddle shall be used at 300 mm interval or less depending on the location and shall be approved by CONSULTANT/Client.
The cable terminations shall be done as per standard practice and crimping type of terminations shall be considered.
The glanding shall be done with suitable arrangement for earthing the gland. Wires / sleeves required for effectively earthing the glands shall be included in the termination materials.
The unused cores of the multicore cables shall be properly taped.
The tag carrying the cable number shall be at interval of 20 mtr. for underground cable and 30 mtr for above ground cable and at all bends and route changes of the cable run. Material of tag will be aluminium for above ground cables and of lead for buried cables. Sample of tags shall be approved by CONSULTANT/Client.
The cable numbers shall be painted near the terminal blocks in MCC / Distribution Boards / Switchboards.
For main power cables loops shall be provided near terminations.
All cables coming from floor / trench shall be taken through a G.I. Pipe. The length of the pipe shall be decided by the contractor and approved by the CONSULTANT/Client.
The glands supplied by the contractor shall be suitable for cable sizes mentioned and if necessary reducers shall be provided by the contractor. The contractor shall indicate the requirement of

reducers and supply the same after approval of rates by Director IITM Pune.

The contractor shall supply and install the ferrules for multicore cable connections. The ferrule markings shall be identical to the wires connected to the terminals.

The Lugs used shall be tinned Copper for Copper Cable and Aluminium Lugs for Aluminium Cable, crimping type of reputed make. The Lugs used for multistrand control cable shall be PVC sleeved crimping type copper lugs.

The connections between the junction boxes/control panels to components like pressure switches, limit switches shall be through flexible conduits. The length of each of the flexible conduit shall not exceed 120 cm.

The cables coming from switchboards to the cable tray shall be taken through branch trays and the cables shall be clamped neatly. The arrangement shall be approved by CONSULTANT/Client.

Main cable runs are to be routed as shown on the contract drawings. Any modifications found necessary due to site conditions must be approved by CONSULTANT. Details of routes not shown on these drawings are to be determined on site by discussion with CONSULTANT/Client.

PVC insulated and / or served cables shall not run parallel within 100 mm of, or be installed above and in line with, any heated pipes or duct. Where crossing above heated pipes or ducts is unavoidable the cable must be kept at least 150 mm from the outer surface of such pipes or ducts or the insulation thereof.

On main horizontal cable runs where cables are supported, suitable mild steel saddles, cleats or clips shall be used. Between these fixing points cables shall be laid neatly in position on the intervening racks. On vertical cable runs and horizontal runs other than the main horizontal runs, cables shall be fixed at one metre intervals. Where different sized cables are together the maximum fixing intervals are to be those required for the smallest cable, unless the smaller cables are bunched with larger cables and supported by them throughout the complete multi-cable run.

NOTE: Where the contract drawings indicate that the cables are to be run or fixed other than in accordance with this specification, the drawings shall be deemed to be correct.

Cable run in RCC trenches are to be run on the floor along the sides on suitable brackets and located 75 mm minimum from floor of trench. Cable ducts in the ground shall be sealed against the ingress of water, foreign matter and vermin, at both ends by means of non-setting compound and / or suitable wood plugs fitted over the cable and into the duct. Where ducts are not in use they shall be sealed in a similar manner.

Cables laid direct in the ground shall be laid on a bedding of 150 mm of sand and covered by 150 mm layer of sand, on top of sand tiles / bricks covering to be done. The depth of laying shall be such as to provide 750 mm minimum cover for low voltage cables and 1000 mm cover for high voltage cables.

All non used open entries in equipment and open ends of conduit are to be sealed by means of conduit plugs (or blanking plates if entries are not of standard conduit sizes) at all time.

NOTE: This is particularly important where equipment is located in position, but electrical installation is incomplete.

Where cables pass through floors, they shall be protected by metal / PVC pipes or other suitable means. Holes in floors, walls,

etc. will be made and reinstalled by the contractor unless otherwise stated.
All cables laid underground shall be protected with good quality brick and interlocked concrete tiles marked "Electric" or "Telephone" cables.
Cable joints shall be mechanically and electrically sound and except for buried cables they shall be accessible for inspection.
Underground joints shall be specially protected with a double layer of bricks and cast iron joint markers (marked 'Cable-Joint'), shall be installed to indicate the position of the joint.
Where corrosion of armour or gland might occur, it shall be effectively protected by suitable means.
The contractor shall test all cables for proper insulation before they are transported for laying and shall furnish a certificate of acceptance to this effect. Any damage to the cable subsequently shall be made good by the contractor at his own cost. After the test of insulation, the cut ends of cables shall be sealed properly with waterproof material to prevent ingress of moisture.
Cable Marking
All Cables shall be externally marked at either end with the respective identification numbers by means of non-deteriorating material. Cable Markers shall be approved by CONSULTANT/Client.
Where conductors are left to be terminated by another party or left to be connected later, they must be individually identified.

Cable Glands
When preparing cables prior to fitting glands, the gland manufacturer's instruction for cable preparation shall be observed.
In all cases where armoured cables are used care shall be taken to ensure that the lay of the armour is maintained after the gland is completely fitted.
Where compound boxes are used for terminating cables, the compound must penetrate fully and leave no air holes. Where hot pouring of compound is employed, 'topping up' must be carried out as soon as possible after the first filling. The pouring temperature of the compound must not be high enough to damage the cable insulation.
All terminations of paper insulated cable shall incorporate damp barriers in each conductor. The insulation shall be removed to leave approximately 15 mm to 20 mm of the conductor exposed, and the conductor shall be soldered at this point.
The preferred method of terminating conductors is by means of solder less compressed connectors. Deviations from the above shall be subject to approval of CONSULTANT/Client.
Connectors shall be of the correct size for the conductor concerned and as manufactured by Dowell's or approved equivalent.
All connectors shall be marked with the size reference for identification with the correct compression tool. This reference shall be located on the palm of the connector and shall be remote from the contact faces where possible.
The palm of the connector shall be of such shape and size that standard washers to relevant IS applicable to the size of stud for which the connector is designed shall lie flat on both faces of the connector palm when the holes in the washers and the palm are co-incident.

Compression tools shall be designed and supplied for specific use with the connectors used, and shall be regularly services by the maker.

Switches –

- The switches shall be quick-make, quick-break heavy-duty type.
- The switches shall be able to make and break 300% of the rated current at 0.3 P.F. as required by IS-4047.
- The operating handle shall be mounted on the door of the compartment housing the switches. The switches shall be provided with an interlocking arrangement such that when the switch is ON it shall not be possible to open the compartment door.
- It shall also be ensured that closing of the switch when the compartment door is open shall not be possible.
- To facilitate closing of switch with door open during maintenance / testing, interlock defeat mechanism shall be provided.
- The castell interlock shall be provided, wherever specified in the SLD.
- In case of switch fuse feeders, the switch rating shall be equal or greater than the fuse rating.
- The switch shall be provided with padlocking facility in OFF position.
- All removable covers protecting live parts shall be clearly labelled with warning notices reading "LIVE PARTS. ISOLATE ELSEWHERE BEFORE REMOVING COVER".
- Rating of the switches shall be as given in the SLD.

Wiring Termination & Ferruling

All control conductors insulating material shall be of the PVC type.

Control, signaling, protection and metering wiring shall be by PVC insulated, 1.1 KV grade copper conductor wires of minimum 1.5 sq mm section, for CT secondary circuit wires of 2.5 sq mm copper conductor minimum shall be used.
Flexible conductor ends shall be fitted with suitable crimped thimble for efficient termination.
All control wires shall be properly bunched, cleated and supported on panel frames.
Where it is necessary to use a large number of conductors in one run, they shall be divided into two or more cable runs in enclosed channels.

Conductors shall only be carried over or bent around sharp corners or edges where this is unavoidable, in which case a suitable insulating strip shall be fixed to the sharp edge.

Sharp bends shall be avoided.

Conductors carried across a hinged portion of a chassis or door shall be flexible stranded copper conductors and the same shall be soldered crimped at ends before connections are made.

Suitable means of protection against abrasion shall be provided.

Sufficient slack shall be left at conductor ends to allow components to which the conductors are attached to be removed for inspection and servicing.

Conductors passing through holes in chassis or screens shall be fully protected by correctly fitted grommets or bushes.

Control and main wiring shall be kept separate as far as practically possible.

Colour coding for wiring shall be used and shall be indicated on the drawing.

Terminal strips for connecting entering control cables shall be Wago make plug in type of adequate size, shall be located conveniently for easy accessibility, without danger of contact with live part, ease of connection, and shall be separated by barriers from power circuits. At least 10% spare terminals shall be provided in terminal strips. Sufficient terminals shall be provided on each terminal strip to ensure that not more than one outgoing wire is connected per terminal.

The wire shall be identified by numbered ferrules at each end all in accordance with the connection diagram. All ferrules shall be made of non-deteriorating materials. The ferrules shall be universal triangular type so that they cannot move freely on the wire.

Glands

It shall be preferable to have all the glands on the removable bottom gland plate. Gland plate shall be 3 mm thick M.S. sheet. Suitable provision for cable clamping shall be given alley for bringing cables to the respective compartments.

Panel Space Heaters

Wherever specified in specific requirements all switchgear shall be provided with space heaters in each vertical units to prevent condensation and the same shall be equipped with differential thermostat to automatically cut in and cut off the heater, so as to maintain interior temperature 5 DEG C above the ambient and shall also have manual disconnect switch and fuse for protection.

Label Details

Labels of 3-ply laminate shall have black lettering on yellow background provided for following:

Main nameplate for the PCC as per description given in SLD in centre on top side on front of the PCC.Name plates for all incomers and outgoing feeders indicating description, rating, equipment no., feeder no., etc.

1. Nameplates for all door mounted components.
2. Name plates for panel numbers on front and rear.
3. Warning labels for interlocks.

- Danger labels shall be provided for interlocks.

1. Danger labels for the PCC as per statutory regulations.
2. Danger labels for busbar chamber.
3. Danger labels for cable alley housing live terminals.

- All components shall be provided with components identification stickers.

- Every component shall be provided with label on inside of the door indicating following information.

- Switch / Breaker Rating
- Fuse Rating
- BMR Rating
- Contactor Rating
- CT Rating
- Rating of other major components

All nameplates shall be fastened by means of screws to the panel.

Limit of Supply

The supply of switchgear shall include the switchgear itself complete with all normal components and devices required for full and proper operation of the equipment even though such components or devices may not be shown in detail on drawings.
Switchgear shall be in working order provided with the following auxiliary components necessary for normal and safe maintenance and operation.

- Special tools - Complete set of special tools shall include all necessary devices for lifting, installing, withdrawing, testing and maintaining the circuit breakers, contactors, fuses, relays and other components of the switchgear.
- 2 Nos. handles for removing fuses shall be delivered with each switchgear.
- 6 Nos. lamp grips for removing and replacing of indicating lamps.
- 1 No. test plug for Relays.

Commissioning and Start Up Supervision

Commissioning and start-up supervision shall be provided by the manufacturer at site, and charges for the same shall be quoted separately

Switchgear and Equipment Certification

Manufacturer shall state in its bid whether proposed circuit breakers and switchgears have been tested by an independent recognized testing organization. Copy of such test certificates shall be attached to the bid.

Packing

The switchboard shall be shipped to site packed in wooden crates. They shall be wrapped in polyethylene sheets before being placed in crates to prevent damage to the finish. Crates shall have skid bottoms for handling.

- The packing cases shall be marked as per the details given in the purchase order.
- Each case shall have the reference to the vendor general arrangement drawing and shall normally indicate the sections of the switchgear.
- The packing cases shall contain one set of all the drawings for easy inspection at site.

Statutory Regulation

The switchgear shall be manufactured as per the requirements of Indian Electricity Rules. The switchgear shall be acceptable to the local statutory authorities such as Electrical Inspectorate and Fire Insurance Council. The switchgear shall have approval of Tariff Advisory Committee and relevant certificates shall be furnished in six sets for records.

Spares

Manufacturer shall quote for recommended spares for 2 years and for spare fuses

Testing

a) 415V switchgear shall be tested as per relevant Indian Standards and will include the following:
b) Visual and dimensional inspection as per general arrangement drawing.
c) Checking for provision of feeders as per general arrangement drawing.
d) Checking for provision of components as per bill of material.
e) Operation test.
f) IR measurement before and after HV test.

- HV test.

The testing will be witnessed by Client's Engineer. Six copies of Test Certificates shall be furnished to Director IITM Pune for approval before dispatch.

LT CABLES

Construction

All LT power cables shall be 660/1100V grade, with aluminium conductor for size 70Sq.MM and above. Power cables of sizes up to 50 Sq.mm. shall be with copper conductors
The cables shall be suitable for laying in trays, trenches, ducts, conduits and underground, buried installation with uncontrolled backfill and possibility of flooding by water. For all cables, cable manufacturer shall provide information on correct voltage drop values when the current is less than the full current rating of the cable

1. PVC Cables
All power / control cables for use on medium voltage systems shall be heavy-duty type, 1100V grade with aluminium / copper conductor, PVC insulated, inner-sheathed, armoured and overall PVC sheathed.

- The construction of the conductors shall be solid for aluminium / copper cables upto 6 sq.mm. For 10 sq.mm and above shall be stranded only. Conductors of nominal area less than 25 sq. mm shall be circular only. Conductors of nominal area 25 sq.mm and above may be circular or shaped.
- The core insulation shall be with PVC compound applied over the conductor by extrusion and shall conform to the requirements of Type 'A' compound of IS: 5831. Control cables having 6 cores and above shall be identified with prominent and indelible Arabic numerals on the outer surface of the insulation
- The inner sheath shall be applied over the laid-up cores by extrusion/wrapping and shall be on PVC / un-vulcanised rubber. If PVC compound is used it shall conform to the requirements of Type ST1 PVC compound of IS: 5831
- For multicore cables, if the armouring is specified, the same shall be by single round galvanised steel wires where the calculated diameter below armouring does not exceed 13 mm and galvanised steel wires / strips where this dimension is greater than 13 mm. Requirement and methods of tests for armour material and uniformity of galvanization shall be as per IS: 3975 and IS: 2633. If armouring is specified for single core cables, the same shall be with hard drawn aluminium round wire of 2.5 mm diameter.
- The outer sheath for the cables shall be applied by extrusion and shall be of PVC compound conforming to the requirements of type ST1 compound of IS: 5831. To protect the cables against rodent and termite attack, suitable chemicals shall be added into the PVC compound of the outer sheath.

2. <u>XLPE Cables</u>

- Power cables shall be with Aluminium / Copper Conductor, XLPE insulated, armoured and overall PVC sheathed. All cables rated above 3.3 KV shall be provided with both conductor screening and insulation screening. The conductors shall be provided with non-metallic extruded semi conducting shielding. The insulation screening shall consist of non-metallic extruded semi-conducting compound in combination with a non-magnetic metallic screening of copper. The insulation screen shall be strippable without application of heat. The copper screen shall be capable of carrying the single line to ground fault current for duration of 1 second. For cables rated above 3.3 KV the conductor screen, XLPE insulation and insulation screen shall all be extruded in one operation by Triple Extrusion process to ensure perfect bonding between the layers. The core identification shall be coloured strips or by printed numerals.
- The construction of the conductors shall be stranded and compacted circular for all cables.

- The core insulation shall be with cross-linked polyethylene unfilled insulating compound. It shall be free from voids and shall withstand all mechanical and thermal stresses under steady state and transient operating conditions
- The inner sheath shall be applied over the laid up cores by extrusion and shall conform to the requirements of Type ST 2 compound of IS: 5831.
- For multicore cables, the armouring shall be by galvanised steel wires / strips. If armouring is specified for single core cables the same shall be with hard drawn aluminium round wire of 2.5 mm diameter.
- The outer sheath for the cables shall be supplied by extrusion over the armouring and shall be of PVC compound confirming to the requirements of Type ST 2 compound of IS: 5831. To protect the cable against rodent and termite attack, suitable chemicals shall be added into the PVC compound of the outer sheath.

Standards

The Cables shall conform to the requirements of the following, but not limited, to latest revision of relevant Indian Standards or equivalent British or any other International Standard Specification.

IS: 1554 -	PVC insulated (heavy duty) electric (Part I) Cables - Part I for working voltages upto and including 1100V.
IS: 1753 -	Aluminium conductors for insulated cables.
IS: 3961 -	Recommended current ratings for (Part II) cables: Part-II PVC insulated and PVC sheathed heavy-duty cables.
IS: 3975 -	Mild steel wires, formed wires and tapes for armouring of cables.
IS: 5831 -	PVC insulation and sheath of electrical cables.
IS: 7098 -	Cross-linked Polyethylene insulated (Part-II) PVC sheathed cables: Part-II for working voltages from 3.3 KV upto & including 33 KV.
IS: 8130 -	Conductors for insulated electric cables and flexible cords.
IS: 9968 -	Elastomer - insulated cables, for (Part I) working voltage upto and including 1100V.

Testing & Inspection

All the cables shall be tested and examined at the manufacturer's works. All the materials employed in the manufacture of the cables shall be subjected, both before and after manufacture of the cable, to examination, and testing by vendor.

All routine and acceptance tests in accordance with the relevant standards shall be conducted in presence of the Client.

Vendor shall furnish Test Certificates for all cables before dispatch for approval.

Vendor to confirm the availability of facilities at their works for the following tests and the standards to which they will conform to.

Accelerated water absorption test for insulation.

Dielectric retention test.

- Oxygen index test.
- Test for rodent and termite repulsion property.

Packing & Forwarding

1. The cables shall be supplied duly wound on non-returnable wooden drums. The drums shall be fully sealed to protect the cable from mechanical damage during transit. The wood used for construction of the drum shall be properly seasoned and free from defects. Wood preservatives shall be applied to the entire drum.
2. All cables shall be supplied in one length. If cable length exceeds standard drum length then the balance quantity shall be supplied in one length. If required by the Client, the vendor shall supply the cable in lengths as specified / informed to vendor during delivery.
3. On flange of the drum necessary information such as manufacturer's name, type / size / voltage grade and length of cable, drum No, year of manufacture shall be printed. An arrow shall be printed on the rim of the flange to show the direction of rotation of the drum.
4. Cables shall be supplied in drum lengths as follows:

   Medium voltage power cables upto and including 6 sq.mm. - 1000 M.
   Medium Voltage power cables from 10 sq.mm. Upto and including 300 sq.mm - 500 M.
   A tolerance of plus 5% shall be permissible for each drum.
5. The length of cable on each drum shall be determined by the manufacturer considering the transport limitations from manufacturer's works to the site.

Laying of Cables

Transporting the cables from stores to place of installation. The drums under the custody of the contractor shall be neatly arranged in the yard near his site office. The drum shall not be rolled for transportation more than 10m Truck / Trailer shall be used for transportation for distance more than 10m.

- The cables shall be rolled out for equipment and cutting shall be as per site requirement. Cable jacks and cable rollers shall be used during laying of cable.
- Electrical Contractor shall cut all cable length by actual measurement at site as per final route determined. Cable lengths indicated in Cable Schedules shall be used only to get an idea of length involved.
- The cables shall be tested for insulation value before laying. Drum Schedule to be prepared by contractor.
- The Cables shall be laid in trenches, trays, along walls or structural support as per the requirement. The cables shall be neatly laid and clamped. The crossing of cables shall be avoided. The arrangement of cables on the tray / trench

shall be decided based on the cable schedule and layout drawings and shall be approved by the CONSULTANT/Client.

- Clamping of cable shall be done by 18 SWG thick aluminium clamps at an interval of 0.5 mtr. for vertical run and 1 mtr. for horizontal run. When cables are cleated on wall / structures, the spacer and saddle shall be used at 300 mm interval or less depending on the location and shall be approved by CONSULTANT/Client.

- The cable terminations shall be done as per standard practice and crimping type of terminations shall be considered.

- The glanding shall be done with suitable arrangement for earthing the gland. Wires / sleeves required for effectively earthing the glands shall be included in the termination materials.

- The unused cores of the multicore cables shall be properly taped.

- The tag carrying the cable number shall be at interval of 20 mtr for underground cable and 30 mtr for above ground cable and at all bends and route changes of the cable run. Material of tag will be aluminium for above ground cables and of lead for buried cables. Sample of tags shall be approved by CONSULTANT/Client.

- The cable numbers shall be painted near the terminal blocks in MCC / Distribution Boards / Switchboards.

- For main power cables loops shall be provided near terminations.

- All cables coming from floor / trench shall be taken through a G.I. Pipe. The length of the pipe shall be decided by the contractor and approved by the CONSULTANT/Client.

- The glands supplied by the contractor shall be suitable for cable sizes mentioned and if necessary reducers shall be provided by the contractor. The contractor shall indicate the requirement of reducers and supply the same after approval of rates by Director IITM Pune.

- The contractor shall supply and install the ferrules for multicore cable connections. The ferrule markings shall be identical to the wires connected to the terminals.

- The Lugs used shall be tinned Copper for Copper Cable and Aluminium Lugs for Aluminium Cable, crimping type of reputed make. The Lugs used for multistrand control cable shall be PVC sleeved crimping type copper lugs.

- The connections between the junction boxes/control panels to components like pressure switches, limit switches shall

be through flexible conduits. The length of each of the flexible conduit shall not exceed 120 cm.

- The cables coming from switchboards to the cable tray shall be taken through branch trays and the cables shall be clamped neatly. The arrangement shall be approved by CONSULTANT/Client.

- Main cable runs are to be routed as shown on the contract drawings. Any modifications found necessary due to site conditions must be approved by CONSULTANT. Details of routes not shown on these drawings are to be determined on site by discussion with CONSULTANT/Client.

- PVC insulated and / or served cables shall not run parallel within 100 mm of, or be installed above and in line with, any heated pipes or duct. Where crossing above heated pipes or ducts is unavoidable the cable must be kept at least 150 mm from the outer surface of such pipes or ducts or the insulation thereof.

- On main horizontal cable runs where cables are supported, suitable mild steel saddles, cleats or clips shall be used. Between these fixing points cables shall be laid neatly in position on the intervening racks. On vertical cable runs and horizontal runs other than the main horizontal runs, cables shall be fixed at one meter intervals. Where different sized cables are together the maximum fixing intervals are to be those required for the smallest cable, unless the smaller cables are bunched with larger cables and supported by them throughout the complete multi-cable run.

  NOTE: Where the contract drawings indicate that the cables are to be run or fixed other than in accordance with this specification, the drawings shall be deemed to be correct.

- Cable run in RCC trenches are to be run on the floor along the sides on suitable brackets and located 75 mm minimum from floor of trench. Cable ducts in the ground shall be sealed against the ingress of water, foreign matter and vermin, at both ends by means of non-setting compound and / or suitable wood plugs fitted over the cable and into the duct. Where ducts are not in use they shall be sealed in a similar manner.

- Cables laid direct in the ground shall be laid on a bedding of 150 mm of sand and covered by 150 mm layer of sand, on top of sand tiles / bricks covering to be done. The depth of laying shall be such as to provide 750 mm minimum cover for low voltage cables and 1000 mm cover for high voltage cables.

- All non used open entries in equipment and open ends of conduit are to be sealed by means of conduit plugs (or blanking plates if entries are not of standard conduit sizes) at all time.

NOTE: This is particularly important where equipment is located in position, but electrical installation is incomplete.

Where cables pass through floors, they shall be protected by metal / PVC pipes or other suitable means. Holes in floors, walls, etc. will be made and reinstalled by the contractor unless otherwise stated.

- All cables laid underground shall be protected with good quality brick and interlocked concrete tiles marked "Electric" or "Telephone" cables.

- Cable joints shall be mechanically and electrically sound and except for buried cables they shall be accessible for inspection. Underground joints shall be specially protected with a double layer of bricks and cast iron joint markers (marked 'Cable-Joint'), shall be installed to indicate the position of the joint.

- Where corrosion of armour or gland might occur, it shall be effectively protected by suitable means

- The contractor shall test all cables for proper insulation before they are transported for laying and shall furnish a certificate of acceptance to this effect. Any damage to the cable subsequently shall be made good by the contractor at his own cost. After the test of insulation, the cut ends of cables shall be sealed properly with waterproof material to prevent ingress of moisture.

- Cable Marking

  All Cables shall be externally marked at either end with the respective identification numbers by means of non-deteriorating material. Cable Markers shall be approved by CONSULTANT/Client.

  Where conductors are left to be terminated by another party or left to be connected later, they must be individually identified

CABLE GLANDS

- When preparing cables prior to fitting glands, the gland manufacturer's instruction for cable preparation shall be observed. In all cases where armoured cables are used care shall be taken to ensure that the lay of the armour is maintained after the gland is completely fitted.

- Where compound boxes are used for terminating cables, the compound must penetrate fully and leave no air holes. Where hot pouring of compound is employed, 'topping up' must be carried out as soon as possible after the first filling. The pouring temperature of the compound must not be high enough to damage the cable insulation.

- All terminations of paper insulated cable shall incorporate damp barriers in each conductor. The insulation shall be removed to leave approximately 15 mm to 20 mm of

the conductor exposed, and the conductor shall be soldered at this point.

- The preferred method of terminating conductors is by means of solder less compressed connectors. Deviations from the above shall be subject to approval of CONSULTANT/Client

- Connectors shall be of the correct size for the conductor concerned and as manufactured by Dowels or approved equivalent

- All connectors shall be marked with the size reference for identification with the correct compression tool. This reference shall be located on the palm of the connector and shall be remote from the contact faces where possible.

- The palm of the connector shall be of such shape and size that standard washers to relevant IS applicable to the size of stud for which the connector is designed shall lie flat on both faces of the connector palm when the holes in the washers and the palm are co-incident.

- Compression tools shall be designed and supplied for specific use with the connectors used, and shall be regularly services by the maker.

DISTRIBUTION BOARDS (Wall Mounted)

The Board shall be installed on column / structure, as required with necessary frame work at an approximate elevation of 1200 mm from finished floor level.

Balance activity, same as mentioned

LIGHTING SYSTEM

The lighting fixtures in the open areas shall be fed from lighting panel and controlled from local switch. Lighting wiring between JB and lighting fixtures shall be done by PVC insulated 3-core (phase neutral and earth) unarmored cable. Lighting fittings in building shall be fed from lighting panels. Wiring in the building shall be done by means of 3-core Copper Conductor PVC insulated or copper conductor wires in conduit of 1' size / metsec channel, as specified. All joints of conductors in Switch boards / JB's / Fittings shall be made only by means of approved Mechanical connectors (nylon / PVC connectors). Bare or twist joints are not permitted anywhere in the wiring system. Cost towards mechanical connectors is deemed to have been included in wiring.

Methods, type, size, etc. mentioned in the BOQ shall supersede the above requirements.

Socket outlets in production areas shall be approximately 1200 mm above finished grade and 300 mm above FFL in office area. Lighting and power panel shall be mounted such

that top of the panel is not more than 2000 mm above finished grade.

Fixtures shall be firmly supported from the structures, support clamps, etc. They may be bolted or welded to the steel work or metal inserts. In case of concrete structures, where metal inserts are not available, fixtures will be fixed to or supported from concrete surfaces with the help of anchor fastener. In such cases special care shall be taken to see that anchoring is firm.

The lighting layouts furnished by Director IITM Pune shall indicate approximate locations of lighting fixtures. The electrical contractor shall determine, with approval of the Engineer-in-Charge or his authorized representative, the exact locations of each fixture in order to avoid interference with mechanical equipment or any structure and also with a view to obtain as uniform illumination as practicable, and to avoid objectionable shadows. Conduit / cable run shown on drawing are only indicative. These shall be laid out by the contractor to suit field conditions as per directions of the Engineer-in-Charge.

All hardware shall be galvanized or zinc passivated. Circuit cable shall be group cleated to structure by using galvanized strip clamps or run in cable trays wherever they are available. Spacers and cleats shall be of suitable size to accommodate the cables and shall be approved by Engineer-in-Charge before fixing at site. For isolated structures lighting cable may be taken in underground G.I. Pipes. G.I. Saddle to be used will be 22 gauge thick ribbed types and GI Spacer will be of 3 mm thick made out of 25 x 3 mm M.S. Flat.

Main runs of wiring from lighting panels and tapings to individual fixtures shall be in sizes specified on the SLD. Wiring for all outlet sockets shall be done with 3 cores of equal sizes for phase, neutral, & earth.

The cost for cable clamps, metal spacers, anchor bolts, etc. shall be deemed to have been included in the installation of cables

Contractor shall keep a close watch on the lighting MTO sheets issued to him. Any discrepancy noticed between the figure given in MTO and the actual requirement at site, shall be immediately brought to the notice of Engineer-in-Charge by the Contractor.

All fluorescent fixtures shall be with high power factor, low harmonic (THD< 10%), warm start electronic ballast. All other Ballasts shall be low loss Cu. Ballasts.

Fluorescent lamps unless otherwise specified shall be tri-phosphor colour 86 (cool day light).

CFL lamps shall be "Bright white" unless otherwise specified.

MID / High bay fixtures and streetlights shall be integral and floodlights shall be non-integral unless otherwise specified.

All housings shall be cast aluminum only. Sheet metal housing is not acceptable for outdoors luminaries. All outdoor luminaries shall be rated at IP 65.

Fixtures construction shall be suitable for maintenance from bottom unless otherwise specified and shall be screw less press fit as far as possible. Lamp replacement shall be possible without removing fixtures.

Tie arrangement shall be provided for covers, louvers etc which need to be removed for lamp / ballast replacement.

CONDUIT SYSTEM

Surface or concealed conduit system of wiring shall be adopted as specified in the drawings. Suitable pull boxes or inspection type fittings will be used to facilitate drawing of wires. Conduit wiring shall be as per IS-732. Wherever specified, conduits and conduit accessories shall be galvanized and shall conform to IS-2667, 1988.

Only threaded type conduit fitting shall be used. Pin Grip type clamp type fittings are not acceptable. Conduit ends shall be free from sharp edges or burrs. The ends of all conduits shall be reamed and neatly bushed with Bakelite bushings.

In order to minimize condensation of sweating inside the conduit system, all outlets shall be properly drained and ventilated in such manner so as to prevent entry of insects.

The outer surface of the conduit pipes, including all accessories forming part of the conduit system shall be adequately protected against rust, particularly when such system is exposed to weather. In all cases bare threaded portion of conduit pipe shall not be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.

Conduit connection to outlet boxes shall be by means of screwed hubs or check nuts on either side.

Conduit pipes shall be fixed by 22 gauge ribbed G.I. saddles on 25 x 3 mm G.I. saddle bars in an approved manner at intervals of not more than 50 cms. Saddle shall be fixed on either side of couplers, bends or similar fittings, at a distance of 30 mm from the centre of such fittings. The cost of saddle bars, saddles, clamps, etc. shall be deemed to have been included in the installation of conduits.

Where concealed wiring is to be adopted, conduits shall be laid in time before concreting of the slab. The contractor shall co-ordinate his work with other agencies involved in the civil works in such a way, that the work of these other agencies is not hampered or delayed because of any section on his part. Vertical conduit runs shall be made either through columns or chases prepared in the walls. Contractor shall fill these chases or any other openings made by him after completing the work and neatly finish the surface. During installation, care shall be

taken to see that adequate covers are provided to prevent rusting of conduits.

If required, conduit runs may be concealed in the floor for low level receptacles and exhaust fans. As built conduit layout drawing shall be submitted by contractor.

Wiring for exhaust fans shall be terminated in ceiling roses / receptacles and the connection from ceiling rose / receptacles to the exhaust fan shall be by means of a flexible cord equivalent in size to the main run of wires.

Maximum permissible number of wires that can be passed through a conduit of particular size shall be as per Table indicated below.

After erection, the entire conduit systems shall be tested throughout for mechanical and electrical continuity and shall be permanently connected to earth by means of approved type earthing clamps, in accordance with Indian Electricity Rules.

Installation is inclusive of supply and fixing of all accessories like:
Elbows, grommeters, bends, T-offs, etc.

2" Deep 65 mm dia round conduit junction box (18 SWG) with acrylic cover and 30A rated completely shrouded PVC connectors in JB. The terminals shall be kept loose in Junction Box for easy maintenance and connection.

CABLE TRAYS

All cable Trays upto 300mm shall be perforated type & above 300mm ladder type trays shall be used.

The Trays shall be pre-fabricated hot-dipped galvanized. Cold galvanizing at site is acceptable only for touch-ups.

The Trays shall have suitable provision for clamping at an interval of 500 mm.

The Earthing Strip for the earthing ring shall be run along the side of the Tray.

The connection between individual equipment to the ring shall be by bracing or with lugs.

The bending of trays shall be smooth and the curvature sufficient for each bending of cables in it. Pre-fabricated accessories such as Tees, bends, risers, couplers, reducers, etc. shall be used at all junction & branches. Cutting & welding of trays at site is not permissible. Similarly, the trays shall not be welded on the supports but bolted only.

Electrical Cable Tray routing shall be co-ordinated by Electrical Contractor at site to check fouling with pipes, equipment, light fittings, HVAC, etc. before fixing the trays.

EARTHING

All Electrical Equipment must be efficiently double earthed in accordance with the requirement of IS-3043/IEEE 80 and relevant regulations of Electric Supply Authority.

The earth pits shall be as per IS with proper arrangement for testing.

All earthing conductors shall be hot dip galvanized / electrolytic grade base copper conductor. The main earthing rings shall be done as per practice laid in Indian Standard.

The earthing of individual electrical equipment by two distinct strips/conductors shall be done as per practice laid in Indian Standard.

The sizes and material of conductors for earthing various equipment shall be as per relevant Earthing Drawing / General Notes for Earthing and Earthing Schedule.

All electrical equipment shall be connected to the earth bus at two points except the lighting fittings and junction boxes.

Following earthing resistances shall be measured and recorded in the presence of CONSULTANT/Client during the dry season.

Resistance of each earth electrode with electrode isolated from the system.

Combined earth resistance of the installation measured at the substation, switch room and any other point as directed by the CONSULTANT/Client.

The method of testing shall be as per Clause No. 10.1 and 10.2 of IS-3043. The contractor shall prepare the test report on standard Format. The effective earth resistance of the system shall be <1ohm.

All hardware for bolted joints shall be galvanized and the size of the bolt shall not be more than quarter of the size of earth conductor.

Tinned copper lugs shall be provided where round earthing conductors are used.

The 415V neutral shall be solidly earthed by means of two separate and distinct connections to earth. Each connection shall be connected to an independent earth pit near the transformer. The earth pits shall be interconnected between themselves and the main earthing grid to form an earthing ring. The neutral earthing leads shall be kept away from the transformer tank.

All joints in the main earthing conductors shall be welded.

Terminal joints on the equipment shall be bolted.

The earthing conductors running underground shall be laid approximately 500 mm / 600 mm below the grade level.

Removable test links shall be provided near the earth pits to facilitate testing of earth pits.

Where the earthing terminal diameter provided on equipment is larger than quarter of the size of the earth conductor, connection shall be made using a wider flag welded to the conductor.

The quality of galvanizing shall be subject to test in the presence of CONSULTANT/Client.

Unless otherwise approved by Director IITM Pune/ Consultant, all equipment (Rotary/ Static) shall be earthed at two points.

The equipment to be earthed shall be connected to a common earth grid of power system.

The pipes shall be earthed, if resistance of earth exceeds 10^6 ohms.

For equipment earthing, suitable GI bolts with spring and plain washers to suit the thread of earth boss of equipment, etc. shall be provided by Electrical Contractor.

Materials for Earthing

The Sizes and Material of Conductors for earthing various Equipment shall be as per relevant Earthing Drawing / General Notes for Earthing and Earthing Schedule prepared for particular Project.

Earth Pits

The number of earth pits will depend upon soil resistivity and the voltage of the system. The location of the earth pit will be as shown in the drawing. The earth pit together with the electrode shall be constructed as per IS-3043-1987. The minimum distance between two earth pits shall not be less than twice the length of the electrode. A bolted assembly link shall be provided in the connection between earth electrode and the main earth conductor. GI pipe for watering shall be included in the rate of earth pit.

Earth Bus and Earth Wires

The earth wire may be of solid bars or flats or stranded. Sufficient care should be taken to prevent corrosion and mechanical damage. Interconnections of earth continuity conductors and main and branch earth wires shall be made in one of the following manners:

Riveted connection

- Welded connection (mainly applicable in the case of M.S.)
- Brazed connection (for copper)
- Bolted connection

Framework and other non-current carrying metal work associated with each system e.g. transformer, tanks, switchgear frame work, etc. shall be earthed. Extraneous metal framework not associated with the power system e.g.

boundary fence, steel structure, sheaths of communication cables, etc. will have to be earthed.

Each incoming and outgoing cable shall be bonded to the switchboard earth so that the armour and sheathing with feeders and interconnection shall form an earth system. The complete earthing system inside a substation shall be given a coat of black asphaltic varnish, if insisted by CONSULTANT/Client.

Following also shall be earthed:-

- **Metallic noncurrent carrying parts of all electrical equipments such as transformer, switchgear, panels, power sockets, lighting fixtures., shall be earthed at one point for and up to 230V and at two points for working voltage of 415 Volts.**
- **Steel structures / columns**
- **Cable trays, spheres, vessels and other process equipment.**
- **Fence and gate of electrical equipment (of transformer yard)**
- **Cable shields and Armour.**
- **Street light poles near to main earth grid shall be earthed by tapping from main earth grid. For remote located street light pole, individual earth electrodes shall be constructed.**
- **Earth strips from Lightning arrester shall be laid and connected to Earth stations directly. Strips shall be of specified size. These shall be connected with plant main grid, whenever specified only below ground.**
- **Equi-potential jumpers for any or all of the above equipment joints / sections intended for earthing.**

Artificial Treatment of Soil

If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

Earth Resistance

Earth resistance of main bus and in turn at connections to equipments shall be less than 1 ohm.

For further Details please refer BOQ. Sizes mentioned in the layout drawing shall supersede the above.

SECTION-G
APPROVED LIST OF MATERIAL

Contractor shall supply material of Reputed Make which is approved by Maharashtra state Transmission Company (MSETCL) and Maharashtra state Electricity Board (MSEDCL)

SR. NO	ITEM DESCRITION	RECOMMENDED MAKES	PROVIDED BY BIDDER
1	H T XLPE CABLES	Universal / RPG./ Lapp/ KEI /Polycab	
2	H T DO fuse	Atlas / Pactil/ Kiron	
3	A.C.S.R. conductor	Atlas / Sterlite / equivalent.	
4	Clamps, Termination Kits, Joints	Raychem/ M-SEAL	
5	HT GOD	Atlas/ Pactil/ Kiron	
6	LT Cables	Universal/Lapp/Finolex /RPG/KEI/Polycab	
7	H.T. cable terminations	Raychem/ M-SEAL	
8	33kv Lightning Arrestors	CG/GE/Elpro	
9	ACB	ABB / Schneider MG / Siemens / L&T	
10	MCCBs	ABB / Schneider MG / Siemens / L&T	
11	SDFs	ABB / Schneider MG / Siemens / L&T	
12	Timers, Temp Controllers etc	Solectron / L&T/ABB	
13	Contactors/Relays	ABB / Schneider MG / Siemens / L&T	
14	Capacitors Banks (APP/MD)	Subodhan / Epcos / ABB	
15	Lighting Fixtures	Wipro/ Philips /Thorn / Bajaj	
16	1/3 Phase/ Sockets	Legrand / L&T/ Hager/ABB	
17	DBs	Hager/Legrand/MG/ABB/ Siemens	
18	Load Managers	L&T Quasar / Socomec/Elmeasure/Rishabh	
19	SDF Unit	Siemens / ABB/ Merlin Gerin/L&T	
20	ELCB / RCCB	Legrand / Merlin Gerin/ Siemens/Hager/ABB	
21	Bustrunking / Rising main	Schneider / L & T	
22	Starters	Siemens/ ABB/Merlin Gerin	
23	Relays (OL & EF)	Alstom/ Siemens/ABB	
24	APFC Relay	Sycon/Beluk/Ducati(RMI)/ABB	

25	Energy meter	L&T/Enercon/Krycard/ AE/Socomec/Elmeasure	
26	Indicating meter(Digital)	Enercon /AE/ Socomec/Elmeasure	
27	Control fuses	EE/Siemens/ Merlin Gerin	
28	Indicating lamps (LED based)	ALTOS/Teknic/Raas, Siemens	
29	Push buttons	Siemens/BCH/ Teknic/	
30	Connectors	WAGO/Phoenix	
31	Current / Voltage transformers	Kappa/ SEGC/AE	
32	Glands	Commet/Braco/Dowels/ Siemens/Phoenix	
33	Lugs	Dowel/Jainson	
34	PVC conduit accessories	Precision/ Circle Arc/ Diamond.	
35	Wires	Finolex / Lapp /RPG/Universal	
36	Switches & socket	ABB/Legrand/ Crabtree / Anchor Roma/	
37	MS Conduit & accessories	BEC/VIMCO	
38	Lighting poles	Valmont/Wipro/Bombay poles/Bajaj	
39	High Mast	Philips / Wipro /Valmont	
40	Ceiling fans	Usha, Orient, Crompton,	
41	Exhaust Fan (heavy duty)	Almonard/GEC/ Crompton	
42	Exhaust fans (light duty)	Siracco	
43	Electronic ballasts	Wipro/CG/ Intelux/ Philips	
44	Light fitting accessories	ATCO/ Vossolloh/ Wipro, Philips/Thorn/ Clipsal	
45	Incandescent Lamps	Philips/ Osram	
46	Telephone tag block	Krone	
47	Lan/Data/Telephone cables / wires (Cat6)	Delton/ Finolex/ ITL/ Avaya	
48	TV cables(RG6)	Airtech/ Komscop/ Sumer/Finolex.	
49	Speaker	Philips, All Wave Radio, Rami	

50	Data Networking	Avaya	
51	Fire alarm / access	Eureka Forbes/Zicom/ Siemens/ Celberus	
52	Cable Trays	Ashlesha /Indiana OR Eqiv.	

SECTION-H

LIST OF IS STANDARD

IS 10028	Code of practice for installation and maintenance of transformers.
IS 1866	Code of practice for Maintenance of mineral insulating oil.
IS 335	New insulating oil for transformers and switchgears.
IS 2309	Protection of buildings and allied structures against lightning.
IS 3043	Code of practice for earthing.
IS 5216	Safety procedure and practices in Electrical work.
IS 3106	Code of practice for selection, installation and maintenance of fuses (Voltage not exceeding 650 Volts)
IS 1646	Code of practice for fire safety of buildings (general) Electrical installation.
IS 9921	Alternating Current Disconnectors above 1000 V.
IS 8623	Factory built assemblies of switchgear, and control gear for voltages up to and including 650 V
IS 2147	Degree of protection provided by enclosure for low voltage switchgear and control gear.
IS 2551	Danger notice plates.
IS 1248	Electrical indicating instruments.
IS 722	AC Electric meters.
IS 2705	Current Transformers.
IS 3156	Voltage transformers.

1. Various materials and electrical installation shall confirm to latest editions of the B.I.S./IEC as mentioned in materials and installation specifications column. Additionally and generally following Indian standards shall also be applicable. All other relevant Indian standards shall also be applicable whether specifically mentioned or not.

IS 8828	Miniature air break circuit breakers for AC circuits.
IS 10118	Installation and maintenance of switchgear.

IS 398 IEC 1089-1991	ACSR conductors
IS 7098	Cross linked polyethylene insulated PVC sheathed cables up to 33 KV
IS 12943	Brass glands for PVC cables
IEC 99-4	Gapless Surge Arrestors
IS-900	Code of practice for Installation and Maintenance of Induction Motors
IS-1255 - 1983	Codes of practice for Installation and Maintenance of Power Cables up to and including 33 KV Rating.
IS-732 - 1989	Code of practice for Electrical Wiring Installation. (System Voltage not exceeding 660 Volt).
IS-1913	General and Safety Requirements for Luminaries.
IS-1646	Code of Practice for Fire Safety of Building (General) Electrical Installation.
IS-2713	Specification for Tubular Poles for Overhead Power lines.
IS-6792	Method for determination of Electric Strength of Insulating Oils.
IS-2667	Specification for Fittings for Rigid Steel Conduits for Electrical Wiring.

VIII.BILL OF QUANTITIES

IX.TENDER DRAWINGS

S.No	ITEM DESCRIPTION	QTY	UNIT	RATE	AMOUNT
A	**Excavation and Back Filling**				
1	**Excavation in soil,soft & hard murum...**				
	Excavation for footing, machine foundation, plinth beams , wall footing, gutters, tanks in soil, soft , hard murum, asphalt road & existing murum filling including removing the excavated stuff upto a distance of 1500 m beyond battery limit area and staking and / or spreading as directed, shoring, strutting,**dewatering for all water may accumulate in excavation(from spring,tidal or rivr seepage,broken water mains or drains and seepage from sub soil aquifer)** and preparing the bed as directed including back filling in layers etc. complete				
	A) 0.00 - 1.50 m Depth	121.50	CUM		
	B) 1.50-3.00 m Depth	121.50	CUM		
	C) 3.00- 4.50 m Depth	25.00	CUM		
	D) 4.50- 6.00 m Depth	25.00	CUM		
2	**Filling in plinth with contractors murum...**	243.00	CUM		
	Filling in plinth and floors with contractor's locally available filling material with all leads and lifts brought from outside (material to be approved by engineer in charge) , including filling in layers of 20-30 cm., watering, compaction levelling etc. complete. The proctor density of such compacted fill shall be 95% of standard proctor ,all royalties etc. complete.				
3	**Carting away surplus excavated earth...**	243.00	CUM		
	Conveying of surplus excavated earth to outside areas with all royalties and the disposal by mechanical transport etc complete (Rate including all leads and lifts beyond municipal corporation boundary limit)				
4	**Hard core 150 mm thk...**	4.95	CUM		
	Providing & laying hard core of hand crushed metal 60 mm in two layers of 100 mm each consolidated to 75 mm making total thickness of 150 mm including watering ,ramming with heavy rollers,levelling the surface with murum /gret spreading etc .complete.(The rate shall be for compacted thickness.)				
5	**Anti-termite treatment...**	33.00	SQM		
	Providing and injecting chemical emulsion for anti- termite treatment and creating a chemical barrier under & around the column pits, walls, foundations, trenches, basement excavation, top surface of murum filling in plinth and rubble soling, junction of wall and floor, along the external perimeter of the building, at expansion joint, surrounding of pipes, conduits etc. complete with chlorophriphos 20% E.C. emulsified concentrates as per latest IS code complete from approved agency.(Plinth area of the building at ground floor is to be considered)				
B	**CONCRETE AND R.C.C. ITEMS -**				
6	**P.C.C. 1:3:6**	13.05	CUM		
	Providing and laying in situ Plain Cement Concrete 1:3:6 of trap metal for foundation, floor bedding etc. including dewatering, formwork, compacting and curing & placing etc. complete at all depths.**Rate shall include concrete brought from RMC plant or batching plant installed on site or outside site premises by contractor**				
7	**Cement concrete M25 grade...**				
	Providing and casting in situ cement concrete of M 25grade concrete of trap metal as per detailed designs including dewatering, centering formwork with shuttering ply & steel plates, compacting with vibrators, placing & fixing inserts (viz. plates, pipes for cutouts, anchors), formation of cutouts, chases etc. as per detail drawing and curing complete. RCC structures shall be Fair Finish.(Rate at all heights & levels and excluding tor / mild steel Reinforcement).**Rate shall include concrete brought from RMC plnat or batching plant installed on site or outside site premises by contractor**				
	A) Footings/ rafts/foundation block/bed block	40.50	CUM		
	B) Columns / Pedestals	16.77	CUM		
	C) Plinth / Ground beam	3.94	M3		
	D) Slab of all types.	5.76	M3		
	E) Beams & lintels.	12.75	M3		

	F) Chajja / canopy/ fins/brackets/portals.	1.16	M3		
	H) Coping.	2.76	M3		
8	**TMT Tor**	12000.00	Kg		
	Providing, fixing and laying in position TMT Tor / Mild steel bar reinforcement of various diameter. for R.C.C. work as per detailed designs, drawings & schedules or as directed including straightening, cutting, bending, hooking the bars**,Chairs, laps,**binding with wires or welding and supported as required, providing cover blocks etc. complete (Rate at all heights & levels & including cost of binding wire and / or welding rods)make Sail,Tisco,RINL or equivalent				
C	**MASONARY ITEMS -**				
9	**B.B.M. With Conventional bricks 150 mm thk...**	16.40	SQM.		
	Providing & constructing brick masonry with conventional bricks in half brick thick walls (Min.150 mm thick) in cement mortar 1:4 with RCC bands- Patli at every 1.00 m height as per designs including racking out joints, scaffolding, watering & curing etc.				
10	**B.B.M. with conventional bricks in superstructure...**	44.19	CUM		
	Providing and constructing masonry with Conventional bricks in C.M.1:6 in superstructure including constructing in line and level at all depths, racking out joints, scaffolding, watering, curing, striking joints etc. complete.				
11	**B.B.M. with conventional bricks in foundation...**	12.39	CUM		
	Providing and constructing masonry with Conventional bricks in C.M. 1:6 in foundation, steps & in plinth including constructing in line and level at all depths, racking out joints, scaffolding, Watering, curing, striking joints etc. complete.				
D	**STRUCTURAL STEEL WORK ITEMS -**				
12	**Structural steelwork in hot rolled sections...**	10000.00	Kg		
	Providing fabricating & erecting structural steelwork in hot rolled sections For columns, tie beams, Pergolas, trusses, purlins, gantry, monorail columns, cable trays,pipe racks ,castellated beams, plate girder, staircase & other structural members with all bracing, gusset plates etc. as per detailed drawing or as directed at all heights and levels including removing the scales & burrs, cleaning with phosphoric acid ,marking, Cutting, fabrication, hoisting, erecting & fixing in position, making alignment of members making welded / bolted / riveted connections with one coat of approved red-oxide paint etc complete.(Shop drawing for roofing & cladding to be Submitted by Contractor for approval.)				
13	Providing, fabricating & fixing M.S. inserts in concrete,tremix flooring or masonary surfaces such as plates, angles, channels, flats etc. as per detailed drawings including cutting, bending, drilling holes, welding, placing in position etc.complete at all heights and levels.	300.00	KG		
E	**PLASTERING AND WATERPROOFING -**				
14	**Internal cement plaster (with neeru finish)...**	167.23	SQM		
	Providing & applying internal cement plaster to walls (minimum thickness 12 mm) in cement mortar 1:4 with Neeru finish to concrete, stone or brick surface including roughening the concrete surface, applying the base coat in line & level, scaffolding, cleaning & curing etc. complete with grooves, pattas etc, wherever specified at all heights, levels and floors.				
15	**External sand faced plaster...**	217.07	SQM		
	Providing & applying externally sand faced plaster over brick stone or concrete surface in two coats (minimum thickness 20mm) using well graded sand, including roughening the concrete surface, applying base coat in C.M. 1:4 in proper line & level using waterproofing compound of approved manufacturer at 1kg per cement bag, curing the same for not less than two days and keeping the surface of the base coat rough to receive the sand faced treatment, applying second coat in C.M. 1:4, finishing the surface by taking out grains and curing for not less than 14 days etc. at all heights and levels as per drawings including curing, scaffolding, including making of dhar, pani patti, groove etc. complete				
16	**Expanded metal mesh...**	30.00	SQM		
	Providing, fixing & placing in position Expanded metal mesh over the joint of R.C.C and brickwork, and / or wherever required to hold the extra thickness of plaster, including tightening mesh, scaffolding, etc. complete.				

17	**Waterproofing treatment to toilet pits...**	2.69	SQM		
	Waterproofing treatment to toilet pits with cleaning the slab surface with wire brush and washing the slab surface thoroughly,applying waterproof plaster in cement mortar 1:3 using approved waterproofing compound to sides and slab surface, finishing necessary laps on walls, watas at junctions of walls etc. including cleaning, watering, curing, giving seven days pond test etc. complete.				
18	Providing and laying I.P.S. waterproofing with brick bat coba upto 150 mm thk	33.00	SQM		
	treatment to terrace slab including -				
	1. Washing the existing concrete surface.				
	2. Laying 1:3 cement mortor base & laying brickbat in layer in CM 1:3 to required				
	slope as per drawing . Top coat of 1:3 cement mortor, finishing the top coat with				
	cement slurry.				
	3. Mixing an integral waterproofing compound of approved make (skott no. 1) at				
	1.0 kg per bag of cement at all stages.				
	4. Injection grouting with non shrink cementacious grout of approved				
	manufacturer (FOSROC, ROFF, SIKKA or equivalent)at construction junctions.				
	5. Item shall include curing, cleaning, giving 7 days pond test and 10 years				
	guarantee.				
	6. Waterproofing shall be carried out upto 300 mm above finished terrace level with				
	terrace level with coving.				
	(Measurement given, is clear plan dimensions)				
F	**FLOORING ITEMS -**				
19	**Graniteflooring...**	4.00	SQM		
	Providing & laying approved quality 25 mm thick natural stone flooring of avg. size 1200 x 1200 sq.mm. in required position & in line and level on a bed of 1:6 cement mortar (50 mm thick) including cement float, filling joints with matching color cement slurry, polishing, curing and cleaning etc. complete				
	A) Granite flooring **(Basic Rate for material only-190 sqft)**				
20	**Granite skirting….**	2.00	SQM		
	Providing and laying 125 mm high approved quality polished Granite stone 20mm thk for treads, risers,skirting & cladding as directed on a bed of 1:4 cement plaster including laying in required position and in line & level, filling joints with neat cement slurry, curing,polishing exposed edges ,cleaning etc. complete.				
21	**Vitrified tile flooring...**	35.00	SQM		
	Providing and fixing Vitrified tiles of avg. max. 600 x 600 sq.mm. size of approved make and colour finish for flooring in required position & in line and level as directed, set on a bed of 1:6 cement mortar (min.35 mm thick) including cement float, maintaining the flooring with the layer of POP and filling the joints with matching colour cement slurry, curing, rubbing ,cleaning etc.complete. (Basic rate of tile - 120/sqm)				
22	**Vitrified tile Skirting...**	5.00	SQM		
	Providing and fixing Vitrified tiles skirting of 100 mm high of approved make and colour finish for flooring in required position & in line and level as directed, set on a bed of 1:6 cement mortar, filling the joints with matching colour cement slurry, curing, rubbing ,cleaning etc.complete.				
23	**Granite platform for counter top basins...**	1.50	RMT.		
	Providing & laying granite platform for counter top basins of 750 mm wide with granite supports for vertical and kadappa below granite as per the detail drawing etc., including fascia patties and rounding or polishing the exposed edges as per drawing, cutting for basin opening, sealing all crevices with silicon sealant, laying Cement mortar 1:6 between granite and kadappa etc. complete.(Basic Rate-150 sqft)				
24	**Ceramic tiles flooring...**	3.28	SQM		
	Providing & laying colored antiskid Ceramic tiles of avg. max. 300 x 300 size ,make, color & quality for flooring in required position & in line and level on a bed of 1:6 c.m. (min.35 mm thick) including cement slurry, filling joints with matching color cement slurry, curing and cleaning etc. complete				
	Basic Rate of material only: Rs. 90/sq.ft.				
25	**Dado...**				

	Providing and laying colored glazed tiles of approved finish size, make, Color and quality for dado & skirting in required position & in line and level on a leveled plaster bed including cement slurry, filling the joints with matching color cement slurry, curing and cleaning etc. complete				
	B) Ceramic glazed tiles (Basic rate-Rs. 85 /sqft)	10.08	SQM		
26	**Flame finished Granite tread & riser**	8.71	SQM		
	Providing and laying avg. 1200 mm long 325 mm wide approved quality Prepolished pre-cut granite 20 mm thick for treads(with 15 mm wide flamed friction strip as per design drawing .) & risers in line & level on a bed of 1:6 cement plaster including cement float, filling joints with matching colour cement slurry, curing, edge polishing, complete.(Basic Rate-150 sqft)chamfering ,cleaning, etc.				
G	**PAINTING AND FINISHING -**				
27	**White wash...**	25.00	SQM		
	Providing and applying whitewash in two coats on plastered or masonry surface at all heights including scaffolding, preparing the surface by brushing brooming down etc. complete.				
28	**Acrylic Emulsion (Oil bound distemper)...**	200.00	SQM		
	Providing and applying Acrylic emulsion (oil bound distemper) of approved make and shade on all surfaces & at all heights in three coats including scaffolding, preparing the surface by brushing and brooming down,applying primer, palti and a coat of Birla white putty etc. complete				
29	**Weather Proof Exterior Grade Emulsion...**	225.00	SQM		
	Providing and applying 100% Weather Proof Exterior Grade Emulsion (Apex Acrylic exterior paint from J & N , Nerolac or equivalant)of approved shade to the plastered or exposed brick or stone or concrete surface in two coats including preparation of the surface, a coat of approved primer, birla white putty scaffolding , curing, cleaning etc. complete.				
30	**Synthetic Enamel paint for structural steel...**				
	Providing and applying Synthetic Enamel paint in two coats over structural steel surface as per the manufacturers instructions & of approved shade and make including preparing the surface, applying zink chromate primer ,scaffolding ,cleaning etc. complete	10.00	M.T.		
H	**DOORS AND WINDOWS -**				
31	Teak wood frame...				
	Providing and fixing C.C.T.W. frame as per detailed drawings with M.S. hold fasts 4 nos. on each side, bar spacer(12mm dia) bolted at the bottom of the frame as per details etc. complete including making the frame, fixing TW cover molding around the frame adjecent to wall and applying two coats of synthetic enamel paint of approved shade and make over a coat of primer on the other faces				
	A) 100 mm x 75 mm	14.90	RMT.		
32	Flush door...	5.00	SQM		
	Providing and fixing approved quality factory made avg. 1 mm thk. both faced laminated solid core flush door with vision panel in single/double leaf 38mm thick BWR type plywood surface on both sides , TW beading on all edges, doors to be of exterior grade as per the detailed drawings including fixing the door and finishing with two coats of melamine polish of approved shade and make over a coat of priming base as approved etc.complete.				
33	S.S.fixtures and fastenings for single leaf door...	3.00	NO.		
	Providing and fixing S.S. fixtures and fastenings for single leaf door as per following details- Fixtures to be for one door- 1.Dorma/or equivalent make Round knob Handles with cylindrical lock arrangement 1 Set. 2. Hinges 100mm				
34	**Fully glazed aluminium windows...**				

	Providing and fixing in position approved make fully glazed aluminum windows manufactured out of HE 9 WP high grade aluminum alloy sections (Zindal make) confirming to I.S. specifications with sub frame framing 100x35 mm, sliding sections of 25 mm series				
	A) Two track two shuttered window with 6 mm thick clear glass of				
	'Modi' make.	2.00	SQM		
	B) Fixed glass window with 6 mm thick Float glass.	2.00	SQM		
	C) Three track three shuttered window with 6 mm thick clear glass of				
	'Modi' make.	2.00	SQM		
	D) Louvred window with 6 mm thick float glass of approved make and				
	colour with provision of exhaust fan etc.	2.00	SQM		
	F) N type window with 6 mm thick float glass.	2.00	SQM		
		1.00	SQM		
35	**Glazed Color anodised casement Window**- Providing, supplying & fixing in position as per manufacturers' shop drawings- duly approved by architect, inclusive of LAMINATED 6+1.52PVB+6 mm sandwich laminated toughened, low-e inside and clear float glass out side of shade and tint of Saint Gobain or equivalant as approved by Architects/Client, as per drawing. The system to be of Al mullion-transom grid frame extruded profile of75mmx 100 mm fixing on horizontally and vertically in all sides and colour anodised to avg. 25 micron as per approved colour & finish, all SS fixtures & fastenings of approved grade; . The item to be cross-checked with structural engineering design and calculations for support sections & fixing hardware by the vendor and item to include same alongwith getting part mock-up at site approved from the architects. Item to include all water pressure testing on unit section,fixing brackets, SS fasteners, sashes, cleaning,hardware, fixtures, accessories complete as approved by the architects; fixed installed complete	20.00	SQM		
L	**MISCELLANEOUS ITEMS**				
36	**Plinth protection...**	5.00	SQM		
	Providing and laying Plinth protection to the outer walls of the building including necessary excavation, metaling of 150mm, laying 100 mm thick PCC 1:4:8 concrete and 100 mm thick reinforced cement concrete 1:2:4 with broom finish including formwork etc complete				
37	Providing ,fabricating and fixing M.S . Grill for boundary wall,frams and supports by using angles,tubes flats,solid bars of 25/35 mm as per detailed drawing including fabricating fixing ,painting in one coat of primer followed by two coats of synthetic enamel paint etc. complete(wt per sqm 12 kg)	10.00	Sqm		
38	Providing fixing Rod type Entry Barrier on road as located in the drawing, of approved make and type , fully steel construction, scratch proof painted, compact gear operated, with all installation, cabling, control panel assembly etc complete with testing The installation to have following fixtures:and guarantee. release arrangement for manual opening obstacle detecting system, speed adjustment, opening, partial opening and closing command; Hold - to- run command; UPS backup for 15min, reverse movement safety arrangement etc				
	c)Size 6.0m boom	1.00	NO		
39	Providing and fixing mild steel gate as per detailed drawings & designs using M.S.box frame 50x50x6 mm, 25 mm square bars at 200 mm centre to center with 18 gauge perforated sheet as per drawing including accessories,locking arrangements, welding, Riveting and painting with two coats of synthetic enamel paint over a coat of red oxide etc. complete(Basic Weight per square meter taken for Sliding Gate 176 kgs per SQM)If there is any change in basic weight due to change in pattern, change in rate will be considered.				
	a) Openable	2.64	SQM		
40	Manufacture , supplying and fixing Ornamental motorised Sliding steel gate as per detailed drawings & designs using M.S.box frame 50x50x6 mm, 25 mm square bars at 200 mm centre to center with 18 gauge perforated sheet,bottom roller arrangement with 60mm G.I pipe ,M.S Double ball bearing wheel as per drawing including accessories, locking arrangements, welding, Riveting and,finished with MRF Poly urthene paint finish excluding Motor arrngement etc. complete (Basic Weight per square meter taken for Sliding Gate 176 kgs per SQM).If there is any change in basic weight due to change in pattern, change in rate will be considered.	16.00	SQM		

41	Supplying and fixing Ornamental sliding gate Motor system of capacity 3 Tons including microprocess control system including Rocker Switch, Photocell pair , remote control unit and installation charges, testing as per I.S.Standards etc. complete (Basic Weight per square meter taken for Sliding Gate 176 kgs per SQM)	1.00	No		
42	**ACP Panel- Canopy**	84.00	SQM		
	Providing and fixing approved make and colour min. 4 mm thk. Exterior Grade Aluminium Composite Panel enclosing on all sides & supported with sub-frame of Alum. channel 38X19 mm or tube 25X40 mm 1.5 mm thick further fixed to Automotive grade painted and primed hot-dip-galvanised skeletal MS Fabricated support; groove filling with approved epoxy sealant, including necessary accessories, with scaffolding and cleaning etc. complete as per detailed design drawing approved for execution. Item to be inclusive of cutting to size and edge-formed to trays strictly as per design drawings, getting approved 2 sq.mt. mock-up from Architect, cleaned finished complete. (Shop drawing for roofing & cladding to be Submitted by Contractor for approval.)				
43	Brass Plate- Providing and fabricating as wrap-around embossed sheet Brass Plaque avg. 2 mm max 3 mm thick factory shop embossed with Graphic logo as per selection of IITM, Pune; wrapped over avg. 12 guage GI plate box avg. 100 mm deep of avg. size 1000 x 1800 sq.mm., this assembly over 75 mm deep RCC base substructure plate of matching size to receive wrap.	1.00	NO		
44	SS Railing- Avg. 60 mm dia. SS 316 Grade pipe fabricated to design drawing complete supported on SS 316 grade 5 mm thk. Balusters avg. 60 mm thk. As per detailed design drawing.	4.00	SQM		
M	**SANITATION AND PLUMBING -**				
45	**Indian WC...**				
	Supplying and fixing 'Hindware' Make pastel glazed Indian Water closet 58 CM Long. Orissa Pattern with white glazed ‘P’ or ‘S’ trap having 50 mm deep water seal, embedding trap and water closet in cement concrete in 1:4:8 Mix using 20mm size stone Jelly to a thickness of 150 mm, to size of water closet cubical, plaster the Concrete surface to slope using cement mortar in 1:3 mix for 20 mm thick, form key to plaster surface to receive required floor finish, supplying river sand, consolidating to a depth of 30 cm to size of cubical, fixing pan and trap to a perfect level, alignment, making holes in walls, restoring the same to original condition by using cement, river sand and any other required materials size etc complete at all locations.(Quoted rate shall be excluding the cost of flush valve)				
	A) Orissa pan - 20004	1.00	NO.		
46	**European WC…**				
	Supplying & fixing approved colour glazed floor mounting European water closet at required line and level with heavy duty plastic seat and cover in matching colour with non-corrosive hinges, bolts, washers, cast iron chair bracket, integral P or S trap including C.I. connection up to soil pipe at the outer face of the wall.,25mm dia valve of ‘R.A.’ or of equivalent make, with 25 mm dia. Concealed G.I. 'C' class flush pipe, fixing the Water Closet to a perfect level on floor by using required fixing materials etc. complete.(Quoted rate shall be excluding the cost of flush valve)				
	B) Model no- 20050(Cleo)	1.00	NO.		
47	**Wash basin...**	1.00	NO.		

	Providing and fixing in position 'Hindware' make Zen catalogue no-10049 Under counter wash basin at required line & level including : A) Colored glazed earthenware wash basin from HINDUSTAN Sanitary ware. B) 32mm dia brass CP bottle trap with waste coupling and joints and 32 mm dia concealed outlet pipe up to the nearest nahani trap. C) Feed pipe with all Brass specials. D) Fixing one no.12mm dia Brass CP heavy type screw down pillar cock(CON-123) of "Jaguar "make. E) 12mm dia Brass CP angular stop cock (CON-059)- one no. of 'Jaguar' make. F) 12 mm dia. flexible pipe supply from angled stop cock.				
48	**Nahani trap...**	2.00	NO.		
	Providing and fixing in position 100 mm dia C.I. NAHANI TRAPS including necessary beddings, up to the outside face of the wall & stainless steel heavy type grating with ring of approved type complete.				
49	**Gully trap...**	2.00	NO.		
	Providing and fixing in position STONE WARE GULLY TRAP of size 150 x 100 mm including C.I. cover and frame, PCC 1:3:6 in foundation, 230 x 300 mm chamber of brick masonry in C.M.1:5 with neat cement rendering including excavation & refilling etc. complete.				
50	**Inspection chamber with CI...**				
	Providing and constructing masonry INSPECTION CHAMBERS up to 1500 mm depth in 230 mm thick conventional brick masonary in C.M. 1:6,including excavation up to 1.5 depth in all kind of strata(excluding Hard rock), 100 mm thick 1:3:6 P.C.C. bedding, plaster in C.M. 1:4.				
	A) 600 mm x 450 mm	2.00	NO.		
	B) 600 mm x 600 mm	2.00	NO.		
	C) 600 mm x 750 mm	2.00	NO.		
	D) 600 mm x 900 mm	2.00	NO.		
	E) 900 mm x 900 mm	1.00	NO.		
51	**Inspection Chambers with precast...**				
	Providing and constructing masonry INSPECTION CHAMBERS up to 1500 mm depth in 230 mm thick conventional brick masonary in C.M. 1:6,including excavation up to 1.5 m depth in all kind of strata(excluding Hard rock), 100 mm thick 1:3:6 P.C.C. bedding, plaster in C.M. 1:4 fro				
	A) 600 mm x 450 mm	1.00	NO.		
	B) 600 mm x 600 mm	1.00	NO.		
	C) 600 mm x 750 mm	1.00	NO.		
	D) 600 mm x 900 mm	2.00	NO.		
52	**RCC hume pipe...**				
	Providing, laying and jointing RCC HUME PIPES of NP 2 class with all specials below ground level at all depths including cutting, jointing with hemp yarn & C.M.1:1 and testing including excavation up to Hard rock & refilling, cleaning etc. complete(Note:if required end casing in 1:2:4 Concrete should consider be exta). Excavation in hard work shall be approved and paid extra				
	A) 150 mm dia.	40.00	RMT.		
	B) 200 mm dia.	60.00	RMT.		
53	**CI Pipes...**				
	Providing, fixing in position & jointing CI Pipes (Heavy Duty) with all specials such as bends, tees, single junctions, double junctions, offsets, cowls etc. with appropriate jointing, including making holes in walls & floors, testing the line and joints.				
	A) 100 mm dia. waste pipe	5.00	RMT.		
54	**GI pipe...**				
	Providing,laying and jointing 'C' Class G.I. Water Supply Pipes with all specials such as bends ,sockets ,back nuts ,elbows ,tees ,reducers ,clamps etc. including fixing in walls or under floor or ground with necessary excavation and back filling.				
	B) 15 mm dia. Concealed	20.00	RMT.		
	D) 20 mm dia. concealed	10.00	RMT.		
	F) 25 mm dia. concealed	10.00	RMT.		
	I) 40 mm dia. open	20.00	RMT.		
55	**Ball Valves...**				

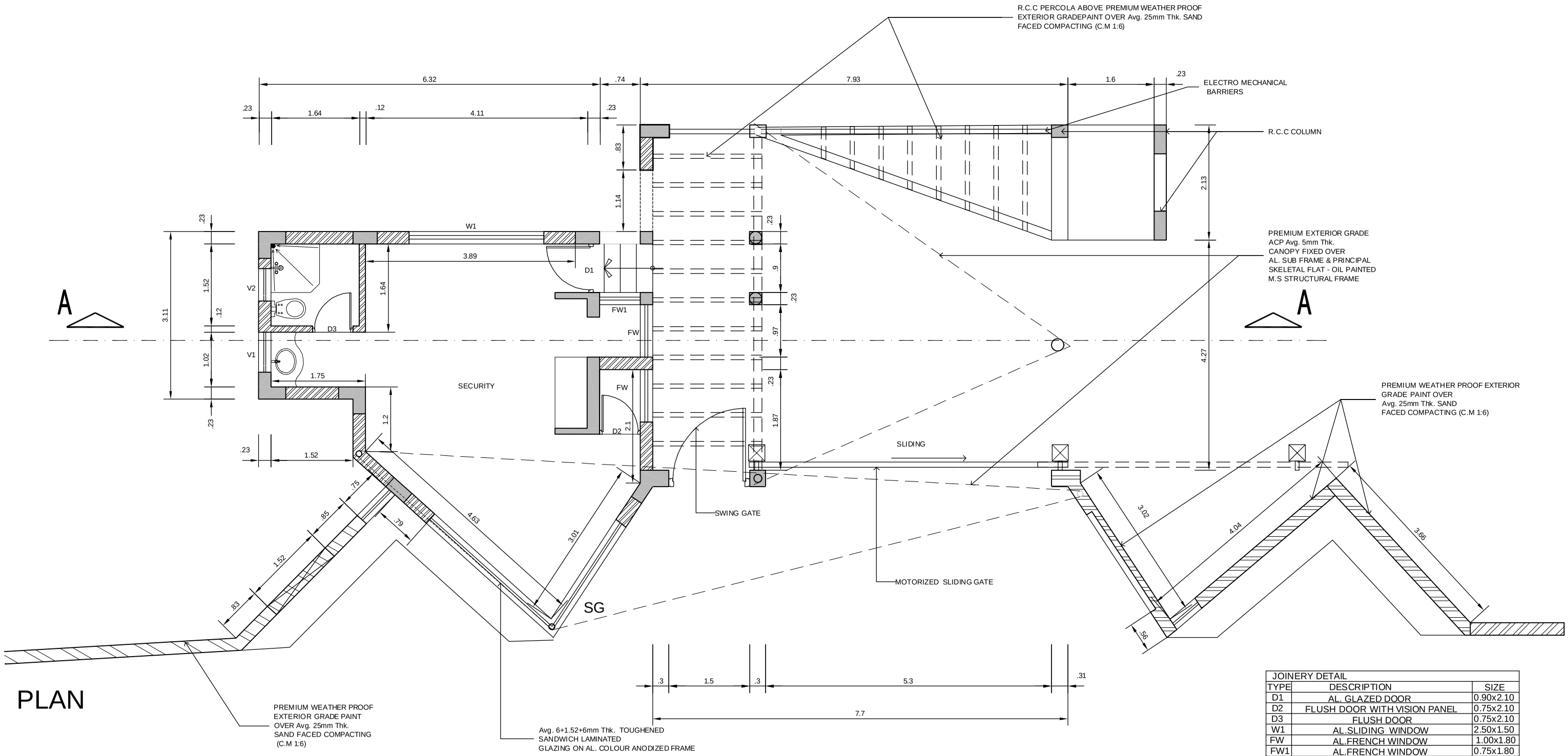
	Providing and fixing Heavy Quality Gun Metal Ball Valves with stainless steel ball complete.				
	A) 25 mm dia.	2.00	NO.		
	C) 40 mm dia.	1.00	NO.		
56	**Long body Bib cock...**	1.00	NO.		
	Providing & fixing long body CP bib cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make- Jaguar clazion 23107 or equivalent)				
57	**Two way Bib cock...**	1.00	NO.		
	Providing & fixing Short body CP bib cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make- Jaguar, item code-23041or equivalent)				
58	**Stop cock...**	2.00	NO.		
	Providing & fixing brass angular stop cock of 15 mm dia of approved Quality & make with all specials, fittings etc. complete.(make-: clarion 23053 or equivalent)				
59	**Pillar cock...**	1.00	NO.		
	Providing & fixing short body CP pillar cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make-Jaguar ,PRS -031or equivalent)				
60	**Push cock...**	1.00	NO.		
	Providing & fixing CP push cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make-Jaguaror equivalent)				
61	**Mirror...**	1.00	SQM		
	Providing and fixing mirrors in toilets including MS powder coated frame, 12mm ply backing and Belgium make mirror with all hardware.				
62	**Paper holder...**	1.00	NO.		
	Providing and fixing paper holder of approved make in toilets with all specials etc. complete.(make-Jaguar, Item code-7751 queen's or equivalent)				
63	**Towel rod...**	1.00	NO.		
	Providing and fixing towel rod of approved make in toilets with all specials etc. complete. (make-Jaguar Continental 1111N or equivalent)				
64	**Soap dish...**	1.00	NO.		
	Providing and fixing ceramic soap dish in toilets including fixing in position and in line and level with cement slurry, curing,cleaning etc. complete.(approved)				
65	**'SINTEX' tank...**	1.00	Nos		
	Providing and fixing "SINTEX" water storage tank of approved make and of required capacity including all connections, accessories, transportation, hoisting, erection etc. complete.(2000 Litre capacity)				
66	**Non return valves...**				
	Providing and fixing approved make gun metal non return valves etc. complete				
	A) 50 mm dia.	1.00	NO.		
67	**Flush valves...**				
	Providing and fixing approved make gun metal flush valves etc.complete				
	A) 32 mm dia.	1.00	NO.		
68	**Stone ware pipes...**				
	Providing, laying and jointing the best quality stone ware pipes with all specials fittings such as bends, tees, junctions, double junctions etc. below ground at all depths including cutting, jointing with hemp yarn & Cement Mortar.1:1and testing.				
	A) 100 mm dia.	10.00	RMT.		
69	PVC Down take pipes of 200 mm	30.00	RMT		

70	**SS SIGNAGE LETTERING**: Providing and Fixing solid 316 grade SS alphabetical letters average height 750 mm, avg. width 125 mm & avg. thickness 40 mm to masonary wall with sufficient anchor bolting/receiving GI circular pipe sleeves insert fixed flush to masonary wall and hidden 316 grade brackets/holdfasts SS welded to back-side of letters; fixed with approved epoxy grouting and as per execution approved Working details in issued drawing fixed firm complete. All fising to be as per issued drawing templates & working details; mounted average max. 4.5 mts high from formed ground level. Item to be inclusive of single work mock-up on site, all scaffolding, accessories, fixing implements, men material and lift upto 5 mts., cleaning finished complete to approved glossy finish to SS.	1.00	Job		
71	**EXTERIOR GRANITE CLADDING**:				
	Cladding the vertical wall surfaces of Cement plastered block masonary wall with pre-polished Granite slab of approved colour 25mm thick of best quality and free from all defects and set in cement mortar 1:2 (One cement and two sand) 10mm thick. The joints shall be flush with faces of granite slabs and in line, cut and jointed as per issued design drawing approved for construction. The joints shall be pointed neatly with same colour pigment mixed with white cement of 1.80 kg/m2. The tiles so laid shall be supported with suitable arrangements for a period of 2 hours. After laying to avoid falling of granite tiles by its self weight after laying in position. Item includes Additional support fixing with 316 grade solid SS studs avg. 40 mm diameter in head and min. 32 mm diameter in Cross-section to Architecct approved profile & glossy head finish, fixed flush complete with Granite outer face & lower rim of stud-head, stud to anchor min. 125 mm in masonary wall. Number and location of studs to be strcitly as per issued design drawing approved for construction. The Granite slabs shall be got approved by the Architect/departmental officers before use in the work, etc., complete. The rate is including labour, all materials, scaffolding charges, hire charges for granite cutting machine, power consumption etc., getting approved from Architect avg. 4 sq.mt. finished installation item cleaned finished complete.	5.00	Sqm		
72	**Granite Natural stone Cill & Jamb pieces:**				
	Providing and fixing with GI holdfasts in masonary wall, avg. 20 mm thick & avg. max. 400 mm wide pre-polished select & approved natural stone granite cill and jamb pieces for opening in masonary wall, finished fixed complete. Item to be inclusive of all scaffolding, fixing bed adhesive of CM 1:2 with specialised Cementitious Tile Grouts, men material and lift upto 5 mts. from formed ground level, all accessories, fixing implements, tools and tackle, getting mock-up of avg. 1 RM approved from Architect, finished cleaned complete. Item includes Additional support fixing with 316 grade solid SS studs avg. 40 mm diameter in head and min. 32 mm diameter in Cross-section to Architecct approved profile & glossy head finish, fixed flush complete with Granite outer face & lower rim of stud-head, stud to anchor min. 125 mm in masonary wall, as per design drawing issued good for construction.	2.00	Sqm		
73	**kerb Stone**				
	Providing 'L' shaped precast reinforced cement concrete M25 grade road kerbs of size as specified in the drawing made to shape using 20 mm down size Coarse graded aggregate including form work and nominal reinforcement of Fe 415 grade, 12 mm dia at 150 c/c with 8 mm dia stirrups at 150 mm c/c fixing in cement concrete 1:3:6 nominal mix including pointing exposed faces with C.M 1:3 and colour washing with acrylic distemper over a coat of primer etc. complete, as directed.	110.00	Rmt		
74	**Paver Block**				
	Providing and laying precast cement concrete designer tile of approved make, specified colour and design thickness not less than 20mm, in locations such as drive way, ramp, foot paths, garden, court yards etc., over an average thickness of 20 mm bed of cement mortar 1:4 (1 cement : 4 coarse sand) including cleaning of base surface and removal of laitance, rubbing, cleaning and curing etc. all complete as per Particular Specification and as directed by Employer / Architect.	500.00	Sqm		
	GRAND TOTAL				

Item No	Description	Unit	Qty	Supply		Installation	
				Rate	Amount	Rate	Amount
	SECTION-I:-						
1	8 way TPN DB with 40A, 4P RCBO 100 mA as incomer & 10A SP MCB -16 Nos & 20A SPMCB-8Nos as outgoings as per SLD **(MAIN GATE LDB)**.	Nos	1.00				
2.0	Supply, Installation, Testing and Commissioning of 1100V grade L.T. XLPE/ PVC insulated multistrand Al./ Cu. conductor cables on provided prefabricated trays/ pipe/ in trenches with necessary clamps, identification tag. & all other items required to complete the task. **(Actual cable lengths shall be measured at site prior to procurement.)**						
2.1	4C x 6 Sq.mm. YWY cable.	Rmtr	150				
2.2	3C x 2.5 Sq.mm. YWY cable.	Rmtr	150				
2.3	3C x 2.5 Sq.mm. Cu. Flexible cable.	Rmtr	100				
3.0	Supply & installation of End termination for cables as above with Brass, heavy duty, Single compression glands, Al/ Cu lugs, other consumable like insulation adhesive tape, crimping, gland hole drilling, ferrulling, marking, etc.						
3.1	4C x 6 Sq.mm. YWY cable.	Nos.	2				
3.2	3C x 2.5 Sq.mm. YWY cable.	Nos.	28				
3.3	3C x 2.5 Sq.mm. Cu. Flexible cable.	Nos.	24				
4.0	Supply & installation of readymade hot dip GI. perforated type tray, including readymade accessories e.g. vertical & horizontal bends, reducers,couplers,Tee's, right angles etc.(Ref Layout)						
4.1	100mm, 50x50 perforated tray. (16 SWG)	Rmtr	10				
5.0	Supply and installation of readymade hot dip GI tray covers 16/18 SWG including readymade shape of Vertical & Horizontal Bend, Tee's, Right angles etc. to suit tray for all vertical runs.						
5.1	100mm perforated tray.	Rmtr	10				
6.0	Supply and Fabrication of M.S. angle/ Channel/ Square tube of 3mm thick of 50x50mm size including base plates supports as per requirement (Duly approved by AEPPL and Client) for trays, frames etc. including necessary painting with 2 coats of primer and 2 coats of enamel black paint.	Kg.	50				
7.0	8 SWG GI Wire.	Rmtr	20				
8.0	Surface / concealed point wiring for light / fan call bell / 5 A points with 2 x 2.5 + 1 x 1.5 Sq.mm. multistrand Cu. wires 1100 V gr. in suitable size FR PVC conduits / flexible conduits wherever required as submains and 2 x 1.5 + 1 x 1.5 Sq.mm. wires for each point complete (submains will not be measured separately) with necessary modular switch board, switch plates and Blanking plates & accessories as required etc. to complete the task.. Primary Point shall mean first point wired from switchboard and Secondary point shall mean successive points next to Primary point.						
	Note:- All conduits in area with false ceiling shall be concealed in wall below false ceiling						

Item No	Description	Unit	Qty	Supply		Installation	
				Rate	Amount	Rate	Amount
8.1	Primary Light point wiring with necessary 5 A SP switch, ceiling rose / Holders complete. (Maximum 1points controlled by one switch)	Pt.	4				
8.2	Primary Light point wiring with necessary Control from DB, ceiling rose / Holders complete. (Maximum 3-4 points controlled by one MCB)	Pt.	3				
83	Secondary light point wiring with 2x1.5 + 1x1.5 sqmm Cu wires from primary point above including necessary accessories e.g. connectors.	Pt.	16				
8.4	5/15A 3 pin socket outlets independent (Modular).	Pt.	6				
8.5	As above but 2 x 2.5 + 1 x 1.5 Sq.mm. wires. In FR PVC conduit.	Rmtr	150				
9.0	Supply, installation, testing and commissioning of lighting fixtures/ fans/Ex. fans etc. including necessary ballast, lamp, accessories, wiring connection, support arrangement like suspension chain, M.S. conduit drop with ball socket. down drops, etc. All FTL fixtures shall be with triphosphor source.						
9.1	MIROLTA Slim 18W HF	Nos.	2				
9.2	1X36W. TUBELIGHT PHILIPS TMS021 1XTLD36W	Nos.	5				
9.3	1X25W Philips Decotwist Slim Radiant tcg300(BUCL)	Nos.	4				
9.4	1X150W MH floodlight MWF231 1xMHNTD-150W S	Nos.	14				
9.5	1X150W Under canopy fix HPK225 1xCDM-ET150W PR	Nos.	4				
9.6	1X125W Post Top Lantern SPC106 1xSON70W E	Nos.	2				
9.7	8W Philips LED150/WW PSU 220-240V 7043	Nos.	12				
9.8	1X32W PHILIPS PENDENT VETRO FP01	Nos.	4				
9.9	Supply, installation testing of 150mm exhaust fans with mounting frame & louvers.	Nos.	1				
9.10	Ceiling fan 24 inch	Nos.	2				
	TOTAL OF SECTION-I						
	Grand Total						

Note-Rate will be inclusive of all taxes



JOINERY DETAIL		
TYPE	DESCRIPTION	SIZE
D1	AL. GLAZED DOOR	0.90x2.10
D2	FLUSH DOOR WITH VISION PANEL	0.75x2.10
D3	FLUSH DOOR	0.75x2.10
W1	AL.SLIDING WINDOW	2.50x1.50
FW	AL.FRENCH WINDOW	1.00x1.80
FW1	AL.FRENCH WINDOW	0.75x1.80
SG	STRUCTURAL GLAZING	5.605x1.80
V1	TOP HUNG VENTILATOR	0.75x0.60
V2	TOP HUNG VENTILATOR	0. 60x0.60

REV.	MODIFICATION	DATE

ARCHIVISTA
ENGINEERING PROJECTS PVT. LTD.
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TEL-(044) 42145194/95
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PROPOSED ENTRANCE FOR IITM PUNE

DESIGN PHASE: STAGE - TENDER

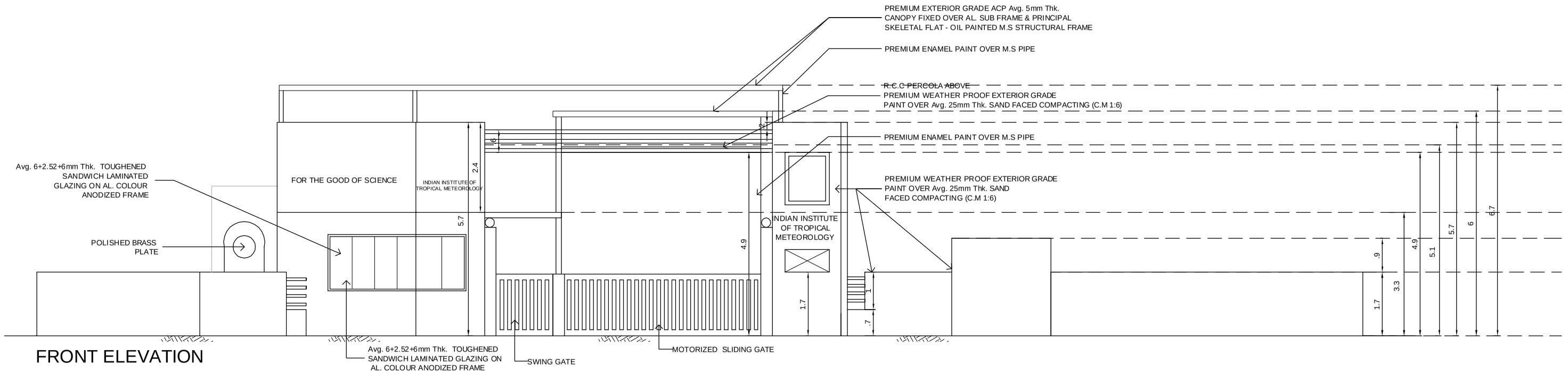
DRAWING TITLE: PLAN

SCALE	FORMAT	DRAWING	CAD FILE
1:50	A2	-	T_402_IITM_G_00

DRAWING NUMBER: T_402_IITM_G_FP_01

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER(S)	DATE OF REVISION	REVISION
07.01.12	.....	-	-

TENDER 07.01.12



FRONT ELEVATION

REV.	MODIFICATION	DATE

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PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - TENDER

DRAWING TITLE: FRONT ELEVATION

SCALE	FORMAT	DRAWN BY	CAD FILE
1:50	A2	-	T_402_IITM_G_00

DRAWING NUMBER: T_402_IITM_G_EL_02

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBERS	DATE OF REVISION	REVISION
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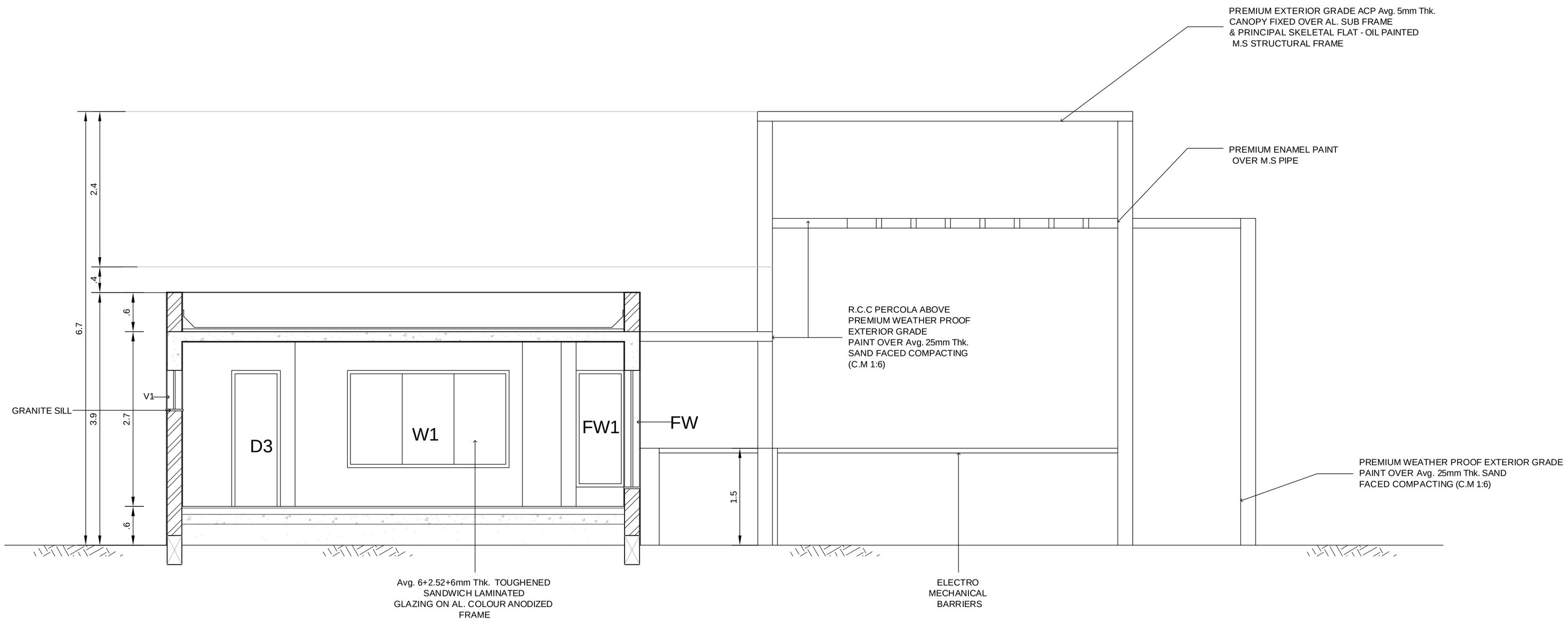
TENDER
07.01.12



SECTION - "A-A"

REV.	MODIFICATION	DATE

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PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - TENDER

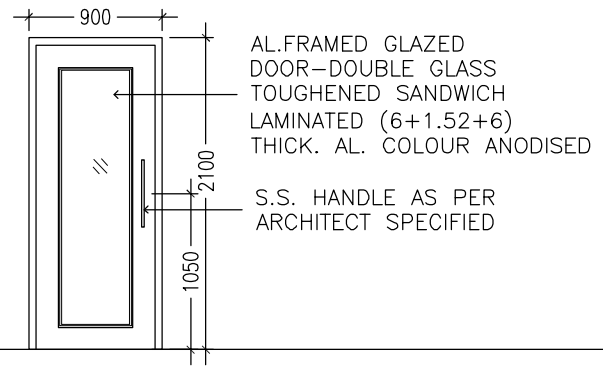
DRAWING TITLE: SECTION

SCALE	FORMAT	DRAWN BY	CAD FILE
1:100	A2		T_402_IITM_G_00

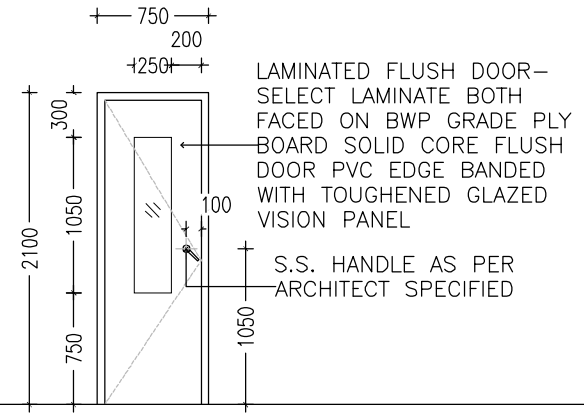
DRAWING NUMBER: T_402_IITM_G_S_03

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER	DATE OF REVISION	REVISION
07.01.12	.....	-	-

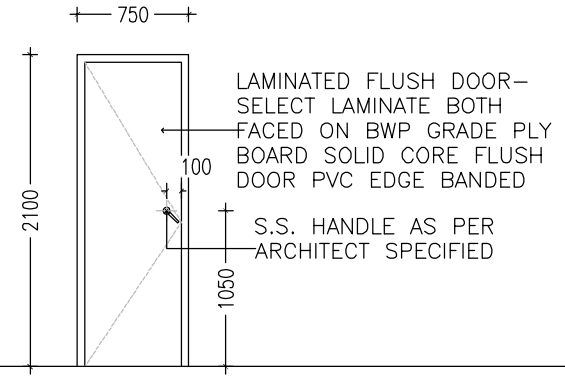
TENDER
07.01.12



TYPE D1
FRAMED GLAZED DOOR
ENTRANCE DOOR

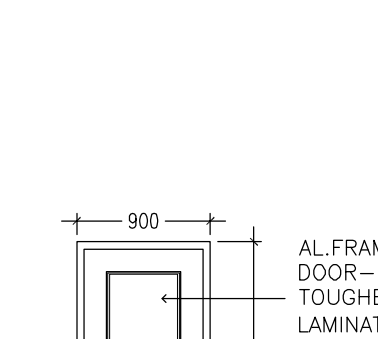


TYPE D2
LAMINATED FLUSH DOOR
INTERIOR DOOR

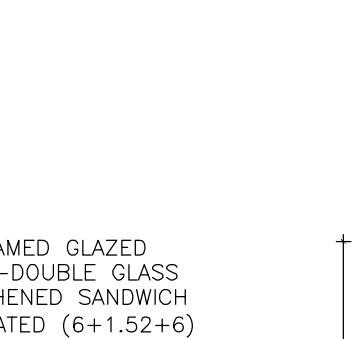


TYPE D3
LAMINATED FLUSH DOOR
TOILET DOOR

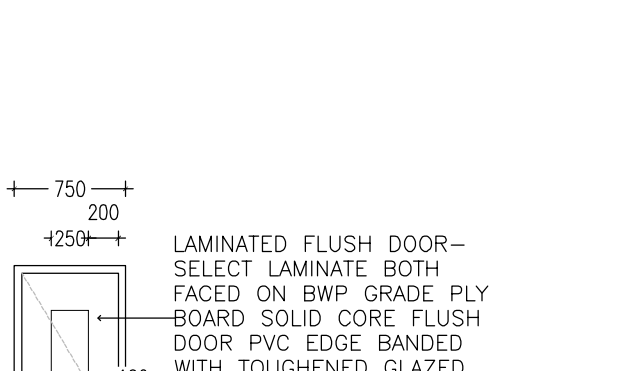
W1 2500x1500
SLIDING WINDOW



FW 1000x1800
FIXED WINDOW



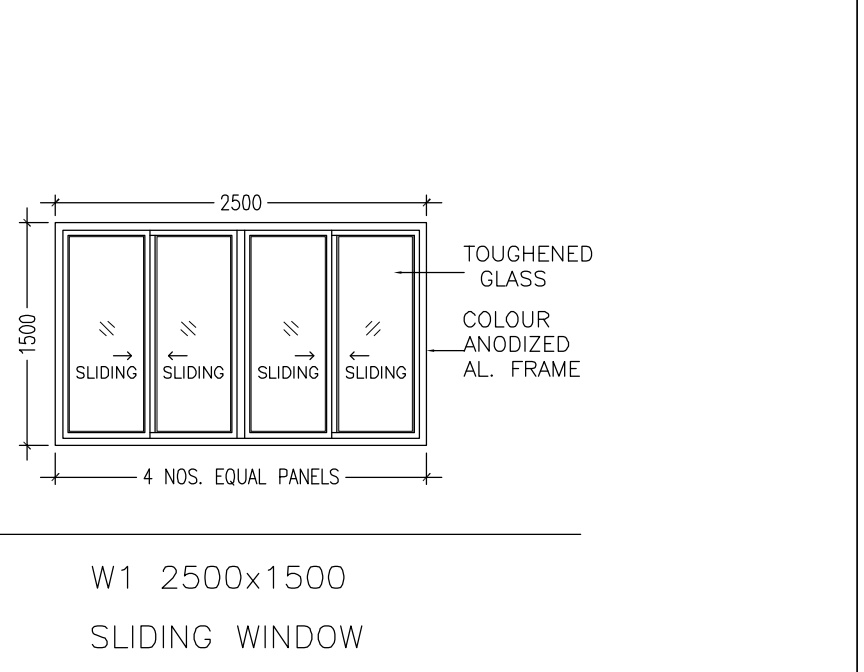
FW1 750x1800
FIXED WINDOW



S.G 5605x1500
STRUCTURAL GLAZING

V1 750x600
TOP HUNG VENTILATOR

V2 600x600
TOP HUNG VENTILATOR



KEY PLAN

REV.	MODIFICATION	DATE

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PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - TENDER

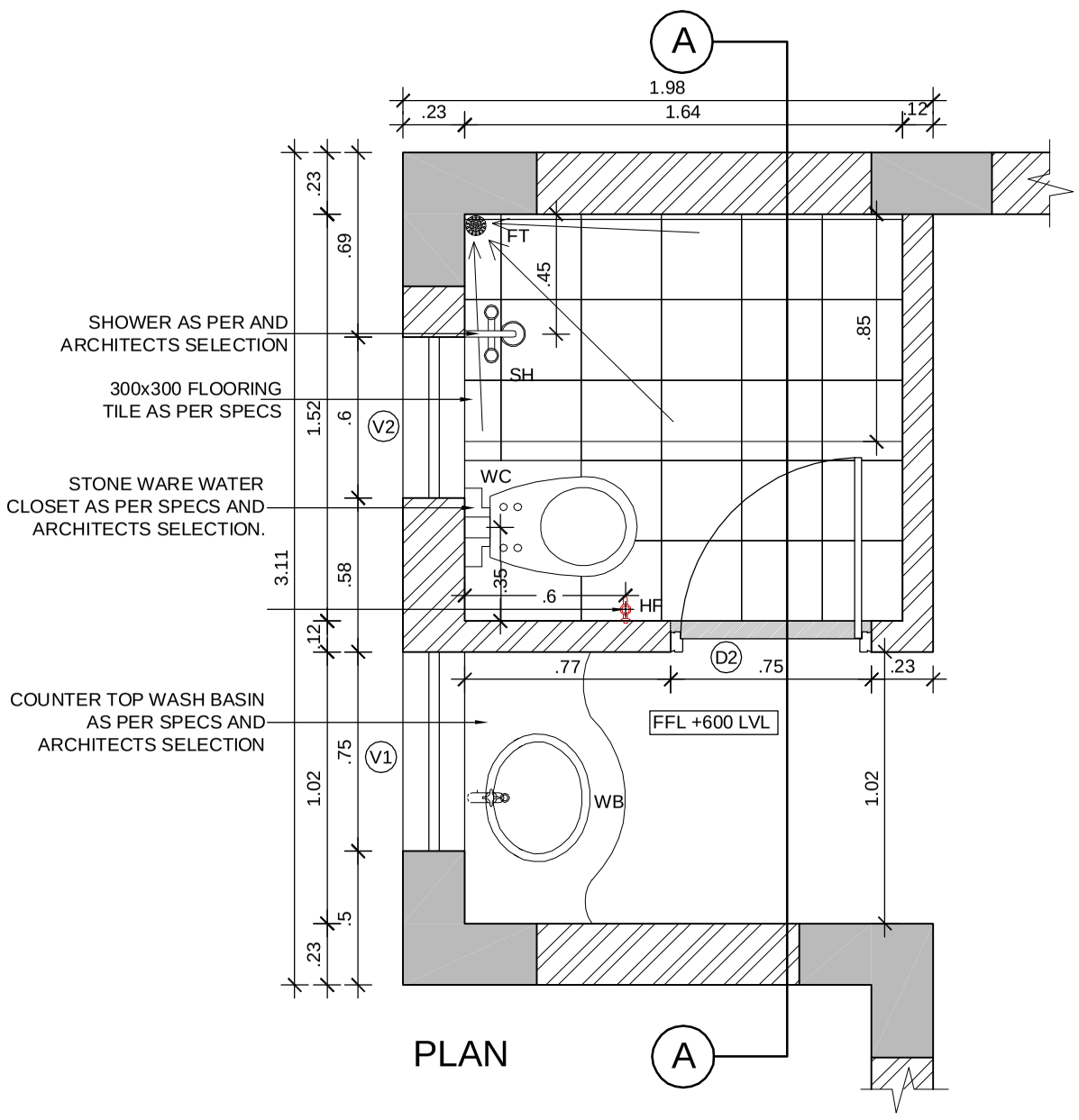
DRAWING TITLE: JOINERY DETAIL

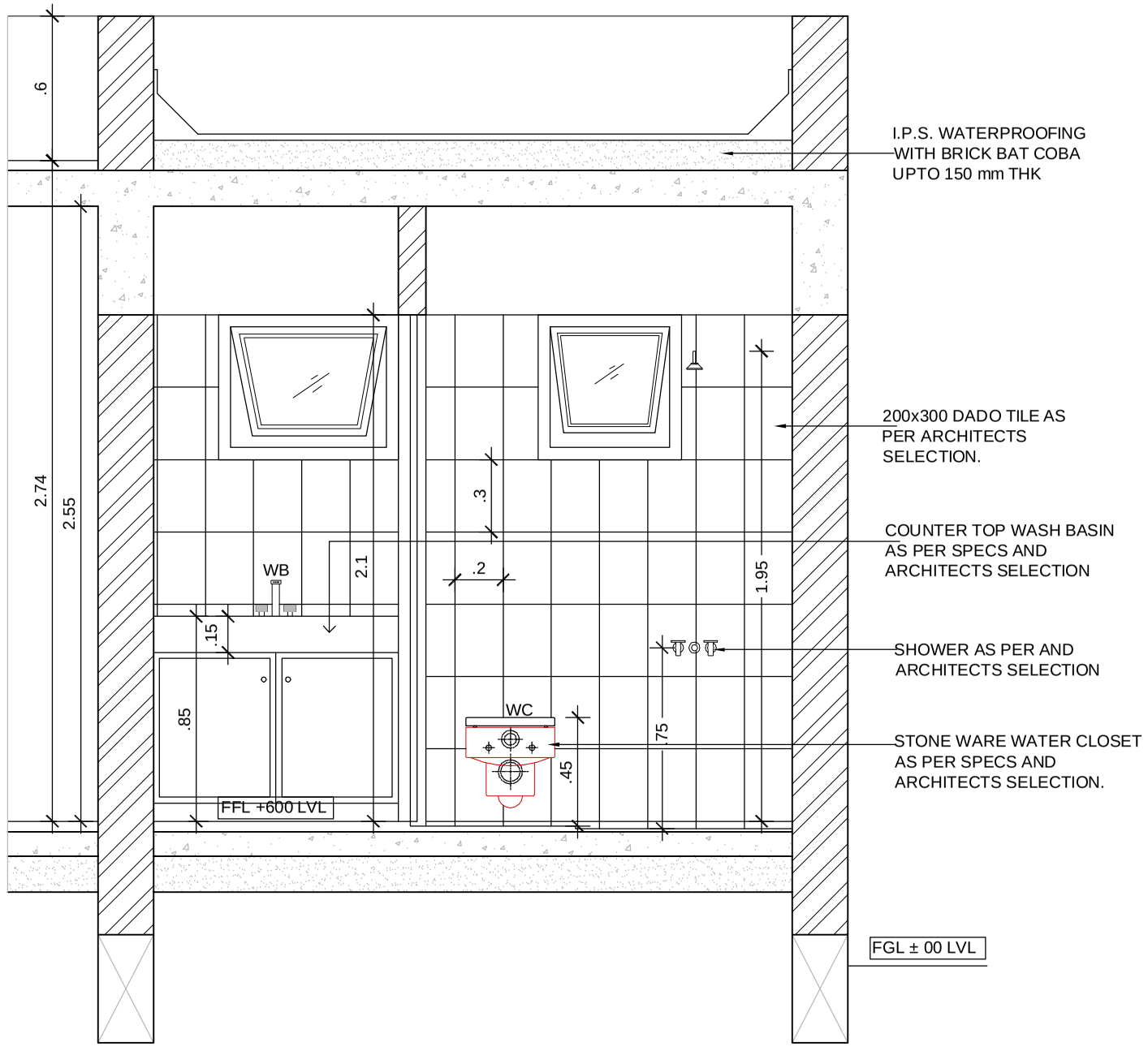
SCALE	FORMAT	DRAWN BY	CAD FILE
1:100	A2	-	T_402_IITM_G_00

DRAWING NUMBER: T_402_IITM_G_DEJD_04

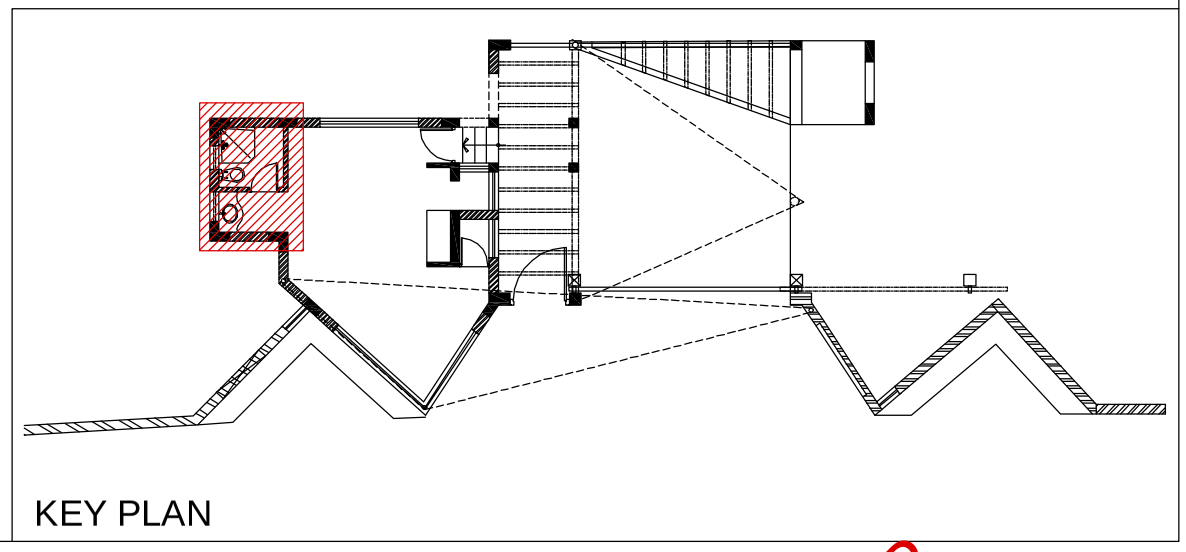
DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER	DATE OF REVISION	REVISION
07.01.12	.....	-	-

TENDER
07.01.12





SECTION - "A-A"



KEY PLAN

REV.	MODIFICATION	DATE

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PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - Tender drawing

DRAWING TITLE: TOILET DETAIL

SCALE	FORMAT	DRAWN BY	CAD FILE
1:25	A3	-	T_402_IITM_G_DETO-00

DRAWING NUMBER: T_402_IITM_G_DETO-05

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER(S)	DATE OF REVISION	REVISION
07.01.12	.....	-	-

TENDER
07.01.12

VIEW FROM SOUTH

REV.	MODIFICATION	DATE

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PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - TENDER

DRAWING TITLE: REFERENCE PERSPECTIVE VIEW

SCALE	FORMAT	DRAWN BY	CAD FILE
1:50	A2		T_402_IITM_G_00

DRAWING NUMBER: T_402_IITM_G_V_06

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER	DATE OF REVISION	REVISION
07.01.12	.....	-	-

TENDER
07.01.12

VIEW FROM NORTH EAST

REV.	MODIFICATION	DATE

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PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - TENDER

DRAWING TITLE: REFERENCE PERSPECTIVE VIEW

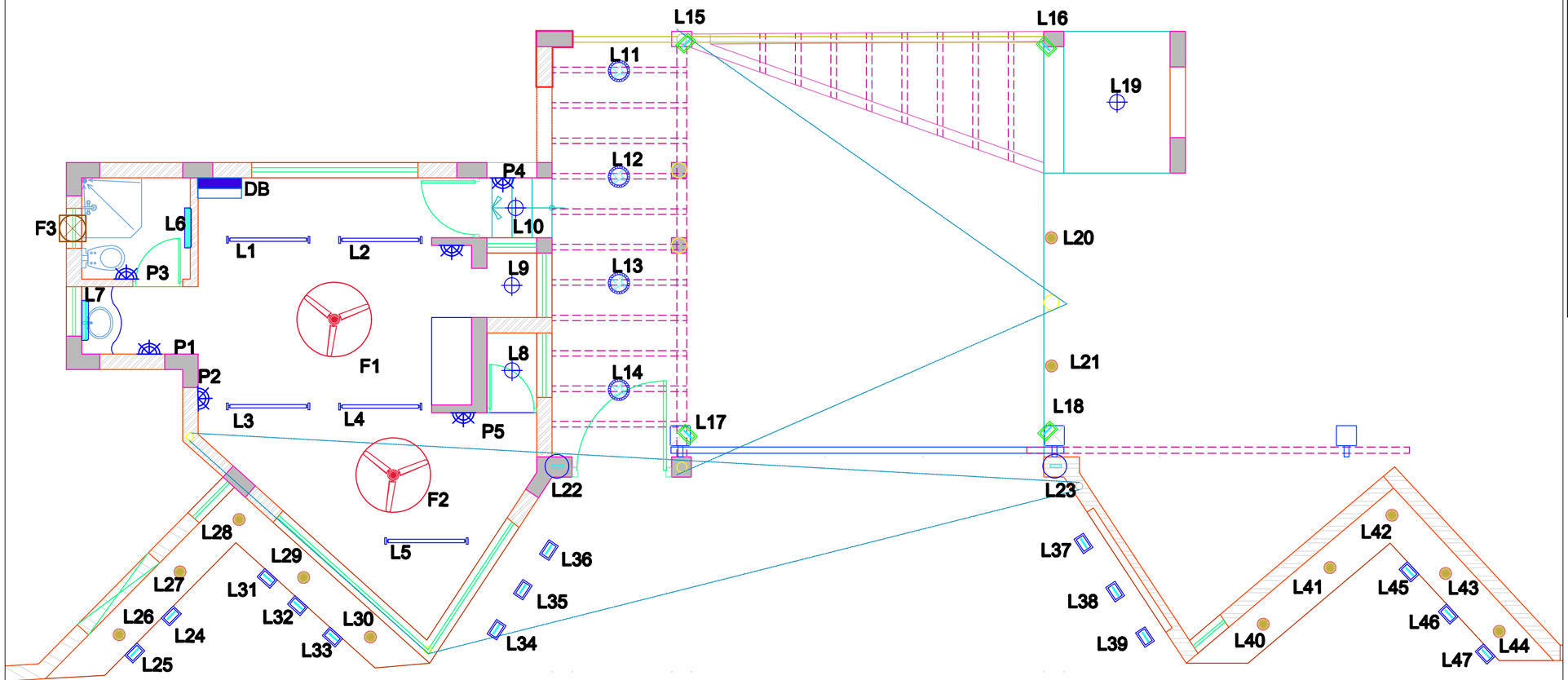
SCALE	FORMAT	DRAWN BY	CAD FILE
1:50	A2	-	T_402_IITM_G_00

DRAWING NUMBER: T_402_IITM_G_V_07

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER(S)	DATE OF REVISION	REVISION
07.01.12	.....	-	-

TENDER
07.01.12

Client	IITM	TENDER DRAWING LIST
Project	IITM-GATE	
Job No.		
S.NO.	**DRAWING NO**	**DRAWINGS**
FLOOR PLANS		
ARCHITECTURAL		
1	T_402_IITM_G_FP_01	PLAN
2	T_402_IITM_G_EL_02	FRONT ELEVATION
3	T_402_IITM_G_S_03	SECTION
4	T_402_IITM_G_DEJD_04	JOINERY DETAIL
5	T_402_IITM_G_DETO_05	TOILET DETAIL
6	T_402_IITM_G_DETO_06	REFERENCE PERSPECTIVE VIEW
7	T_402_IITM_G_DETO_07	REFERENCE PERSPECTIVE VIEW
ELECTRICAL		
8	T_704_IITM_G_EL_01	LIGHTING AND POWER LAYOUT
9	T_704_IITM_G_EL_02	SCHEMATIC LATOUT



LEGEND

SYMBOL	DESCRIPTION	QTY
	1X18W MIROLTA	2
	1X40W. TUBE LIGHT FIXTURE	5
	1X25W Philips Decotwist	4
	1X150W Metal Halide floodlight	14
	1X150W CDMTD under canopy lum.	4
	1X70W MH Post Top Lantern	2
	Philips LED Bollar II-8W LED	12
	1X32W PHILIPS PENDENT VETRO lum	4
	Exhaust fan	1
	Ceiling fan 24 inch	2
	5/15A MODULAR SOCKET WITH 15A SWITCH	6
	DISTRIBUTION BOARD (DB)	1

REV.	MODIFICATION	DATE

ARCHIVISTA

ENGINEERING PROJECTS PVT. LTD.

OFFICE NO. 201/202, THIRD FLOOR, SAI EMPIRE
BANER, PUNE - 411 045,
PH. (020) 66294444 , FAX. (020) 66294699,
www.archivistaindia.com

PROPOSED ENTRANCE FOR IITM PUNE

DESIGN PHASE: STAGE - TENDER

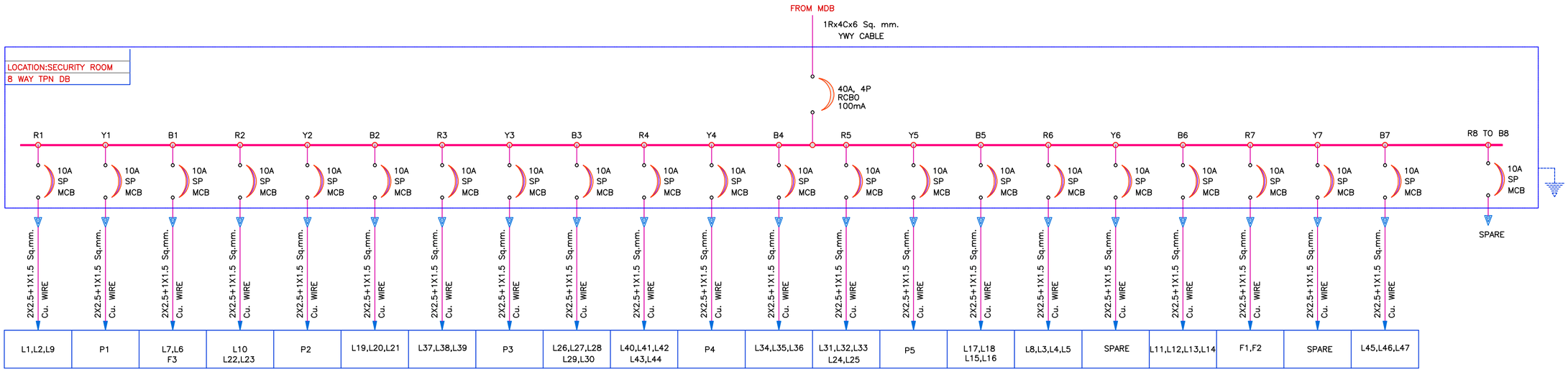
DRAWING TITLE: LIGHTING AND POWER LAYOUT

SCALE	FORMAT	DRAWN BY	CAD FILE
1:100	A2		T_704_IITM_G_EL_00

DRAWING NUMBER: T_704_IITM_G_EL_01

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER GMP	DATE OF REVISION	REVISION
07.01.12	**********	-	-

TENDER
07.01.12



REV.	MODIFICATION	DATE

ARCHIVISTA
ENGINEERING PROJECTS PVT. LTD.
OFFICE NO. 201/202, THIRD FLOOR, SAI EMPIRE
BANER, PUNE - 411 045,
PH. (020) 66294444 , FAX. (020) 66294699,
www.archivistaindia.com

PROPOSED ENTRANCE FOR IITM
PUNE

DESIGN PHASE: STAGE - TENDER

DRAWING TITLE: Schematic layout

TENDER 07.01.12

SCALE	FORMAT	DRAWN BY	CAD FILE
1:100	A2		T_704_IITM_G_EL_00

DRAWING NUMBER: T_704_IITM_G_EL_02

DATE OF FIRST ISSUE	REFERENCE DRAWING NUMBER GMP	DATE OF REVISION	REVISION
07.01.12	.....	-	-

TENDER DOCUMENT FOR PROPOSED

Civil, Plumbing and Electrical works for Proposed Construction and Development of Main Gate and Security Cabin at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008, Maharashtra State.

CLIENT:

INDIAN INSTITUTE OF TROPICAL METEOROLOGY.
DR. HOMI BHABA ROAD, PASHAN, PUNE 411008 MAHARASHTRA

ARCHITECT AND PROJECT MANAGEMENT CONSULTANTS:

ARCHIVISTA ENGINEERING PROJECTS PVT.LTD.
F201/202 SAI EMPIRE,BANER,PUNE-411045.

COMMERCIAL BID

VOLUME –II

S.No	ITEM DESCRIPTION	QTY	UNIT	RATE	AMOUNT
A	**Excavation and Back Filling**				
1	**Excavation in soil,soft & hard murum...**				
	Excavation for footing, machine foundation, plinth beams , wall footing, gutters, tanks in soil, soft , hard murum, asphalt road & existing murum filling including removing the excavated stuff upto a distance of 1500 m beyond battery limit area and staking and / or spreading as directed, shoring, strutting,**dewatering for all water may accumulate in excavation(from spring,tidal or rivr seepage,broken water mains or drains and seepage from sub soil aquifer)** and preparing the bed as directed including back filling in layers etc. complete				
	A) 0.00 - 1.50 m Depth	121.50	CUM		
	B) 1.50-3.00 m Depth	121.50	CUM		
	C) 3.00- 4.50 m Depth	25.00	CUM		
	D) 4.50- 6.00 m Depth	25.00	CUM		
2	**Filling in plinth with contractors murum...**	243.00	CUM		
	Filling in plinth and floors with contractor's locally available filling material with all leads and lifts brought from outside (material to be approved by engineer in charge) , including filling in layers of 20-30 cm., watering, compaction levelling etc. complete. The proctor density of such compacted fill shall be 95% of standard proctor ,all royalties etc. complete.				
3	**Carting away surplus excavated earth...**	243.00	CUM		
	Conveying of surplus excavated earth to outside areas with all royalties and the disposal by mechanical transport etc complete (Rate including all leads and lifts beyond municipal corporation boundary limit)				
4	**Hard core 150 mm thk...**	4.95	CUM		
	Providing & laying hard core of hand crushed metal 60 mm in two layers of 100 mm each consolidated to 75 mm making total thickness of 150 mm including watering ,ramming with heavy rollers,levelling the surface with murum /gret spreading etc .complete.(The rate shall be for compacted thickness.)				
5	**Anti-termite treatment...**	33.00	SQM		
	Providing and injecting chemical emulsion for anti- termite treatment and creating a chemical barrier under & around the column pits, walls, foundations, trenches, basement excavation, top surface of murum filling in plinth and rubble soling, junction of wall and floor, along the external perimeter of the building, at expansion joint, surrounding of pipes, conduits etc. complete with chlorophriphos 20% E.C. emulsified concentrates as per latest IS code complete from approved agency.(Plinth area of the building at ground floor is to be considered)				
B	**CONCRETE AND R.C.C. ITEMS -**				
6	**P.C.C. 1:3:6**	13.05	CUM		
	Providing and laying in situ Plain Cement Concrete 1:3:6 of trap metal for foundation, floor bedding etc. including dewatering, formwork, compacting and curing & placing etc. complete at all depths.**Rate shall include concrete brought from RMC plant or batching plant installed on site or outside site premises by contractor**				
7	**Cement concrete M25 grade...**				
	Providing and casting in situ cement concrete of M 25grade concrete of trap metal as per detailed designs including dewatering, centering formwork with shuttering ply & steel plates, compacting with vibrators, placing & fixing inserts (viz. plates, pipes for cutouts, anchors), formation of cutouts, chases etc. as per detail drawing and curing complete. RCC structures shall be Fair Finish.(Rate at all heights & levels and excluding tor / mild steel Reinforcement).**Rate shall include concrete brought from RMC plnat or batching plant installed on site or outside site premises by contractor**				
	A) Footings/ rafts/foundation block/bed block	40.50	CUM		
	B) Columns / Pedestals	16.77	CUM		
	C) Plinth / Ground beam	3.94	M3		
	D) Slab of all types.	5.76	M3		
	E) Beams & lintels.	12.75	M3		

	F) Chajja / canopy/ fins/brackets/portals.	1.16	M3		
	H) Coping.	2.76	M3		
8	**TMT Tor**	12000.00	Kg		
	Providing, fixing and laying in position TMT Tor / Mild steel bar reinforcement of various diameter. for R.C.C. work as per detailed designs, drawings & schedules or as directed including straightening, cutting, bending, hooking the bars**,Chairs, laps,**binding with wires or welding and supported as required, providing cover blocks etc. complete (Rate at all heights & levels & including cost of binding wire and / or welding rods)make Sail,Tisco,RINL or equivalent				
C	**MASONARY ITEMS -**				
9	**B.B.M. With Conventional bricks 150 mm thk...**	16.40	SQM.		
	Providing & constructing brick masonry with conventional bricks in half brick thick walls (Min.150 mm thick) in cement mortar 1:4 with RCC bands- Patli at every 1.00 m height as per designs including racking out joints, scaffolding, watering & curing etc.				
10	**B.B.M. with conventional bricks in superstructure...**	44.19	CUM		
	Providing and constructing masonry with Conventional bricks in C.M.1:6 in superstructure including constructing in line and level at all depths, racking out joints, scaffolding, watering, curing, striking joints etc. complete.				
11	**B.B.M. with conventional bricks in foundation...**	12.39	CUM		
	Providing and constructing masonry with Conventional bricks in C.M. 1:6 in foundation, steps & in plinth including constructing in line and level at all depths, racking out joints, scaffolding, Watering, curing, striking joints etc. complete.				
D	**STRUCTURAL STEEL WORK ITEMS -**				
12	**Structural steelwork in hot rolled sections...**	10000.00	Kg		
	Providing fabricating & erecting structural steelwork in hot rolled sections For columns, tie beams, Pergolas, trusses, purlins, gantry, monorail columns, cable trays,pipe racks ,castellated beams, plate girder, staircase & other structural members with all bracing, gusset plates etc. as per detailed drawing or as directed at all heights and levels including removing the scales & burrs, cleaning with phosphoric acid ,marking, Cutting, fabrication, hoisting, erecting & fixing in position, making alignment of members making welded / bolted / riveted connections with one coat of approved red-oxide paint etc complete.(Shop drawing for roofing & cladding to be Submitted by Contractor for approval.)				
13	Providing, fabricating & fixing M.S. inserts in concrete,tremix flooring or masonary surfaces such as plates, angles, channels, flats etc. as per detailed drawings including cutting, bending, drilling holes, welding, placing in position etc.complete at all heights and levels.	300.00	KG		
E	**PLASTERING AND WATERPROOFING -**				
14	**Internal cement plaster (with neeru finish)...**	167.23	SQM		
	Providing & applying internal cement plaster to walls (minimum thickness 12 mm) in cement mortar 1:4 with Neeru finish to concrete, stone or brick surface including roughening the concrete surface, applying the base coat in line & level, scaffolding, cleaning & curing etc. complete with grooves, pattas etc, wherever specified at all heights, levels and floors.				
15	**External sand faced plaster...**	217.07	SQM		
	Providing & applying externally sand faced plaster over brick stone or concrete surface in two coats (minimum thickness 20mm) using well graded sand, including roughening the concrete surface, applying base coat in C.M. 1:4 in proper line & level using waterproofing compound of approved manufacturer at 1kg per cement bag, curing the same for not less than two days and keeping the surface of the base coat rough to receive the sand faced treatment, applying second coat in C.M. 1:4, finishing the surface by taking out grains and curing for not less than 14 days etc. at all heights and levels as per drawings including curing, scaffolding, including making of dhar, pani patti, groove etc. complete				
16	**Expanded metal mesh...**	30.00	SQM		

	Providing, fixing & placing in position Expanded metal mesh over the joint of R.C.C and brickwork, and / or wherever required to hold the extra thickness of plaster, including tightening mesh, scaffolding, etc. complete.				
17	**Waterproofing treatment to toilet pits...**	2.69	SQM		
	Waterproofing treatment to toilet pits with cleaning the slab surface with wire brush and washing the slab surface thoroughly,applying waterproof plaster in cement mortar 1:3 using approved waterproofing compound to sides and slab surface, finishing necessary laps on walls, watas at junctions of walls etc. including cleaning, watering, curing, giving seven days pond test etc. complete.				
18	Providing and laying I.P.S. waterproofing with brick bat coba upto 150 mm thk	33.00	SQM		
	treatment to terrace slab including -				
	1. Washing the existing concrete surface.				
	2. Laying 1:3 cement mortor base & laying brickbat in layer in CM 1:3 to required				
	slope as per drawing . Top coat of 1:3 cement mortor, finishing the top coat with				
	cement slurry.				
	3. Mixing an integral waterproofing compound of approved make (skott no. 1) at				
	1.0 kg per bag of cement at all stages.				
	4. Injection grouting with non shrink cementacious grout of approved				
	manufacturer (FOSROC, ROFF, SIKKA or equivalent)at construction junctions.				
	5. Item shall include curing, cleaning, giving 7 days pond test and 10 years				
	guarantee.				
	6. Waterproofing shall be carried out upto 300 mm above finished terrace level with				
	terrace level with coving.				
	(Measurement given, is clear plan dimensions)				
F	**FLOORING ITEMS -**				
19	**Graniteflooring...**	4.00	SQM		
	Providing & laying approved quality 25 mm thick natural stone flooring of avg. size 1200 x 1200 sq.mm. in required position & in line and level on a bed of 1:6 cement mortar (50 mm thick) including cement float, filling joints with matching color cement slurry, polishing, curing and cleaning etc. complete				
	A) Granite flooring **(Basic Rate for material only-190 sqft)**				
20	**Granite skirting….**	2.00	SQM		
	Providing and laying 125 mm high approved quality polished Granite stone 20mm thk for treads, risers,skirting & cladding as directed on a bed of 1:4 cement plaster including laying in required position and in line & level, filling joints with neat cement slurry, curing,polishing exposed edges ,cleaning etc. complete.				
21	**Vitrified tile flooring...**	35.00	SQM		
	Providing and fixing Vitrified tiles of avg. max. 600 x 600 sq.mm. size of approved make and colour finish for flooring in required position & in line and level as directed, set on a bed of 1:6 cement mortar (min.35 mm thick) including cement float, maintaining the flooring with the layer of POP and filling the joints with matching colour cement slurry, curing, rubbing ,cleaning etc.complete. (Basic rate of tile - 120/sqm)				
22	**Vitrified tile Skirting...**	5.00	SQM		
	Providing and fixing Vitrified tiles skirting of 100 mm high of approved make and colour finish for flooring in required position & in line and level as directed, set on a bed of 1:6 cement mortar, filling the joints with matching colour cement slurry, curing, rubbing ,cleaning etc.complete.				
23	**Granite platform for counter top basins...**	1.50	RMT.		
	Providing & laying granite platform for counter top basins of 750 mm wide with granite supports for vertical and kadappa below granite as per the detail drawing etc., including fascia patties and rounding or polishing the exposed edges as per drawing, cutting for basin opening, sealing all crevices with silicon sealant, laying Cement mortar 1:6 between granite and kadappa etc. complete.(Basic Rate-150 sqft)				
24	**Ceramic tiles flooring...**	3.28	SQM		
	Providing & laying colored antiskid Ceramic tiles of avg. max. 300 x 300 size ,make, color & quality for flooring in required position & in line and level on a bed of 1:6 c.m. (min.35 mm thick) including cement slurry, filling joints with matching color cement slurry, curing and cleaning etc. complete				

	Basic Rate of material only: Rs. 90/sq.ft.				
25	**Dado...**				
	Providing and laying colored glazed tiles of approved finish size, make, Color and quality for dado & skirting in required position & in line and level on a leveled plaster bed including cement slurry, filling the joints with matching color cement slurry, curing and cleaning etc. complete				
	B) Ceramic glazed tiles (Basic rate-Rs. 85 /sqft)	10.08	SQM		
26	**Flame finished Granite tread & riser**	8.71	SQM		
	Providing and laying avg. 1200 mm long 325 mm wide approved quality Prepolished pre-cut granite 20 mm thick for treads(with 15 mm wide flamed friction strip as per design drawing .) & risers in line & level on a bed of 1:6 cement plaster including cement float, filling joints with matching colour cement slurry, curing, edge polishing, complete.(Basic Rate-150 sqft)chamfering ,cleaning, etc.				
G	**PAINTING AND FINISHING -**				
27	**White wash...**	25.00	SQM		
	Providing and applying whitewash in two coats on plastered or masonry surface at all heights including scaffolding, preparing the surface by brushing brooming down etc. complete.				
28	**Acrylic Emulsion (Oil bound distemper)...**	200.00	SQM		
	Providing and applying Acrylic emulsion (oil bound distemper) of approved make and shade on all surfaces & at all heights in three coats including scaffolding, preparing the surface by brushing and brooming down,applying primer, palti and a coat of Birla white putty etc. complete				
29	**Weather Proof Exterior Grade Emulsion...**	225.00	SQM		
	Providing and applying 100% Weather Proof Exterior Grade Emulsion (Apex Acrylic exterior paint from J & N , Nerolac or equivalant)of approved shade to the plastered or exposed brick or stone or concrete surface in two coats including preparation of the surface, a coat of approved primer, birla white putty scaffolding , curing, cleaning etc. complete.				
30	**Synthetic Enamel paint for structural steel...**				
	Providing and applying Synthetic Enamel paint in two coats over structural steel surface as per the manufacturers instructions & of approved shade and make including preparing the surface, applying zink chromate primer ,scaffolding ,cleaning etc. complete	10.00	M.T.		
H	**DOORS AND WINDOWS -**				
31	Teak wood frame...				
	Providing and fixing C.C.T.W. frame as per detailed drawings with M.S. hold fasts 4 nos. on each side, bar spacer(12mm dia) bolted at the bottom of the frame as per details etc. complete including making the frame, fixing TW cover molding around the frame adjecent to wall and applying two coats of synthetic enamel paint of approved shade and make over a coat of primer on the other faces				
	A) 100 mm x 75 mm	14.90	RMT.		
32	Flush door...	5.00	SQM		
	Providing and fixing approved quality factory made avg. 1 mm thk. both faced laminated solid core flush door with vision panel in single/double leaf 38mm thick BWR type plywood surface on both sides , TW beading on all edges, doors to be of exterior grade as per the detailed drawings including fixing the door and finishing with two coats of melamine polish of approved shade and make over a coat of priming base as approved etc.complete.				
33	S.S.fixtures and fastenings for single leaf door...	3.00	NO.		
	Providing and fixing S.S. fixtures and fastenings for single leaf door as per following details- Fixtures to be for one door- 1.Dorma/or equivalent make Round knob Handles with cylindrical lock arrangement 1 Set. 2. Hinges 100mm				

34	**Fully glazed aluminium windows...**				
	Providing and fixing in position approved make fully glazed aluminum windows manufactured out of HE 9 WP high grade aluminum alloy sections (Zindal make) confirming to I.S. specifications with sub frame framing 100x35 mm, sliding sections of 25 mm series				
	A) Two track two shuttered window with 6 mm thick clear glass of				
	'Modi' make.	2.00	SQM		
	B) Fixed glass window with 6 mm thick Float glass.	2.00	SQM		
	C) Three track three shuttered window with 6 mm thick clear glass of				
	'Modi' make.	2.00	SQM		
	D) Louvred window with 6 mm thick float glass of approved make and				
	colour with provision of exhaust fan etc.	2.00	SQM		
	F) N type window with 6 mm thick float glass.	2.00	SQM		
		1.00	SQM		
35	**Glazed Color anodised casement Window**- Providing, supplying & fixing in position as per manufacturers' shop drawings- duly approved by architect, inclusive of LAMINATED 6+1.52PVB+6 mm sandwich laminated toughened, low-e inside and clear float glass out side of shade and tint of Saint Gobain or equivalant as approved by Architects/Client, as per drawing. The system to be of Al mullion-transom grid frame extruded profile of75mmx 100 mm fixing on horizontally and vertically in all sides and colour anodised to avg. 25 micron as per approved colour & finish, all SS fixtures & fastenings of approved grade; . The item to be cross-checked with structural engineering design and calculations for support sections & fixing hardware by the vendor and item to include same alongwith getting part mock-up at site approved from the architects. Item to include all water pressure testing on unit section,fixing brackets, SS fasteners, sashes, cleaning,hardware, fixtures, accessories complete as approved by the architects; fixed installed complete	20.00	SQM		
L	**MISCELLANEOUS ITEMS**				
36	**Plinth protection...**	5.00	SQM		
	Providing and laying Plinth protection to the outer walls of the building including necessary excavation, metaling of 150mm, laying 100 mm thick PCC 1:4:8 concrete and 100 mm thick reinforced cement concrete 1:2:4 with broom finish including formwork etc complete				
37	Providing ,fabricating and fixing M.S . Grill for boundary wall,frams and supports by using angles,tubes flats,solid bars of 25/35 mm as per detailed drawing including fabricating fixing ,painting in one coat of primer followed by two coats of synthetic enamel paint etc. complete(wt per sqm 12 kg)	10.00	Sqm		
38	Providing fixing Rod type Entry Barrier on road as located in the drawing, of approved make and type , fully steel construction, scratch proof painted, compact gear operated, with all installation, cabling, control panel assembly etc complete with testing The installation to have following fixtures:and guarantee. release arrangement for manual opening obstacle detecting system, speed adjustment, opening, partial opening and closing command; Hold - to- run command; UPS backup for 15min, reverse movement safety arrangement etc				
	c)Size 6.0m boom	1.00	NO		
39	Providing and fixing mild steel gate as per detailed drawings & designs using M.S.box frame 50x50x6 mm, 25 mm square bars at 200 mm centre to center with 18 gauge perforated sheet as per drawing including accessories,locking arrangements, welding, Riveting and painting with two coats of synthetic enamel paint over a coat of red oxide etc. complete(Basic Weight per square meter taken for Sliding Gate 176 kgs per SQM)If there is any change in basic weight due to change in pattern, change in rate will be considered.				
	a) Openable	2.64	SQM		

40	Manufacture , supplying and fixing Ornamental motorised Sliding steel gate as per detailed drawings & designs using M.S.box frame 50x50x6 mm, 25 mm square bars at 200 mm centre to center with 18 gauge perforated sheet,bottom roller arrangement with 60mm G.I pipe ,M.S Double ball bearing wheel as per drawing including accessories, locking arrangements, welding, Riveting and,finished with MRF Poly urthene paint finish excluding Motor arrngement etc. complete (Basic Weight per square meter taken for Sliding Gate 176 kgs per SQM).If there is any change in basic weight due to change in pattern, change in rate will be considered.	16.00	SQM		
41	Supplying and fixing Ornamental sliding gate Motor system of capacity 3 Tons including microprocess control system including Rocker Switch, Photocell pair , remote control unit and installation charges, testing as per I.S.Standards etc. complete (Basic Weight per square meter taken for Sliding Gate 176 kgs per SQM)	1.00	No		
42	**ACP Panel- Canopy**	84.00	SQM		
	Providing and fixing approved make and colour min. 4 mm thk. Exterior Grade Aluminium Composite Panel enclosing on all sides & supported with sub-frame of Alum. channel 38X19 mm or tube 25X40 mm 1.5 mm thick further fixed to Automotive grade painted and primed hot-dip-galvanised skeletal MS Fabricated support; groove filling with approved epoxy sealant, including necessary accessories, with scaffolding and cleaning etc. complete as per detailed design drawing approved for execution. Item to be inclusive of cutting to size and edge-formed to trays strictly as per design drawings, getting approved 2 sq.mt. mock-up from Architect, cleaned finished complete. (Shop drawing for roofing & cladding to be Submitted by Contractor for approval.)				
43	Brass Plate- Providing and fabricating as wrap-around embossed sheet Brass Plaque avg. 2 mm max 3 mm thick factory shop embossed with Graphic logo as per selection of IITM, Pune; wrapped over avg. 12 guage GI plate box avg. 100 mm deep of avg. size 1000 x 1800 sq.mm., this assembly over 75 mm deep RCC base substructure plate of matching size to receive wrap.	1.00	NO		
44	SS Railing- Avg. 60 mm dia. SS 316 Grade pipe fabricated to design drawing complete supported on SS 316 grade 5 mm thk. Balusters avg. 60 mm thk. As per detailed design drawing.	4.00	SQM		
M	**SANITATION AND PLUMBING -**				
45	**Indian WC...**				
	Supplying and fixing 'Hindware' Make pastel glazed Indian Water closet 58 CM Long. Orissa Pattern with white glazed ‘P’ or ‘S’ trap having 50 mm deep water seal, embedding trap and water closet in cement concrete in 1:4:8 Mix using 20mm size stone Jelly to a thickness of 150 mm, to size of water closet cubical, plaster the Concrete surface to slope using cement mortar in 1:3 mix for 20 mm thick, form key to plaster surface to receive required floor finish, supplying river sand, consolidating to a depth of 30 cm to size of cubical, fixing pan and trap to a perfect level, alignment, making holes in walls, restoring the same to original condition by using cement, river sand and any other required materials size etc complete at all locations.(Quoted rate shall be excluding the cost of flush valve)				
	A) Orissa pan - 20004	1.00	NO.		
46	**European WC…**				
	Supplying & fixing approved colour glazed floor mounting European water closet at required line and level with heavy duty plastic seat and cover in matching colour with non-corrosive hinges, bolts, washers, cast iron chair bracket, integral P or S trap including C.I. connection up to soil pipe at the outer face of the wall.,25mm dia valve of ‘R.A.’ or of equivalent make, with 25 mm dia. Concealed G.I. 'C' class flush pipe, fixing the Water Closet to a perfect level on floor by using required fixing materials etc. complete.(Quoted rate shall be excluding the cost of flush valve)				
	B) Model no- 20050(Cleo)	1.00	NO.		
47	**Wash basin...**	1.00	NO.		

	Providing and fixing in position 'Hindware' make Zen catalogue no-10049 Under counter wash basin at required line & level including : A) Colored glazed earthenware wash basin from HINDUSTAN Sanitary ware. B) 32mm dia brass CP bottle trap with waste coupling and joints and 32 mm dia concealed outlet pipe up to the nearest nahani trap. C) Feed pipe with all Brass specials. D) Fixing one no.12mm dia Brass CP heavy type screw down pillar cock(CON-123) of "Jaguar "make. E) 12mm dia Brass CP angular stop cock (CON-059)- one no. of 'Jaguar' make. F) 12 mm dia. flexible pipe supply from angled stop cock.				
48	**Nahani trap...**	2.00	NO.		
	Providing and fixing in position 100 mm dia C.I. NAHANI TRAPS including necessary beddings, up to the outside face of the wall & stainless steel heavy type grating with ring of approved type complete.				
49	**Gully trap...**	2.00	NO.		
	Providing and fixing in position STONE WARE GULLY TRAP of size 150 x 100 mm including C.I. cover and frame, PCC 1:3:6 in foundation, 230 x 300 mm chamber of brick masonry in C.M.1:5 with neat cement rendering including excavation & refilling etc. complete.				
50	**Inspection chamber with CI...**				
	Providing and constructing masonry INSPECTION CHAMBERS up to 1500 mm depth in 230 mm thick conventional brick masonary in C.M. 1:6,including excavation up to 1.5 depth in all kind of strata(excluding Hard rock), 100 mm thick 1:3:6 P.C.C. bedding, plaster in C.M. 1:4.				
	A) 600 mm x 450 mm	2.00	NO.		
	B) 600 mm x 600 mm	2.00	NO.		
	C) 600 mm x 750 mm	2.00	NO.		
	D) 600 mm x 900 mm	2.00	NO.		
	E) 900 mm x 900 mm	1.00	NO.		
51	**Inspection Chambers with precast...**				
	Providing and constructing masonry INSPECTION CHAMBERS up to 1500 mm depth in 230 mm thick conventional brick masonary in C.M. 1:6,including excavation up to 1.5 m depth in all kind of strata(excluding Hard rock), 100 mm thick 1:3:6 P.C.C. bedding, plaster in C.M. 1:4 fro				
	A) 600 mm x 450 mm	1.00	NO.		
	B) 600 mm x 600 mm	1.00	NO.		
	C) 600 mm x 750 mm	1.00	NO.		
	D) 600 mm x 900 mm	2.00	NO.		
52	**RCC hume pipe...**				
	Providing, laying and jointing RCC HUME PIPES of NP 2 class with all specials below ground level at all depths including cutting, jointing with hemp yarn & C.M.1:1 and testing including excavation up to Hard rock & refilling, cleaning etc. complete(Note:if required end casing in 1:2:4 Concrete should consider be exta). Excavation in hard work shall be approved and paid extra				
	A) 150 mm dia.	40.00	RMT.		
	B) 200 mm dia.	60.00	RMT.		
53	**CI Pipes...**				
	Providing, fixing in position & jointing CI Pipes (Heavy Duty) with all specials such as bends, tees, single junctions, double junctions, offsets, cowls etc. with appropriate jointing, including making holes in walls & floors, testing the line and joints.				
	A) 100 mm dia. waste pipe	5.00	RMT.		
54	**GI pipe...**				
	Providing,laying and jointing 'C' Class G.I. Water Supply Pipes with all specials such as bends ,sockets ,back nuts ,elbows ,tees ,reducers ,clamps etc. including fixing in walls or under floor or ground with necessary excavation and back filling.				
	B) 15 mm dia. Concealed	20.00	RMT.		
	D) 20 mm dia. concealed	10.00	RMT.		
	F) 25 mm dia. concealed	10.00	RMT.		
	I) 40 mm dia. open	20.00	RMT.		
55	**Ball Valves...**				

	Providing and fixing Heavy Quality Gun Metal Ball Valves with stainless steel ball complete.				
	A) 25 mm dia.	2.00	NO.		
	C) 40 mm dia.	1.00	NO.		
56	**Long body Bib cock...**	1.00	NO.		
	Providing & fixing long body CP bib cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make- Jaguar clazion 23107 or equivalent)				
57	**Two way Bib cock...**	1.00	NO.		
	Providing & fixing Short body CP bib cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make- Jaguar, item code-23041or equivalent)				
58	**Stop cock...**	2.00	NO.		
	Providing & fixing brass angular stop cock of 15 mm dia of approved Quality & make with all specials, fittings etc. complete.(make-: clarion 23053 or equivalent)				
59	**Pillar cock...**	1.00	NO.		
	Providing & fixing short body CP pillar cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make-Jaguar ,PRS -031or equivalent)				
60	**Push cock...**	1.00	NO.		
	Providing & fixing CP push cock 15 mm dia of approved quality & make with all specials, fittings etc. complete. (make-Jaguaror equivalent)				
61	**Mirror...**	1.00	SQM		
	Providing and fixing mirrors in toilets including MS powder coated frame, 12mm ply backing and Belgium make mirror with all hardware.				
62	**Paper holder...**	1.00	NO.		
	Providing and fixing paper holder of approved make in toilets with all specials etc. complete.(make-Jaguar, Item code-7751 queen's or equivalent)				
63	**Towel rod...**	1.00	NO.		
	Providing and fixing towel rod of approved make in toilets with all specials etc. complete. (make-Jaguar Continental 1111N or equivalent)				
64	**Soap dish...**	1.00	NO.		
	Providing and fixing ceramic soap dish in toilets including fixing in position and in line and level with cement slurry, curing,cleaning etc. complete.(approved)				
65	**'SINTEX' tank...**	1.00	Nos		
	Providing and fixing "SINTEX" water storage tank of approved make and of required capacity including all connections, accessories, transportation, hoisting, erection etc. complete.(2000 Litre capacity)				
66	**Non return valves...**				
	Providing and fixing approved make gun metal non return valves etc. complete				
	A) 50 mm dia.	1.00	NO.		
67	**Flush valves...**				
	Providing and fixing approved make gun metal flush valves etc.complete				
	A) 32 mm dia.	1.00	NO.		
68	**Stone ware pipes...**				
	Providing, laying and jointing the best quality stone ware pipes with all specials fittings such as bends, tees, junctions, double junctions etc. below ground at all depths including cutting, jointing with hemp yarn & Cement Mortar.1:1and testing.				
	A) 100 mm dia.	10.00	RMT.		
69	PVC Down take pipes of 200 mm	30.00	RMT		

70	**SS SIGNAGE LETTERING**: Providing and Fixing solid 316 grade SS alphabetical letters average height 750 mm, avg. width 125 mm & avg. thickness 40 mm to masonary wall with sufficient anchor bolting/receiving GI circular pipe sleeves insert fixed flush to masonary wall and hidden 316 grade brackets/holdfasts SS welded to back-side of letters; fixed with approved epoxy grouting and as per execution approved Working details in issued drawing fixed firm complete. All fising to be as per issued drawing templates & working details; mounted average max. 4.5 mts high from formed ground level. Item to be inclusive of single work mock-up on site, all scaffolding, accessories, fixing implements, men material and lift upto 5 mts., cleaning finished complete to approved glossy finish to SS.	1.00	Job		
71	**EXTERIOR GRANITE CLADDING**:				
	Cladding the vertical wall surfaces of Cement plastered block masonary wall with pre-polished Granite slab of approved colour 25mm thick of best quality and free from all defects and set in cement mortar 1:2 (One cement and two sand) 10mm thick. The joints shall be flush with faces of granite slabs and in line, cut and jointed as per issued design drawing approved for construction. The joints shall be pointed neatly with same colour pigment mixed with white cement of 1.80 kg/m2. The tiles so laid shall be supported with suitable arrangements for a period of 2 hours. After laying to avoid falling of granite tiles by its self weight after laying in position. Item includes Additional support fixing with 316 grade solid SS studs avg. 40 mm diameter in head and min. 32 mm diameter in Cross-section to Architecct approved profile & glossy head finish, fixed flush complete with Granite outer face & lower rim of stud-head, stud to anchor min. 125 mm in masonary wall. Number and location of studs to be strcitly as per issued design drawing approved for construction. The Granite slabs shall be got approved by the Architect/departmental officers before use in the work, etc., complete. The rate is including labour, all materials, scaffolding charges, hire charges for granite cutting machine, power consumption etc., getting approved from Architect avg. 4 sq.mt. finished installation item cleaned finished complete.	5.00	Sqm		
72	**Granite Natural stone Cill & Jamb pieces:**				
	Providing and fixing with GI holdfasts in masonary wall, avg. 20 mm thick & avg. max. 400 mm wide pre-polished select & approved natural stone granite cill and jamb pieces for opening in masonary wall, finished fixed complete. Item to be inclusive of all scaffolding, fixing bed adhesive of CM 1:2 with specialised Cementitious Tile Grouts, men material and lift upto 5 mts. from formed ground level, all accessories, fixing implements, tools and tackle, getting mock-up of avg. 1 RM approved from Architect, finished cleaned complete. Item includes Additional support fixing with 316 grade solid SS studs avg. 40 mm diameter in head and min. 32 mm diameter in Cross-section to Architecct approved profile & glossy head finish, fixed flush complete with Granite outer face & lower rim of stud-head, stud to anchor min. 125 mm in masonary wall, as per design drawing issued good for construction.	2.00	Sqm		
73	**kerb Stone**				
	Providing 'L' shaped precast reinforced cement concrete M25 grade road kerbs of size as specified in the drawing made to shape using 20 mm down size Coarse graded aggregate including form work and nominal reinforcement of Fe 415 grade, 12 mm dia at 150 c/c with 8 mm dia stirrups at 150 mm c/c fixing in cement concrete 1:3:6 nominal mix including pointing exposed faces with C.M 1:3 and colour washing with acrylic distemper over a coat of primer etc. complete, as directed.	110.00	Rmt		
74	**Paver Block**				
	Providing and laying precast cement concrete designer tile of approved make, specified colour and design thickness not less than 20mm, in locations such as drive way, ramp, foot paths, garden, court yards etc., over an average thickness of 20 mm bed of cement mortar 1:4 (1 cement : 4 coarse sand) including cleaning of base surface and removal of laitance, rubbing, cleaning and curing etc. all complete as per Particular Specification and as directed by Employer / Architect.	500.00	Sqm		
	GRAND TOTAL				

Item No	Description	Unit	Qty	Supply		Installation	
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)
	SECTION-I:-						
1	8 way TPN DB with 40A, 4P RCBO 100 mA as incomer & 10A SP MCB -16 Nos & 20A SPMCB-8Nos as outgoings as per SLD **(MAIN GATE LDB)**.	Nos	1.00				
2.0	Supply, Installation, Testing and Commissioning of 1100V grade L.T. XLPE/ PVC insulated multistrand Al./ Cu. conductor cables on provided prefabricated trays/ pipe/ in trenches with necessary clamps, identification tag. & all other items required to complete the task. **(Actual cable lengths shall be measured at site prior to procurement.)**						
2.1	4C x 6 Sq.mm. YWY cable.	Rmtr	150				
2.2	3C x 2.5 Sq.mm. YWY cable.	Rmtr	150				
2.3	3C x 2.5 Sq.mm. Cu. Flexible cable.	Rmtr	100				
3.0	Supply & installation of End termination for cables as above with Brass, heavy duty, Single compression glands, Al/ Cu lugs, other consumable like insulation adhesive tape, crimping, gland hole drilling, ferrulling, marking, etc.						
3.1	4C x 6 Sq.mm. YWY cable.	Nos.	2				
3.2	3C x 2.5 Sq.mm. YWY cable.	Nos.	28				
3.3	3C x 2.5 Sq.mm. Cu. Flexible cable.	Nos.	24				
4.0	Supply & installation of readymade hot dip GI. perforated type tray, including readymade accessories e.g. vertical & horizontal bends, reducers,couplers,Tee's, right angles etc.(Ref Layout)						
4.1	100mm, 50x50 perforated tray. (16 SWG)	Rmtr	10				
5.0	Supply and installation of readymade hot dip GI tray covers 16/18 SWG including readymade shape of Vertical & Horizontal Bend, Tee's, Right angles etc. to suit tray for all vertical runs.						
5.1	100mm perforated tray.	Rmtr	10				
6.0	Supply and Fabrication of M.S. angle/ Channel/ Square tube of 3mm thick of 50x50mm size including base plates supports as per requirement (Duly approved by AEPPL and Client) for trays, frames etc. including necessary painting with 2 coats of primer and 2 coats of enamel black paint.	Kg.	50				
7.0	8 SWG GI Wire.	Rmtr	20				
8.0	Surface / concealed point wiring for light / fan call bell / 5 A points with 2 x 2.5 + 1 x 1.5 Sq.mm. multistrand Cu. wires 1100 V gr. in suitable size FR PVC conduits / flexible conduits wherever required as submains and 2 x 1.5 + 1 x 1.5 Sq.mm. wires for each point complete (submains will not be measured separately) with necessary modular switch board, switch plates and Blanking plates & accessories as required etc. to complete the task.. Primary Point shall mean first point wired from switchboard and Secondary point shall mean successive points next to Primary point.						
	Note:- All conduits in area with false ceiling shall be concealed in wall below false ceiling						

Item No	Description	Unit	Qty	Supply		Installation	
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)
8.1	Primary Light point wiring with necessary 5 A SP switch, ceiling rose / Holders complete. (Maximum 1points controlled by one switch)	Pt.	4				
8.2	Primary Light point wiring with necessary Control from DB, ceiling rose / Holders complete. (Maximum 3-4 points controlled by one MCB)	Pt.	3				
83	Secondary light point wiring with 2x1.5 + 1x1.5 sqmm Cu wires from primary point above including necessary accessories e.g. connectors.	Pt.	16				
8.4	5/15A 3 pin socket outlets independent (Modular).	Pt.	6				
8.5	As above but 2 x 2.5 + 1 x 1.5 Sq.mm. wires. In FR PVC conduit.	Rmtr	150				
9.0	Supply, installation, testing and commissioning of lighting fixtures/ fans/Ex. fans etc. including necessary ballast, lamp, accessories, wiring connection, support arrangement like suspension chain, M.S. conduit drop with ball socket. down drops, etc. All FTL fixtures shall be with triphosphor source.						
9.1	MIROLTA Slim 18W HF	Nos.	2				
9.2	1X36W. TUBELIGHT PHILIPS TMS021 1XTLD36W	Nos.	5				
9.3	1X25W Philips Decotwist Slim Radiant tcg300(BUCL)	Nos.	4				
9.4	1X150W MH floodlight MWF231 1xMHNTD-150W S	Nos.	14				
9.5	1X150W Under canopy fix HPK225 1xCDM-ET150W PR	Nos.	4				
9.6	1X125W Post Top Lantern SPC106 1xSON70W E	Nos.	2				
9.7	8W Philips LED150/WW PSU 220-240V 7043	Nos.	12				
9.8	1X32W PHILIPS PENDENT VETRO FP01	Nos.	4				
9.9	Supply, installation testing of 150mm exhaust fans with mounting frame & louvers.	Nos.	1				
9.10	Ceiling fan 24 inch	Nos.	2				
	TOTAL OF SECTION-I						
	Grand Total						

Note-Rate will be inclusive of all taxes