INDIAN INSTITUTE OF TROPICAL METEOROLOGY
PASHAN, PUNE-411 008

Tender No. IITM/works/2013-14/02

e-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: - Civil works for Strengthening and Modification of existing Building and External civil works for HPC- II at I.I.T.M., Pune.

Tender documents can be down loaded from e-procurement web site http: // www.eprocure.gov.in or from Institutes web site http://www.tropmet.res.in and also can be obtained from the Civil wing of the Institute. In case of downloading of tender documents from above websites the bidder has to submit the tender document fee of Rs.2,500=00 (Rs, Two thousand five hundred only) payable in the form of DD drawn in favour of Director, IITM, Pune.

Date of issue of tender documents	**:**	**07/06/2013**
Pre - Bid Meeting	**:**	**13/06/2013 at 11.00 hrs**
Last date of receipt of Tender at IITM, Pune	**:**	**21/06/2013 at 12.30 hrs**
Opening of Tenders (Technical Bids only)	**:**	**21/06/2013 at 15.00 hrs**

The Institute reserves the right to reject any or all tenders without assigning any reason there of.

Civil Engineer
For Director

Email: anupam@tropmet.res.in

भारतीय उष्ण देशीय मौसम विज्ञान संस्थापुमो
पाषाण, पुणे – 411 008

*निविदा सं./*No. CE/IITM/project/Const./Bounsary Wall/12-13/08

ई-निविदा सूचना

निदेशक, भारतीय उष्णदेशीय मौसम विज्ञान संस्थान, डॉ. होमी भाभा रोड, पाषाण, पुणे – 411 008 (भारत), पीडब्ल्यूडी/एमईएस/सीपीडब्ल्यूडी/रेलवे/पी एंड टी/अनुभवी औद्योगिक ठेकेदारों तथा अन्य समकक्ष सरकारी विभागों द्वारा ठेकेदारों की अनुमोदित सूची में पंजीकृत ठेकेदारों से निम्नलिखित कार्य हेतु अलग-अलग मुहरबंद लिफाफे में निविदाएं (भाग-I तकनीकी बोली, भाग-II वाणिज्यिक बोली) आमंत्रित करते हैं:

कार्य का नाम:-

जारी करने की तिथि :- 09/07/2012

बोली पूर्व बैठक की तिथि एवं समय:- 16/07/2012 **को** 11.00 **बजे**

निविदा प्राप्त होने की अंतिम तिथि:- 31/07/2012 **को** 12.30 **बजे**

निविदा खोलने की तिथि (केवल तकनीकी बोलियाँ):- 31/07/2012 **को** 15.00 **बजे**

निविदा दस्तावेज ई-प्रोक्योरमेंट वेबसाइट **http://** www.eprocure.gov.in या संस्थान की वेबसाइट **http://www.tropmet.res.in** या संस्थान के सिविल विंग से प्राप्त किए जा सकते हैं यदि निविदा दस्तावेज वेबसाइट से भी डाउनलोड किए जाते हैं तो बोली कर्ता को रु.1000 =00(रु. एक हजार केवल) का निविदा दस्तावेज शुल्क के रूप में निदेशक, आईआईटीएम के पक्ष में डिमांड ड्राफ्ट देना होगा।

संस्थान को किसी निविदा या सभी निविदाओं को बिना कारण बताए निरस्त करने का अधिकार है। विस्तृत विवरण हेतु कृपया हमारी वेबसाईट ***www.tropmet.res.in*** देखें।

सिविल इंजीनियर
कृते निदेशक
ई-मेल : anupam@tropmet.res.in

TENDER DOCUMENT FOR PROPOSED

Civil Works for strengthening and modification of existing Building & External civil works for HPC II 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:

MADHAV JOSHI AND ASSOCIATES.
102, LAXMI VILLA, 1170/32, REVENUE COLONY,
SHIVAJINAGAR, PUNE 411005.

PROJECT MANAGEMENT CONSULTANTS:

HORIZON CONSULTING ENGINEERS PVT.LTD.
FLAT NO. 5, SUBHADRA SMRUTI, MANIKBAG, SINHGAD ROAD,
PUNE 411051. PHONE: 24350213.

DESIGN CONSULTANTS:

STRUCTURAL – G A BHILARE & ASSOCIATES, PUNE.

VOLUME I – (SECTIONS I TO VI)

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

SECTION - I

TENDER NOTICE
&
INVITATION FOR BIDS (IFB)

Indian Institute of Tropical Meteorology.
Dr. Homi Bhaha Road, Pashan, Pune 411008.

SECTION I – TENDER NOTICE

Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008 invites sealed tender (Part I – Technical Bid, Part II – Commercial Bid) in separate sealed covers from contractors registered in the approved list of contractors of PWD/ CPWD/ MES/ Railway/ P & T/ Experienced Industrial contractors and any other Government department in appropriate class for following works –

Name of the work – Civil Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008, Maharashtra State

Tender documents can be down loaded from e – procurement web site http://www.eprocure.gov.in or from Institute's web site http://www.tropmet.res.in and also can be obtained from civil Wing of the Institute. The Tender document fee is Rs. 2500/- (Rs. Two Thousand Five Hundred only) payable in form of Demand Draft in favor of Director IITM Pune.

Date of Issue of Tender Documents – 07/06/2013

Pre-Bid meeting – 13/06/2013 At 1100 hrs.

Last Date of receipt of Tender at IITM Pune 21/06/2013 at 1230 hrs.

Opening of Tenders (Technical Bids only) 21/06/2013 at 1500 hrs.

The Institute reserves the right to reject any or all tender documents without assigning any reasons thereof.

Civil Engineer
For Director,
anupam@tropmet.res.in

Indian Institute of Tropical Meteorology. Dr. Homi Bhaha Road, Pashan, Pune 411008.

SECTION I - INVITATIONS FOR BIDS (IFB)

Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008 has proposed to Carry out Civil Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008, Maharashtra State and intends to invite sealed Item Rate Bids from contractors registered in the approved list of contractors of PWD/ CPWD/ MES/ Railway/ P & T/ Experienced Industrial contractors and any other Government department in appropriate class for works as detailed in below table .

Bids may be down loaded from e – procurement web site http://www.eprocure.gov.in or from Institute's web site http://www.tropmet.res.in and also can be obtained from civil Wing of the Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008, from 07/06/2013 to 21/06/2013. The Tender document fee is Rs. 2500/- (Rs. Two Thousand Five Hundred only) payable in form of Demand Draft in favor of Director IITM 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 1230 Hrs. on 21.06.2013. The Technical bids will be opened at 15.00 Hrs. on 21.06.2013. 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 13.06.2013 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	Approximate Value (Rs)	E M D (Rs)	Cost Of Document (Rs)	Period of Completion
Civil Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Pashan, Pune, 411008	1,35,00,000/- (Rupees One Crore Thirty Five Lakhs only)	Rs. 2,70,000/- (Rupees Two Lakhs Seventy Thousand only)	2500/- (Rupees Two Thousand Five Hundred only) Non Refundable.	Four Months

SECTION - II

NOTICE TO THE TENDERERS AND GENERAL INSTRUCTIONS

SECTION II - NOTICE TO THE TENDERERS AND GENERAL INSTRUCTIONS

1. Sealed Item rate Bids are invited from contractors registered in the approved list of contractors of PWD/ CPWD/ MES/ Railway/ P & T/ Experienced Industrial contractors and any other Government department in appropriate class for works for Civil Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008.

2. Tenderers are strongly advised to go through all the documents in connection with this contract very carefully. Bids may be down loaded from e – procurement web site http://www.eprocure.gov.in or from Institute's web site http://www.tropmet.res.in and also can be obtained from civil Wing of the Indian Institute of Tropical Meteorology, Dr. Homi Bhaha Road, Pashan, Pune, 411008, from 07/06/2013 to 21/06/2013. The Tender document fee is Rs. 2500/- (Rs. Two Thousand Five Hundred only) payable in form of Demand Draft in favor of Director IITM Pune.

   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 superscribed with name of work, due date, item and nature of bid (prices or unpriced).

   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.

   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. Tenderers 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.

5. 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 envelops mentioning "Tender for the Civil Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008 ."

6. Each tenderer shall furnish Earnest Money Deposit of Rupees 2,70,000/- (Rs. Two Lakhs Seventy Thousand Only) by a Demand Draft or Bank Guarantee Drawn in favor of The Director, Indian Institute of Tropical Meteorology, Pune.' with the tender. The EMD amount will be sent back to the unsuccessful tenderers 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 tenderer and shall not carry any interest.

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

8. Every tenderer 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 tenderer 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.

   Tenderers 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.

9. Every tenderer 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

10. 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.

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

12. The tenderer 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 tenderer shall initial each page of the Schedule of Quantities.

13. The tender shall be signed by a person or persons so authorized by the tenderer.

14. 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 tenderer with his dated initials as many times as the corrections occur.

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

16. 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.
TENDERERS SHALL SEPARATLY MENTION IN THEIR FORWARDING LETTER THE PERCENTAGE OF VAT AND SERVICE TAX THEY HAVE CONSIDERED WHILE QUOTING RATES.

17. No alteration which is made by the tenderer 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.

18. 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.

19. The following specialized works shall be carried out only by specialist firm / manufacturer after the approval of Architect / PMC / IITM.

- Box type Waterproofing treatment
- Fabrication for structural steel for strengthening of structure.
- Carbon Fiber treatment to slabs.
- External stonecreat plaster.

20. The tenderer 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.

21. The tender shall accompany the following information and schedules With Technical Bid -:

a) A tentative construction programme showing the tenderer's 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 tenderer 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 tenderer 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 tenderer [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.

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

23. After acceptance of the tender, the tenderer 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 tenderer shall thus be bound even though the formal agreement has not been executed and signed within the time by the tenderer.

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

25. 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.

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

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

Signature of Tenderer Seal of Tenderer

Date:
Address:

SECTION - III

LETTER OF OFFER.

SECTION III - LETTER OF OFFER

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

To

_____

_____

_____

Dear Sirs:

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 Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008.

[b] Earnest Money: Rupees Two Lakhs Seventy Thousand only

[RS. 2,70,000.00 only]

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

[d] Time allowed for the works : Four months [04], work commencing from the 7th 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 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	One Bill per month Not less than 25% of total cost
3.	Retention Money	33.3	05% of value of Interim [Running Work] bills up to a maximum 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.	Period of Commencement	41.1	7th day after the receipt of Letter of commencement.
6.	Time of Completion	41.1	Entire work under contract to be completed in Four calendar months.
7.	Liquidated Damages	43	1% per week and maximum up To 10% of Order Value.
8.	Minimum amount of third Party insurance	49	Rs.2, 00,000.00 any one incident, with the number of incidents Unlimited.

Place:

Date:

Seal: [Signature of Tenderer]

SECTION - IV

PROFORMA FOR ARTICLES OF AGREEMENT

SECTION IV - 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 Works for strengthening and modification of existing Building & External civil works for HPC II at Indian Institute of Tropical Meteorology (IITM), Dr. Homi Bhaha Road, Pashan, Pune, 411008. made this ……..day of..... Two Thousand Eleven between M/s.....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", Horizon Consulting Engineers Pvt. Ltd. Flat No. 5, Subhadra Smruti, Manik Bag, Sinhgad Road, Pune - 411051 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 servants, 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	Signed and Delivered for and on behalf of IITM
Witness: 1. Sign: Name: Address:	1. Sign: Name: Address:
Witness: 2. Sign: Name: Address:	2. Sign: Name: Address:

SECTION - V

GENERAL CONDITIONS OF CONTRACT

SECTION V - 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 tenderers for various Items.
[e] "Architect"	Architect, shall be Madhav Joshi & Associates, Architect and Urban Planner, flat No. 8, Matrusmriti Apartment, fourth floor, Plot No 92, Mayur Colony, Kotharud, Pune – 411038. Phone- 020 25410557 / 8.
[f] "Project Management Consultants"	Project Management Consultants (PMC), Horizon Consulting Engineers Pvt. Ltd. Flat No. 5, Subhadra Smruti, Manik Bag, Sinhgad Road, Pune - 411051 Phone – 24350213.
[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 that item a similar percentage or proportionate sum. Provided always that 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 by the IITM "	No Material shall be supplied by IITM
[p] " Expected risks "	Are 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.
[r] " A Day "	Shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.
[s] " A Week "	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 schedule 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 project Engineer in accordance with the 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 with in 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 with in 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 to all the work including authorized extra works.

7.5 All 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 otherwise 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 and 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. If 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 / 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 all 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 / 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) Horizon Consulting Engineers 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, filling 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 an other place of a sub-contractor [whether or not a nominated sub-contractor 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, on site 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 therefor.

[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.

21.0 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 install 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 shall 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 Thecontractor'sratesshallbeinclusiveofAlltaxesincludingoctroi,tollorsalestax on WorkContractTax,royalty,WorkContractTax,ServiceTaxonLabourandor material,ValueaddedTaxoranyothertaxandallduties,etcandallthesetaxes& dutiesshallbe payablebythecontractorandnoclaimwhatsoeverinthisrespect shallbe 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 expences.

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, all 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 Theworkshallinnowaybedelayedorstoppedbythecontractoronaccountofany dispute betweenhimandhisnominated/othersub-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 all 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 [j].

[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 / 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 sub-contract to deduct from any sum due or to become due to the nominated sub-contractor, 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 / PMC shall issue a certificate to that effect and thereupon the IITM may himself pay such amounts to any nominated sub-contractor 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 / 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 / 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 of 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 of instructions issued in regard to 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 sub-clause [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 / 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 / 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 upto 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 as 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 / 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 from 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 / Client before proceeding with the work involved. If the contractor in writing gives no such information to the architect / PMC / 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 can not 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 plus taxes as applicable 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 therefor.

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 the structure, and the contractor shall be entirely responsible for damage or loss by weather or other cause.

39.6 Within 15 days after signing the contract, the contractor shall submit for approval of the architect / PMC a complete list of all 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 / 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 / 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 / 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 mony 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 / 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 / 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 / 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 posses.

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 property 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 proceeding 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 therefrom, 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 shall 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 favour 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 all 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 / 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

51.1 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 continuos 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 [III] 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 IITM materials or goods so paid for shall become the property of the IITM.

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 all 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 IITM uncleaned and as excavated.

56.2 If in the opinion of the architect / 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 / 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 7,11,24,28,39,42(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 / 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 / PMC under the foll 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, IITM, who in consultation with architect / PMC shall state his decision in writing. Such decision made in the form of a final certificate or otherwise. The decision of the Director. IITM, with respect to any of the accepted matters shall be final and without appeal. But if either the IITM or the contractor be dissatisfied with the Advice of the architect / 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	:	21 days
33.2	Value of work for interim certificate	:	25 % of order value.
33.3	Retention percentage	:	05 % of value of work done from . R A Bill.
33.4	Period of final measurement & valuation	:	01 month
33.6	Installment after virtual completion	:	Amount of work done
			Full retention to be released after defect liability Period
40.1	Defect liability period	:	12 months from date of taking over.
41.1	Date of commencement		7th day from date of Letter of Commencement.
41.1	Date of completion		7 days + EFour months from date Of issuance of Letter of Commencement.
43	Agreed liquidated damages	:	1% per week delay in completion Subject to a Maximum of 10% of Order Value of works.

SECTION - VI

SPECIAL CONDITIONS OF CONTRACT

SECTION VI - 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 Director, Indian Institute Of Tropical Meteorology., Dr. Homi Bhaha Road, Pashan, Pune 411008,

2. No tender will be received after 1300 hours on 21.06.2013 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 tenderer 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 tenderer 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 tenderer/contractor must not assign the contract, nor sublet any portion of the contract, except with the written consent of the architects.

7. ElectricPower: 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 totalled 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 tenderers. 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 tenderer 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 tenderer 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 tenderer must obtain for himself, on his own responsibility, and at his own expenses all 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 tenderer 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 tenderer should be based upon probable quantities of the several items of work, which are furnished for the tenderers 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 tenderer, 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 with in 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 tenderer must give bar chart & state the periods within which he proposes to complete the several stages. The attention of the tenderer 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 tenderer 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 tenderer 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 + taxes as applicable.

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 PMC. PMC shall scrutinize and forward the bill along with his certification to Architect with in Seven days. Architect shall forward bill along with his certification to IITM with in three days and Client shall release the Payment with in 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 carryout the measurements alone and they will be deemed to have been accepted by the contractor.

24. Architect's/ProjectManagementConsultant'sStatusandDecisions:

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 endeavour 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 the 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. ProjectManagementConsultant: 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 with in 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 Tenderer]

Witness:_____ _____

Name and Address: [Seal of the tenderer]

TENDER DOCUMENT FOR PROPOSED

Civil Works for strengthening and modification of existing Building & External civil works for HPC II 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:

MADHAV JOSHI AND ASSOCIATES.
102, LAXMI VILLA, 1170/32, REVENUE COLONY,

SHIVAJINAGAR, PUNE 411005.

PROJECT MANAGEMENT CONSULTANTS:

HORIZON CONSULTING ENGINEERS PVT.LTD.
FLAT NO. 5, SUBHADRA SMRUTI, MANIKBAG, SINHGAD ROAD,
PUNE 411051. PHONE: 24350213.

DESIGN CONSULTANTS:
STRUCTURAL – G A BHILARE & ASSOCIATES, PUNE.

VOLUME II – (SECTION VII TO IX)
Technical Specification, Bill of Quantity & Tender drawings

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SECTION – VII

SPECIFICATIONS OF CIVIL AND ALLIED WORKS

1.0 Management and Co-ordination

1.1 Contractor's 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, specifications and Schedule of Quantities, Architect's/PMC instructions and directions to the satisfaction of the 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 instructions from the architect before undertaking any work where architect's/PMC directions or instructions are required. Any such work done in advance of such instructions 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 carrying 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 water 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 / Client's 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 the 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.

[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] No 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 aspects of labour laws, rules and regulations 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 minors] 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 strong 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 with theirs.

If any part of contractor's or sub-contractor's work depends for proper execution, or results, upon the work of any other contractor or sub-contractor, the contractor shall inspect and promptly report to the architect/project manager any defects in such work that render it unsuitable for such proper execution and results. His failure to so inspect and report shall constitute an acceptance of the work as fit and proper for

the reception of his work, except as to defects which may develop in the other contractor's or sub-contractor's work after the executive of the 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/ project 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 modifications shall be settled in advance and an authorization 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 Work

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 shall immediately remove from the premises materials and/or workmanship which, in the opinion of the architects/ 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.

[b] The contractor shall, if required, submit satisfactory evidence 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 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 the work by any separate contractor employed by the IITM, or by changes ordered in the work, or by strikes, lockouts, fire, unavoidable causalities or any cause beyond the contractor's 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 Madhav Joshi And Associates.

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 information 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 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 material [s] or labour.

[c] A reasonable doubt that the contract can be completed for the balance then unpaid. Here the architect's/ project management consultant's 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 openings, 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 Labor's Housing

At the discretion of the employer, space free of cost may be provided for laborers' 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 reassure 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 for proper installation of the finishing elements. The Architect's / 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 & 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 Defects 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.

2.0 EARTH WORK

2.1 Extent and Intent

The work under this section covers all operations listed below in connection with building construction work.

[a] Clearing and grubbing
[b] Grading
[c] Excavation
[d] Filling and back Filling
[e] Removal and Disposal of Surplus Material
[f] Anti-termite Treatment

The contractor shall provide all materials, labour, equipment, operations and incidental necessary and required for the completion of all aspects of work listed above as called for in the drawings and specifications.

2.2 Investigation of Site

The contractor shall visit the site, inspect the substrata and decide for him the nature of the ground and the substrata to be excavated. No claim of extras will be entertained in consequence of any misunderstanding or incorrect information or ignorance of existing conditions.

2.3 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 handed over to the architect/project manager as called for under relevant clause of conditions of contract.

2.4 Excavated Materials

Any sand, gravel, mica, rock or similar useful materials obtained as a result of site excavation shall be the property of the IITM and shall not be disposed off or used in the construction of the works without prior written consent of the architect/PMC/IITM. It is the intention of this contract that all benefits accruing from materials within the site shall pass to the IITM and the fair market price of any such material disposed off or used shall be pledged to the IITM by the contractor and the contract sum adjusted accordingly. Borrow pits shall not be dug on the site without the prior written consent of the architect/PMC.

2.5 Clearing the Site

The contractor shall clear the site of all structures rubbish and materials, remove all grass and low vegetation only after consultation with the architect/PMC as to which bushes, trees and buildings shall be saved. All disused foundations, drains or other obstructions met with during excavation shall be dug out and cleared as directed by architect/ PMC.

2.6 Setting out of the Work

The contractor shall be responsible for the true and proper setting out of the work in relation to original points, lines and levels of reference and for the correctness of the levels, dimensions and alignment of all parts of the work and for the provision of all necessary instruments, appliances and labour in connection therewith. If at any time during the progress of the work any error appears or arises in the position of levels, dimensions, or alignment of any part of the work the contractor on being required to make good the error shall at his own expense rectify such errors to the satisfaction of the architect/project manager. The checking of any line or level by the architect/project manager shall not in any way relieve the contractor of his responsibilities.

The contractor shall provide all required setting-out pillars and one or more permanent benchmarks in some central place before the start of the work, from which all important centerlines and levels for excavations will be set. The contractor shall provide all labour and materials for setting-out at his own cost.

The setting-out pillars and permanent benchmarks shall consist of masonry pillars with top neatly plastered and horizontal as per the approval of architect/PMC. Benchmarks shall be well connected with GTS or any other benchmark approved by architect/ PMC.

2.7 Excavation of Materials

Excavation shall be carried out in and through any material met on the site to the lines, levels and contours shown on the detailed drawings, and the contractor shall remove all excavated materials to soil heaps on site or transport for use as filling on the site or stack them for reuse as directed or cart away as called for.

Excavated material shall not be deposited within 1.5 m. from the top edge of the excavation.

The sides of the excavation may be out sloping or shored and strutted to hold the face of earth as per site requirements and as directed by the architect/ PMC. The contractor shall, as necessitated by the nature of soil and the depth of excavation make safe and appropriate measurers for protection of workers and others.

Foundation pits shall not be excavated to the full depth unless construction is imminent. The last fifteen [15] c.m. depth of the excavation shall not be removed until concreting work is imminent. The full depth may be excavated at the discretion of the architect/ PMC and the bed covered with a one hundred [100] mm. [minimum] thick [or as indicated on drawing] layer of lean concrete or as specified in schedule of rates, after watering, if required and adequately consolidating the bed.

The contractor shall provide suitable drainage arrangements to prevent surface/subsurface water from any source, entering the foundation pits, at his own cost.

If the bottom of any excavation has been left exposed by the contractor and that in the opinion of the architect/ PMC it has become badly affected by the atmosphere or by water, then the contractor shall remove such portions of the deteriorated foundation material as the architect/ PMC may direct, and shall make good with lean concrete 1:3:6 mix [1 cement; 3 sand; 6 coarse aggregate]. All expenses for such additional concrete and excavation shall be borne by the contractor.

Where excavation is made in excess of the depth required, the contractor shall, at his own expense, fill up to required level with lean concrete of mix 1:3:6 [1 cement; 3 coarse sand; 6 aggregate] or as decided by architect/ PMC.

Unless otherwise specified the contractor at his own expenses without extra charges shall make provisions for pumping or bailing out water accumulated [from any source] in the excavated pit/trench/worksite.

Loose or soft bed-ground encountered in excavation at the required depth shall on architect/ PMC's instruction be excavated to a firm bed and the difference made up to the required level by methods as the architect/ PMC's may decide.

In those cases where, during excavation, side slips occur for reasons not attributable to the contractor [e.g., where no shoring and strutting is provided with prior approval of architect/project manager], the extra quantity of earth due to such slips shall be measured and paid for, as per the respective rates of earthwork for excavation. No extra payment shall be made if, as per the opinion of the architect/project manager, such slips have occurred due to surcharge of earth kept near the edge of excavation or due to improper, dewatering and/or shoring and strutting system.

Any obstacle encountered during excavation shall be reported immediately to the architect/ PMC and shall be dealt with as instructed by him. Removal or buried piping or cables shall not be done without prior permission of architect/ PMC and contractor shall provide all measurers to protect such lines. Cost of such protective measures is deemed to be included in the rates for various items of excavation.

The contractor shall not undertake any concreting in foundation until the architect/ PMC approves the excavation pit.

2.8 Shorting and strutting

The shoring and strutting of the sides to withhold the face of excavation pits/trenches shall be done as directed by the architect/ PMC and as required at the site.

The shoring shall be of closed or open timbering type depending upon the site requirements and as directed by the architect/ PMC whose decision shall be final and binding, as to the type of shoring to be used.

The method and arrangement of the shoring and strutting shall be sound and safe and shall be got approved from the architect/ PMC before installation. The approval shall not absolve the contractor of his responsibilities of safety of the workers and any other contractual requirements of the contractor.

The shoring and strutting shall be kept in portion till all the relevant works are completed and approved. It shall be dismantled and removed only after the permission to do so as obtained.

No extra payment shall be made to the contractor for shoring, strutting or any work to be done by him to protect the sides of excavation. The rates for excavation items shall be deemed to be inclusive of such protective measurers.

2.9 Stacking of Soil

Excavated materials shall not be placed within 1.5 meters of the edges of trench or half the depth of the trench, whichever is more.

2.10 Water in Excavation

All water that may accumulate in excavation from all causes is to be bailed, pumped out or otherwise removed. Adequate pumping or other facilities shall be employed to keep all excavation clear of water constantly. Care shall be taken to see the water is not discharged where it will cause damage to buildings or other property or cause inconvenience in the legitimate use of the property. During excavation the contractor shall take particular care to avoid damage to drains, water mains, underground work and services. Should any damage be done, the architect/project manager is to be notified immediately and the damage made good at the contractor's expense. Pipes, cables etc., met with during the excavation are to be properly slung or otherwise supported.

2.11 Notification to Architect/Project Management Consultant

The contractor shall notify the architect/PMC when excavation is ready for inspection and no foundation shall be put in before the excavation has been approved by the architect/PMC. He shall give architect/PMC at least three working days notice.

2.12 Protection

The contractor shall protect the excavation from the effect of inclement weather or other damage or make good such damages to the satisfaction of the architect/ PMC at his cost.

2.13 Fill Material

Fill materials required for fill and back fill shall be subject to the approval of the architect/ PMC. Fill materials shall be hard and free from all soft or spongy material. Clods or rocks over 20 cm. in greatest dimension shall not be placed within 30 cm. of grade. No material over 8 cm. in size shall be placed in the upper 15 cm. of fill.

Fill under floors, terraces and concrete beds shall be free of saltpeter, white ants etc. Where sufficient fill material is not available from the excavation good quality earth shall be imported from external sources and used for filling.

2.14 Fill Compaction

The fill shall be spread in layers not exceeding 20 cm. thick and each layer shall be watered and thoroughly consolidated with a ten [10] tone roller. At locations where rolling is not possible, the filling shall be carried out in layers not exceeding 20 cm. thick and each layer watered and rammed with heavy vibratory compactors and rammers till the required level is reached. The fill shall then be flooded with water for at least 24 hours, allowed to dry and then rammed and consolidated again. The finished surfaces shall be formed to correct lines, levels, slopes, shapes etc. and shall not be executed until all foundation, footings etc. have been inspected and approved by the architect/ PMC.

The contractor shall fill in around foundations, walls etc. as described above and bring grades up to either original ground levels or as required by the drawings when different from original grades. Consolidation of all filling shall be carried out to achieve a dry density of not less than 95% unless otherwise specified in the item.

2.15 Anti-Termite Treatment

Designed buildings shall be adequately protected against attack by subterranean termites by suitable chemical treatment measurers. The work shall be carried out by the specialist pest control agency approved by the Architect/ PMC.

The pest control agency to be selected by the architect/ PMC shall be a member of the Indian Pest Control Association.

The work to be carried out by the specialist firm shall carry a guarantee on court stamp of hundred rupees of the satisfactory performance of the treatment for a minimum period of ten [10] years.

The treatment shall be carried out generally in accordance with the stipulations laid down by IS: 6313 [Part II] (Code of practice for Anti Termite Measurers in Buildings - Part II: Pre-constructional Chemical Treatment Measurers] subject to the minimum requirements given in this specification.

2.16 Minimum Specification

2.16.1 The earth filling immediately under the stone soling [under floors], bottom and side fills of all entrance to basements shall be chemically treated against termites. The chemicals to be used for the treatment shall be conforming to the requirements and concentration lay down in IS: 6313 [Part II].

2.16.2 *Application*: The chemical solution shall be prepared by mixing the chemical with the appropriate quantity of water to obtain a chemical emulsion of the

correct concentration as stipulated above. The prepared emulsion shall be applied as described below.

2.16.3 *Treatment to Back Fill*: After the column foundations, wall foundation etc., have come up, the back fill in immediate contract with the foundation structure shall be treated at the rate of 7.5 litters per square meter of the surface of the sub-structure for each side. If water is used for ramming the earth fill, the chemical treatment shall be done after ramming operation is completed by rodding earth at 15 cm. centers close to the wall face and spraying the chemical with the above dose. The earth is to be returned in layers and the treatment shall also be carried out in similar stages. The chemical emulsion shall be directed towards the masonry wall surfaces so that the earth in contact with these surfaces is well treated with the chemical.

2.16.4 *Top Surface of Filling over Basement etc.,* The top surface of the plinth fill and fill over basement roof slabs [just below the stone soling shall be treated with chemical emulsion at the rate of 5 litters per square meter of the surface before the stone soling is laid. If the filled earth has been well consolidated and does not permit the emulsion to seep through, holes unto 50 to 75 mm. deep at 15-0 mm. centers both ways may be made with crowbars to facilitate saturation of the soil with the chemical emulsion. The treatment is to be carried out over the earth fill over the basement roof and other fills. The treatment to the earth fill shall be continued into the side fills of the foundation to a depth of 500 mm. [or more as directed] using chemical solution at the rate of 7.5 litters per square meter. Also the treatment shall be carried up vertically wherever the filling meets with vertical obstruction. Such returns of the treatment shall be carried out as instructed by the architect/ project manager.

2.16.5 *Soil Surrounding Pipes*: Wherever any service pipes enter the soil inside the area of the foundation of any buildings, the soil surrounding the point of entry of each pipe at the foundation, floor, etc., shall be fully soaked with the chemical solution for a distance of at least one meter from the point of such entry.

2.16.6 *Spraying Equipment*: To facilitate proper penetration of the chemical into the soil, a pressure pump of adequate capacity and sprayers shall be employed to apply to solution.

2.16.7 *Pavements*: The contractor shall be paid on the basis of the actual area [plinth area of the building treated] for carrying out the work in accordance with above specifications.

2.17 Stone Soling [Hardcore]

Hardcore [stone soling] under floors, paving, roads, parking areas and other locations where called for, shall be of approved hard broken quartzite stones 50 mm. and down, the grading of stones shall be as given under:

Sieve Designation	Percentage by Weight Passing the Sieve
63 MM	100
50 MM	95-100
40 MM	35-70
20 MM	0-15
10 MM	0-5

The stones shall be hand packed in position, interstices between stones packed with smaller chips and the surface thoroughly, rolled with a 10 tone roller, with frequent watering. The surface shall then be blinded with murum, watered thoroughly and consolidated with a ten-tone roller to required grade and profiles. Where rolling as described above is not possible, the consolidation shall be carried out using heavy hand rammers, light manually operated rollers or vibratory compactors. The consolidated thickness shall be as shown on the drawings.

3.0 SPECIFICATIONS FOR CAST-IN-PLACE PLAIN AND REINFORCED CONCRETE

3.1 General Description

3.1.1 This section covers the requirements for furnishing of cement concrete including materials, proportioning, batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast-in-place reinforced concrete.

Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, and water, with or without admixture as approved, proportioned and mixed as specified herein.

3.1.2 Related Work Specified Elsewhere

[a] Steel Reinforcement
[b] Formwork

3.1.3 Applicable Codes and Standards

The codes and standards generally applicable to the work of this section are listed herein after.

[a] *Cement*

IS:	269	Specification for 33 grade ordinary Portland cement
IS:	650	Specification for standard sand for testing of cement
IS:	4031	Methods of physical tests for hydraulic cement
IS:	4032	Methods of chemical analysis of hydraulic cement
IS:	6925	Methods of testing for determination of water-soluble Chlorides in concrete admixtures
IS:	8112	Specification for 43 grade ordinary Portland cement
IS:	12330	Specifications for Sulfate Resistant Cement

[b] *Aggregates, RCC*

IS:	383	Specification for coarse and fine aggregates from Natural sources for concrete
IS:	456	Code of practice for plain and reinforced concrete
IS:	516	Methods of test of strength of concrete
IS :	1199	Methods of sampling and analysis of concrete
IS:	2386	Parts I and II. Code of practice for extreme weather Concreting.
IS:	7861	Parts I and II.Code or practice for extreme weather concreting
IS:	10262	Recommended guidelines for concrete mix design.

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[c] *Building Construction Practices*

IS:	1828	Parts I and II specifications for preformed fillers for expansion joint in concrete pavements and structures.
IS:	1946	Code of practice for use of fixing devices in walls, ceilings and floors of solid construction
IS:	3414	Code of practice for design and installation of joints in buildings
IS:	6509	Code of practice for installation of joints in concrete pavements
IS:	11134	Code of practice for setting out of buildings
IS:	11433	Parts I and II. Specifications for one part gun grade polysulphide based joint sealant.

[d] *Construction Plant and Machinery*

IS:	1791	Specification for batch type concrete mixers.
IS:	2505	General requirements for concrete vibrators: immersion type
IS:	2506	General requirements for screed board concrete vibrators
IS:	3366	Specification for plan vibrators
IS:	3558	Code of practice for use of immersion vibrators for concrete
IS:	4656	Specifications for form vibrators for concrete
IS:	4925	Specification for concrete batching and mixing plant
IS:	11993	Code of practice for use of screed board concrete vibrators.

[e] *Instruments for Testing Cement and Concrete*

IS:	5513	Specification for vicat apparatus
IS:	5514	Specification for apparatus used in Le Chaterlier test
IS:	5515	Specification for compaction factor apparatus
IS:	7320	Specification for concrete slump test apparatus
IS:	7325	Specifications for apparatus for determining constituents of fresh concrete
IS:	10080	Specification for moulds for use in tests of cement and concrete
IS:	10510	Specification for Vee Bee Consistometer

[f] *Sieves, Sieving and Related Items*

IS:	460	Parts I to III. Specification for test sieves
IS:	1607	Methods of test sieving

[g] *Construction Management*

IS: 4082 Recommendations on stacking and storage of construction materials at site. In this contract to be taken as a directive.

[h] Building Material and Components Sampling
IS: 2430 Methods of sampling of aggregates for concrete
IS: 3535 Methods of sampling hydraulic cements.

[i] *General*

National Building Code of India SP: 7
Handbook on Concrete Mixes SP: 23 [S & T]

The following clauses are intended to amplify the requirements of the reference documents listed above and the contractor shall comply with these clauses.

3.2 **Submittals**

3.2.1 *Material Report*: Prior to start of delivery of materials required for cement concrete, the following shall be submitted by the contractor to the Architect/ PMC.for approval.

[a] Recommended suppliers and/or sources of all ingredients for making concrete including cement, fine and coarse aggregate,water and additives.

[b] Quality inspection plan to ensure continuing quality control of ingredients by periodic sampling, testing and reporting to the project manager/engineer of the quality of materials being supplied.

3.2.2 *Mix Design*:

[a] The contractor shall design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. [Also refer to "Handbook on Concrete Mixes" SP: 23 (S & T) of ISI].

[b] Prior to commencement of concreting work the contractor shall submit the mix design as a report for the approval of Architect/ PMC.This report shall compare the proposed mix design specified herein.

[c] The design mix for any Grade of concrete submitted by contractor shall be allowed to make use of the design mix only after satisfactory results are obtained.

[d] If contractor delays this Procedure, the losses arising out of use of nominal mix in place of design mix shall be recovered from the contractor.

3.2.3 *Plant and Equipment*:

[a] The contractor shall submit the following to Architect/ PMC, well in advance.

[b] The proposed programme, methods and details of plant and equipment to be used for batching and mixing of concrete.

3.2.4 *Certification*:

[a] With each mix design, the contractor shall submit laboratory test reports and manufacturer's certificates attesting that ingredients are conforming to specifications. Such reports and certificates shall be supplied on receipt of each new consignment or batch.

[b] In case the source, brand or characteristic properties of the ingredients need to be varied during the term of the contract a revised laboratory mix design report shall be submitted.

3.2.5 *Reports for Inspection and Testing*:

During concreting operations, the contractor shall conduct inspection and testing as described in subsection 3.10.2 herein, and all reports thereon shall be submitted in summary to the Architect/ PMC.

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3.2.6 *Schedule*:

The contractor shall prepare working schedules for dates and rate of placing of concrete for each item of work and submit the same to the Architect/ PMC, when requested.

3.3 **Materials**

3.3.1 Before bringing to the site, all materials for cement concrete shall be approved by the Architect/ PMC. All approved samples shall be deposited at the site office of the site engineer before placing orders for the materials with suppliers. The materials brought on to the work shall confirm in every respect to their approved samples.

3.3.2 Fresh samples shall be deposited with Architect/ PMC.whenever type or source of any material changes. The contractor shall check fresh consignments or materials as it is brought on to the works site to ensure that they confirm to the specifications and/or approved samples.

3.3.3 The Architect/ PMC shall have the option to have any of the materials tested to find whether they are in accordance with specifications at the contractor's expense. All bills vouchers and test certificates which in the opinion of the Architect/ PMC are necessary to convince him as to the quality of materials or their suitability shall be produced for his inspection when required.

3.3.4 Any materials which have not been found to conform to the specifications and not approved by the Architect/ PMC shall be rejected forthwith and shall be removed from the site entirely by the contractor at his own cost within the time stipulated by the Architect/ PMC. The Architect/ PMC shall have the powers to cause the contractors to purchase and use materials from any particular source, as may in his opinion be necessary for the proper execution of work.

3.3.5 *Cement*:

[a] The cement used shall be one of the following types: in case not specified otherwise:

i] Sulfate Resistant Cement conforming to IS: 12330
iii] 43 grade ordinary Portland cement confirming to IS: 8112.

[b] Whenever possible all cements of each type shall be obtained each from one constant source throughout the contract. Cement of different types shall not be mixed one with the other. Different brands of cement, or the same brand of cement from different sources, shall not be used without prior approval of the Architect/ PMC.

[c] Unless otherwise agreed with the Architect/ PMC the cement shall be packed in bags. Packaged cement shall be delivered to the site in original sealed bags, which shall be labeled with the date of manufacture, weight, name of manufacture, brand and type. Cement received in torn bags shall not be used. Moreover, bags of cement, which varies in weight by more than 3% shall not be accepted.

[d] All cement shall be fresh when delivered and at ambient atmospheric temperature.

[e] In fair-faced elements, the cement used in the concrete for any complete element shall be from a single consignment. All cement for exposed concrete shall be from the same approved source and uniform in color.

[f] With each and every delivery of cement the contractor shall provide manufacturers certificate that the cement confirms to the relevant Indian Standard.

The contractor shall provide complete facilities at site for carrying out the following tests:

i] Setting time by Vicat's apparatus as per IS: 4031 and IS:5513.
ii] Compressive strength on cement as per IS: 4031, IS: 650, IS: 10080.

3.3.6 *Aggregate*:

[a] Aggregates from natural sources shall be in accordance with IS:383. The contractor shall submit to the PMC, certificates of grading and compliance from the suppliers for all consignments of aggregate. In addition, at site, from time to time, the contractor shall allow for carrying out such tests and for supplying test records to the PMC, the aggregates shall be procured from approved sources only as directed by the PMC from time to time.

[b] For fair faced concrete, the contractor shall ensure that aggregates are free from iron pyrites and impurities, which may cause discoloration.

[c] Fine Aggregate:

i] The contractor shall provide complete facilities at site for determining grading of aggregates by sieves as per IS: 383, IS: 460, IS: 1607 and IS: 2386.

ii] The fine aggregate shall be only approved sand. It shall be free from clay, loam, earth or vegetable matter and from salt or other harmful chemical impurities. It shall be clean, sharp, strong, angular and composed of hard siliceous material.

iii] The grading of fine aggregate when determined as described in IS: 2386 [Part I] shall be within the grading Zones I, II and III.

iv] The contractor shall provide facilities at site for carrying out the following tests:

- Proportion of clay, silt and fine dust by sedimentation method as per IS: 2386 Part II.

- Moisture content in fine aggregate as per IS: 2386 Part III.

[d] Coarse Aggregate:

i] The coarse aggregate shall be crushed stone.

ii] Coarse aggregate obtained from crushed or broken stone shall be angular, hard, strong, dense, durable, clean and free from soft, friable, thin plate, elongated or flaky pieces.

iii] River shingle or pit gravel shall be rounded, sound, hard, clean, non-porous, suitably graded in size with or without broken fragments and free from flat particles or shale, clay silt, loam and other impurities.

iv] Except where it can be shown to the satisfaction of the that Architect/PMC a supply of properly graded aggregate of uniform quality can be maintained over the said period of the works, the grading of aggregate shall be controlled by obtaining the coarse aggregate in different sizes and blending them in correct proportions as and when required.

v] The maximum size of coarse aggregate shall be such that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of formwork. Unless otherwise permitted by the PMC the maximum size shall not exceed 20 mm.

3.3.7 *Water*:

[a] Water used in the works shall be potable water and free from deleterious materials. Water used for mixing and curing concrete as well as for cooling and/or washing aggregate shall be fresh and clean free from injurious amounts of oil, salts, acids, alkali, other chemicals and organic matter.

[b] Water shall be from the source approved by the Architect/ PMC and shall be in accordance with clause 4.3 of IS 456.

[c] Before starting any concreting work and wherever the source of water changes, the water shall be tested for its chemical and other impurities to ascertain its suitability for use in concrete for approval of the Architect/ PMC. No water shall be used until tested and found satisfactory. Cost of all such tests shall be borne by the contractor.

3.3.8 *Admixtures and Additives*:

[a] Chemical admixtures are not to be used until permitted by the Architect/ PMC in case their use is permitted. The type, amount and method of use of any admixtures proposed by the contractor shall be submitted to the S.O. for approval.

[b] The contractor shall further provide the following information concerning each admixture to the Architect/ PMC.

i] Normal dosage and detrimental effects if any of under dosage and over dosage.

ii] The chemical names of the main ingredients in the admixtures.

iii] The chloride content, if any, expressed as a percentage by weight of admixture.

iv] Whether or not the admixture leads to the entrapment of air when used in the manufacturer's written confirmation of their compatibility.

[c] In reinforced concrete, the chloride content of any admixture used shall not exceed 2 per cent by weight of the admixture as determined in accordance with IS: 6925 and the total chloride content in concrete mix shall not exceed 0.4 per cent by weight of cement.

[d] The admixtures when used shall conform to IS: 9103. The suitability of all admixtures shall be verified by trial mixes.

[e] In addition of calcium chloride to concrete containing embedded mental will not be permitted under any circumstances.

[f] Retarding admixtures when used shall be based on lingosusphonate with the due consideration to clause and 5.3 of IS: 7861.

3.4 **Plant**

3.4.1 The contractor shall obtain the approval of the Architect/ PMC for all plant items he proposes to use for the manufacture and placing of concrete.

3.4.2 The arrangements and siting of plant for the manufacture of concrete shall be agreed with the Architect/ PMC.

3.4.3 The contractor shall maintain all items of plant at all times in a clean and efficient working condition.

3.5 **Storage**

All goods and products covered by these specifications shall be procured well in advance and stored as specified below:

3.5.1 *Cement*

[a] Cement shall be stored on a raised floor in dry weatherproof and drought free but well ventilated shed.

[b] Cement bags shall be stacked close together away from external walls and in stack not more than ten bags to avoid lumping under pressure.

[c] Cement stored during monsoons or cement expected to be in store for more than eight weeks shall be completely enclosed in 700 gauge polyphone sheet so arranged that the flap close on the top stack. The contractor shall ensure that protective polythene sheet is not damaged at any time during use.

[d] Cement of different types shall be stored in separate sheds or separate compartments of a shed. If different types of cement are mixed, the Architect/ PMC will have the discretion to condemn all the cement concerned.

[e] Consignments of cement shall be used in order of delivery. A record shall be kept of the batch numbers of cement deliveries in such a form that the part of the works in which the cement is used can be readily identified.

[f] The contractor shall be responsible for the storage of cement at the site and no claims will be entertained in the event of any damage occurring to cement due to faulty storage by the contractor or on account of his negligence.

[g] Cement stored on site shall be tested to the satisfaction of the Architect/ PMC before it is used in the works as and when required by him to assure the quality.

[h] Cement which has so deteriorated in quality that it no longer conforms in all respect to the requirements of this specification will be condemned by the Architect/ PMC and shall not be used in the works. The contractor shall immediately remove from the site all cement, which has been so condemned.

3.5.2 *Aggregates*

[a] Aggregates shall be stored on a suitable well-drained raft of concrete, timber, metal or other approved material. The storage of aggregate on the ground will not be permitted.

[b] Each size of aggregate shall be stored separately in such a manner as to prevent spillage and mixing of one aggregate with an adjacent aggregate. The dividing walls of any bins shall be of sufficient height and the aggregates shall be so deposited that a distance of 300 mm. shall be left between the top of the division wall and any part of the aggregate stack.

[c] When stockpiling, the aggregate shall not form pyramids resulting in segregation of different size particles. The stacks shall be regular and of a height not exceeding two meters.

3.6 **Concrete Mix Proportions**

Cement concrete used in the works shall be either of the two category gives below:

3.6.1 *Ordinary Concrete*

[a] All cement concrete not designated by strength shall be treated as ordinary concrete of nominal mix as specified. The aggregates and cement shall be

measured by volume. Mixing water shall be measured in graduated litter cans.

[b] As a rough guide, nominal mix proportions by volume of 1:4:8, 1:3:6, 1:2:4 and 1:1/2:3 may result in strengths equivalent to those of controlled concrete of designation M7.5, M10, M15, M20 respectively. At site, Table 3 or IS: 456 would form the basis for use or ordinary concrete.

3.6.2 *Controlled Concrete*

[a] All cement concrete designated by strength shall be treated as controlled concrete. The controlled concrete shall confirm to one of the grades specified herein or on the drawings. The aggregate and cement shall be measured by weight in an approved weight batching equipment. Mixing water shall be measured in graduated liter cans. One or more complete bags of cement shall be used for each batch of concrete.

[b] The controlled concrete shall meet with the requirement laid down in Table 1. The aggregate cement ratio and water cement ratio to be used for obtaining the specified cube strength given in Table 1 shall be determined in accordance with the design of the mix.

Table 1: Durability Requirements of Concrete

Grade of Concrete as per IS: 456	Max Free Water Cement Ratio	Min Cement Content
M 20	0.5	300 Kg./Cum
M 25	0.5	350 Kg./Cum
M 30	0.5	400 Kg./Cum
M 35	0.45	400 Kg./Cum

Note: In the case of M 35 concrete mix cement content shall also be limited to 450 Kg./Cum for water retaining structures.

[c] The contractor shall be responsible for designing mixes of the specified performance to suit the degree of workability and characteristic strength required for the various parts of the works. The mix designs shall be evolved in full-fledged concrete laboratory approved by the Architect/PMC.

[d] Alternative mixes may be designed by the contractor for use in both thin and narrow sections and thick sections. Special mixes using finer aggregates may be designed by hum for infiling pockets and narrow spaces and for regions of congested reinforcement.

[e] The minimum cement content for controlled concrete shall not be less than the amounts given in Table 1 for the particular grade of concrete. This minimum requirement has been laid down purely from durability considerations.

3.7 Water Cement Ratio

3.7.1 The quantity of water added to the cement and aggregates during mixing shall be such as to produce concrete having sufficient workability to enable to be properly compacted to be worked into the corners of the shuttering and around reinforcement. Reference may be made to IS: 456, Clause 6, for guidance with respect to workability.

3.7.2 Due account shall be taken of the variation of moisture content. Within any consignment of aggregate or any variations due to watering, exposure to rain or drying weather. The contractor shall carry out regular moisture content tests on stacked aggregates as directed by the PMC and results submitted to him.

3.7.3 In case of ordinary concrete the maximum value of water cement ratio shall be 0.68 and in the case of controlled concrete the water cement ratio shall be determined by the mix design but in no case shall be greater than 0.50.

3.7.4 The contractor shall exercise particularly tight control of the water content for fair faced concrete the colour of which is sensitive to small variations of water in the mix.

3.7.5 When a suitable water cement ratio has been determined and agreed with the PMC, it shall be maintained throughout the corresponding part of works. Approved tests shall be undertaken periodically by the contractor to satisfy the site engineer of the maintenance of the consistency. However, the amount of water added to a mix other than for fair faced concrete may be reduced below the agreed design amount with the consent of the site engineer. If the contractor is able to demonstrate that such a reduction is consistent with producing concrete of the required workability and characteristic strength.

3.7.6 The contractor shall frequently test the concrete for slumpcone test and provide complete facilities for the same at site. Unless otherwise permitted, the slump at the point of placing as measured in accordance with the methods laid down in IS: 1199 shall not be more than 75 mm. and not less than 50 mm. except for concrete containing a retarding plasticizer admixtures when the initial slump shall be 100 mm. plus or minus 25 mm.

3.8 Requirement of Controlled Mixes

3.8.1 The measure of quality control exercised by the contractor in the manufacture of the concrete at site shall be the standard deviation derived from the analysis of cube results tested in accordance with IS: 516. Sampling will be done as per IS: 456 and IS: 1199.

3.8.2 The contractor shall design each concrete mix to have mean strength greater than the required characteristics strength by at least the current margin defined as 1.65 times the standard deviation. In the first instance the contractor shall assume a standard deviation as suggested in Table 6 of IS: 456.

3.8.3 Should further analysis be required using the next 100 test cubes of concrete, [the mix will be of similar proportions and of similar materials produced over a period not exceeding 12 months, by the same plant under the same supervision] show the standard deviation to be less than that indicated in IS: 456, the contractor may redesign the mix assuming a standard deviation as suggested in Table 1 Column 2 of IS: 10262 and shall submit the details of the proposed new mix proportions to the Architect/PMC for his consideration.

3.8.4 If at any time the statistical minimum strength of the concrete defined in the acceptance criteria in IS: 456, clause 15 falls below the characteristic strength, the contractor shall redesign the mix. Details of the new mix proportions shall be submitted to the PMC for his comments and the contractor's supervision and degree of control over mix proportions shall be improved.

3.9 **Approval of Designed Mixes**

3.9.1 The contractor shall submit to the Architect/ PMC for comment sufficient evidence, based on trial mixes for each grade of concrete, the intended workability. The proposed mix proportions and the method of manufacture will produce concrete of the required quality.

3.9.2 The contractors shall obtain from the Architect/ PMC his written approval on the mix design for each grade of concrete before any concrete of that grade is placed in the works.

3.9.3 For each grade of concrete, three separate batches of concrete shall be made by the contractor using materials typical of the proposed supply and under full-scale site conditions.

3.9.4 The workability of each of the trial batches shall be determined and six specimen preliminary test cubes shall be produced from each trial batch. Three cubes of each set shall be tested at seven days and the remaining three cubes of each set shall be tested at 28 days.

3.9.5 The trial mix proportions for each grade of concrete shall be considered satisfactory if the mean strength of the nine cubes tested at 28 days exceeds the specified characteristic strength by between 0.6 and 1.2 times the current margin and the least cube strength is greater than the specified characteristic strength and the contractor has satisfied the project manager/engineer that the concrete contains the correct amount of cement and the free water cement ratio is below the maximum specified value.

3.9.6 Following agreement with the Architect/PMC on the trial mix proportions should the contractor wish to make substantial changes in the materials or in the proportions of

the materials to be used in a mix, the site engineer will require further trial mixes to be made and their results submitted for comments prior to such materials or proportions being approved for adoption by the contractor, except that no such trial mixes will be required under clause 8.3 and 8.4 of this specification.

3.10 **Concrete Testing**

3.10.1 *Test Cubes*

[a] The strength of concrete either in assessing the suitability of the trial mixes or when placed in the works shall be determined from 150 mm. cubes made, cured, stored, transported and tested in accordance with IS: 516.

[b] Test cubes shall be made as, where and when the Architect/ PMC may require. The moulds for making cubes shall be as per IS: 10086.

[c] Test cubes shall be made under the direct supervision of the competent person appointed by the contractor to supervise all stages of the preparation and placing of concrete. They shall be made by the contractor in the presence of the Architect/ PMC, generally from concrete taken at the point of discharge from the mixer and the contractor shall provide suitable facilities in the form of a hut or other covered protection as agreed with or directed by the site engineer for the storing and curing of the test cubes. The cubes shall be cured in a manner, which replicates the environment in which the poured concrete will cure on site.

[d] Test cubes shall be marked and dated in such a manner that the grade and the part of the works in which the concrete they represent has been placed can be readily identified.

[e] The contractor shall also provide complete facilities at site for determining crushing strength of the concrete cubes. The compression-testing machine shall have a minimum capacity of 1500 KN and be of the electrical-cum-hand-operated type.

3.10.2 *Work Tests*

[a] When concrete of a particular grade is first used in the works, two cubes shall be taken from three separate batches during each of the first seven days of using that grade of these six cubes made daily, three cubes [each cube representing concrete made of a different batch] shall be tested at seven days and the remaining three cubes shall be tested at 28 days.

[b] For every subsequent 20 cubic meters of concrete or for every day's concreting be it less in volume, 6 cubes shall be made for each grade of concrete and tested at seven and 28 days as per sub-clause 10.2.1.

[c] If the mean concrete strength determined from such 28 days cube tests does not meet the acceptance criteria as per clause 15 of IS: 456, the

materials and/or their proportions for that grade shall be modified by the contractor to the satisfaction of the Architect/PMC.

[d] In addition, the contractor shall at his own expense, take such actions as the Architect/PMC may consider necessary on the concrete placed in that part of the works represented by the set of cubes which have failed to meet the acceptance criteria.

3.11 ***Weigh Batching***

3.11.1 Unless otherwise agreed with the Architect/PMC, all concrete ingredients except water for controlled concrete shall be weigh batched. The weigh batches shall be of approved type and manufacture.

3.11.2 Batching shall be of an accuracy of not less than 1/2 kg. and the weigh batching equipment shall have an accuracy of plus or minus three per cent the weigh batches shall be tested for accuracy of calibration before commencement of work on each day.

3.12 **Concrete Mixing**

3.12.1 All concrete whether ordinary or controlled, shall be mixed in a mixer for the minimum time necessary to ensure adequate quality and uniform distribution of the materials. The cement and aggregates shall normally be first dry until all particles of aggregate are coated with cement after which the water shall be added. The mixer shall be approved type and manufacture and as per IS: 1791 and IS: 4925.

3.12.2 Allowance shall be made for the moisture content of the aggregates when calculating the amount of water to be added for each mix.

3.12.3 Precautions are necessary during hot weather concreting as indicated in IS: 7861, Part-I. These may consist of dampening sub-grade and forms, placing concrete at the lowest practicable temperatures, erecting sunshades, reducing time between placement of concrete and start of curing, and minimizing evaporation, particularly during the first few hours subsequent to placing concrete. The temperature of the aggregate, water and cement when added to the mixer shall be such that the temperature of the concrete is less than that indicated in Table 2 at the indicate relative humidifies.

Table 2: Limiting Concrete Temperature [Maximum] and Relative Humidity [minimum] to avoid Plastic Shrinkage Cracking.

Concrete Temperature Deg C	Relative Humidity %
38	40
33	20

3.12.4 Materials for concrete shall be deposited into the drum while it is in rotation. Mixers shall not be loaded beyond their rated capacity and each batch shall be completely discharged from the drum before recharging takes place.

3.12.5 Facilities shall be provided to spray the mixer drum with cold water between batches and on the completion of concreting the drum shall be washed down. The surface of the mixer drum shall be maintained in a clean condition at all times.

3.12.6 Retempering and/or mixing of concrete which has partially hardened and set will not be permitted under any circumstances.

3.13 Transporting

3.13.1 The period between mixing the concrete and placing it in the final position shall be kept to a minimum and the delivery of concrete shall be coordinated with the rate of placement to avoid delays in delivery and placement.

3.13.2 Concrete shall be handled from the place of mixing to the place of final deposit by methods, which prevent segregation, loss of ingredients and contamination and maintain the required workability.

3.13.3 Should any segregation have occurred in any batches arriving at the place of deposition, such batches shall be deposited and thoroughly turned over by hand before placing in the works.

3.13.4 Where concrete is conveyed any chutes, the chutes shall be made or metal or fitted with metal linings. The approval of the Architect/PMC shall be obtained for the use of chutes in excess of three meters long and in such cases the concrete shall be remixed if so required by the engineer.

3.13.5 All plant and equipment used in the transportation of concrete shall be thoroughly cleaned before and after each working period and at all changes of concrete mixes. Water used for this purpose shall be discharged well clear of formwork or the concrete already in place.

3.14 Preparation before Commencing

3.14.1 The inside surface of the forms against which concrete is to be placed shall be clean and free from dried or hardened spattering or coating of concrete. The forms shall be well wetted before placing concrete.

3.14.2 When the work has to be resumed on a surface, which has hardened, hacking so as to remove the cement coating from the aggregate shall roughen such surface. It shall then be kept clean by wire brushes and thoroughly wetted immediately before placing of concrete.

3.14.3 Before any concrete is placed on the sub-grade, the sub-grade shall be checked and approved for degree of compaction and alignment. The sub-grade shall be kept damp ahead of concreting.

3.14.4 Concrete shall not be placed in the works until the Architect/PMC has inspected the formwork, reinforcement, inserts and sleeves, if any, and given his permission to place concrete.

3.15 **Placing**

3.15.1 Concreting of any portion of the works shall be done only in the presence of the representatives of the Architect/PMC.

3.15.2 Concreting shall be carried out continuously between construction, construction or expansion joints, shown on the drawings or agreed by the Architect/PMC. The contractor shall closely follow the sequence of concreting where such is specified on the drawings. If concreting is interrupted before reaching the predetermined joint an approved construction joint shall be provided.

3.15.3 Concrete shall be deposited as nearly as is practicable in its final position and shall not be dumped in a large quantity at any point to be run or worked along the formwork manually or with vibrators. Concrete shall not be deposited at a faster rate than it can be placed and compacted.

3.15.4 Concrete shall be thoroughly worked into the forms so that they are entirely filled, reinforcing bars adequately and tightly surrounded and entrained air released from the mass of concrete. Placing shall be carried out by hand prodding as well as vibrators in a manner directed by the Architect/PMC.

3.15.5 The concrete shall be placed in layers not greater than 300 mm. thickness and thoroughly compacted before succeeding layers are placed. concrete shall be placed in single operation to the full thickness of slab, beams and similar members. No concrete shall be placed on concrete, which has set sufficiently to cause the formation of planes of weakness, and where there is likely to occur due to unforeseen circumstances the procedure to be followed shall be as per clause 14.2 this specification.

3.16 **Compaction**

3.16.1 Each layer of concrete whilst being deposited shall be compacted by approved methods to form a dense material with all surface free from honey combing, air holes or other blemishes. The contractor shall use mechanical vibration for all concrete and shall take care that internal vibrators shall not be brought into contact with the reinforcement or the formwork. Where external vibration of the forms is not adopted for fair faced surfaces, the concrete shall be rodded adjacent to such surfaces in addition to internal vibrating.

3.16.2 An adequate number of vibrators of approved type and manufacture and as per IS: 2505, IS: 2506, IS: 3366, IS: 3558, IS: 4656, IS: 11993 shall be used to ensure that compaction of concrete is achieved within ten minutes of placing. Particular attention shall be given to the compaction of the concrete around the waterbars to ensure that no voids or porous areas are left.

3.16.3 Compacting shall cease as soon as excess water appears on the face of concrete. Any water accumulating on the surface of newly placed concrete shall be removed by approved methods and no further concrete shall be placed thereon until such water has been removed.

3.16.4 Notwithstanding the requirements mix design, should it be found that the proportion of water in the mix is such that Latinate forms before compaction [i.e., completion of expulsion of air] is completed, the quantity of water in the mix shall be reduced. No water shall be added to concrete after mixing has been completed. But where the proportion of water in the mix is such that it is impossible to achieve complete compaction, the quantities of aggregate shall be reduced without any alteration to the quantities of cement and water. Whenever either of the aforesaid procedures is to be adopted, an additional set of six cubes for testing at seven or 28 days shall be made from the adjusted mix.

3.16.5 The time elapsing between the discharge of the concrete from the mixer and the completion of compaction shall not generally exceed 20 minutes.

3.16.6 A sufficient number of spare vibrators shall be kept readily accessible to the place of deposition of concrete to assure adequate vibration in case of break down of those in use.

3.17 **Finishes**

3.17.1 All concrete surface shall have a good, dense finish except for slabs, the exposed faces of concrete for which formwork is not provided shall be smoothed with a steel or wooden trowel or provide a finish equal to that face where form work is provided.

3.17.2 The top surfaces of all floor and roof slabs specified as smooth shall be leveled and troweled before the concrete begins to set to a smooth finish at the levels or falls shown on the drawings. The troweling shall be done at such times and in such a manner that an excess of mortar is not brought to the surface of concrete nor the aggregate displaced. Deep hacking before the finish is laid shall uniformly roughen the top surface of concrete slabs specified to receive an integral finish.

3.17.3 Immediately after striking the formwork and removing any superficial water, honeycombed areas in normal unfinished concrete shall be inspected by the Architect/ PMC and where directed the contractor shall immediately make good at his own expense such honeycombing whilst the concrete is still green to the satisfaction of the site engineer. All air holes shall be similarly filled in. For defects in concrete the contractor shall also use special prepackaged “patch up” mortars as directed by the Architect/PMC .

3.17.4 The contractor shall be responsible for providing an adequate key in concrete where plastering or rendering is specified to be applied. Hacking of the concrete surface immediately after striking the formwork will be permitted.

3.17.5 The faces of all fair faced concrete shall be of even colour throughout, free from air bubbles, cracks, honeycombing or other blemishes and will be inspected by the site engineer immediately after the formwork has been struck. Such faces shall not be rubbed down after striking the formwork to remove fins, excrescencies or any similar imperfections without the prior permission of the site engineer.

3.17.6 Concrete surface finishes shall accord to the requirements and all instructions by the engineer with regard to the method of achieving such finishes shall be implemented.

3.18 Curing and Protection

3.18.1 Curing of concrete shall be complete and continuous using water that is free of harmful amounts of deleterious materials that may attack, stain or discolour the concrete.

3.18.2 Immediately after compaction and completion of any surface finishes, the concrete shall be protected from the evaporation of moisture by means of polythene sheathing, wet hessian or other material kept soaked by spraying. As soon as the concrete has attained a degree of hardening sufficient to withstand surface damage, moist curing shall be implemented and maintained for a period of at least 15 days after casting.

3.18.3 Method of curing and their duration shall be such that the concrete will have satisfactory durability and strength and members will suffer a minimum distortion, be free from excessive efflorescence and will not cause by its shrinkage, undue crackling in the works.

3.18.4 The top surface of slabs and other horizontal surfaces shall be cured by impounding water in cement mortar bunds. Steeply sloping and vertical formed surfaces shall be kept completely and continuously moist prior to and during the striking of formwork by applying water to the top surfaces and allowing it to pass down between the formwork and the concrete.

3.18.5 The contractor shall give careful consideration to the curing methods and conditions for fair faced concrete. Components, which are specified to have exposed concrete finish, shall receive the same curing treatment. Moreover, water used for curing shall be clean so as not to discolour the concrete.

3.18.6 All fairfaced concrete shall be protected from damage from the time of striking the formwork. All edges and surfaces of such concrete shall be protected from chipping using notched timber corner pieces or other suitable covers, which shall be maintained, in place until the completion of the works.

3.18.7 The contractor shall be responsible for ensuring all fair faced concrete free of stains from concrete materials and shall clean all such staining as may occur at his own cost as soon as possible to the satisfaction of the Architect/ PMC.

3.18.8 *Approved Curing Compounds:* Approved curing compounds may be used in lieu of moist curing only with the permission of the Architect/ PMC. Such approved

compounds shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set.

3.19 Construction Joints

3.19.1 Construction joints shall be made only where shown on the drawings. Where the contractor wishes to form joints in concrete other than those shown on the drawings, he shall submit his proposals giving the position, form and treatment of such joints to the Architect/ PMC

3.19.2 Vertical construction joints shall be formed against a stopboard and horizontal construction joints shall be level.

3.19.3 Except where shown otherwise on the drawings, reinforcement shall continue through construction joints.

3.19.4 As soon as possible, after the formwork has been for vertical joints or after the concrete has set in horizontal joints, the surface laitance of the hardened concrete on the face of the joint shall be removed to expose the coarse aggregate in such a manner that the loosened particles of aggregate and damaged concrete are not left on the surface. The exposed face shall be swept clean of foreign mutter and laitance. Feathered construction joints will not be permitted.

3.20 Contraction Joints

3.20.1 Contraction joints where required will be shown on the drawings.

3.20.2 Contraction joints shall not be hacked, wetted or mortared before concrete is placed against them.

3.21 Expansion Joints

3.21.1 Expansion joints shall be provided where shown on the drawings or as directed by the Architect/ PMC. They shall be constructed with an initial gap between the adjoining parts of the works of the width specified in the drawings.

3.21.2 The contractor shall ensure that no debris is allowed to enter expansion joints.

3.21.3 Expansion joints shall be provided with joint filler. A joint sealing compound and in waterproof concrete, a water bar in addition.

3.21.4 *Open Joint Fillers*

[a] Where shown on the drawings, open joint in the structure shall be filled with one of the following expansion joint fillers:

i] In internal areas a material conforming to IS: 1838 containing bitumen emulsion fibers or cork granules bound together with natural resin.

ii] In external areas a material comprising closed cell rubber or containing cork granules bound together with natural resin.

[b] The joint filler shall be easily and uniformly compressible to its original thickness, tamable, easily cut or sawn, robust, durable, resistant to decay due to termite or weathering, unaffected by water and free or any constituent which will bleed into or stain the concrete.

[c] The joint filler shall be of same thickness of the joint width, it shall extend through the full thickness of the concrete unless otherwise specified and shall be sufficiently rigid during handling and placing to permit the formation of straight joints.

3.21.5 *Joint Sealing Compounds*

[a] Joint sealing compounds shall seal joints in concrete against the passage of water, prevent the ingress of grit or other foreign material and protect the joint filler. The compound shall have good extensibility and adhesion to concrete surfaces and shall be resistant to flow and weathering.

[b] Polysulphide joints where specified on the drawings shall be sealed with polysulphide liquid polymer, stored, mixed, handled applied and cured strictly in accordance with the manufacturer's written instructions, such joints shall be formed to the correct dimensions, thoroughly cleaned and treated with recommended primer strictly in accordance with the manufacturer's written instructions prior to sealing. The contractor shall use only competent personnel experienced in the application of polysulphide for such work.

[c] Where specified in the drawings, rubber/bituminous based sealant shall be of an approved manufacture. The treatment of the joint and the use of sealing compound shall be strictly in accordance with the manufacturer's written instructions. The entire work shall be carried out as per IS: 3414, IS: 6509, IS: 11433.

3.21.6 *Waterbars*

[a] Where water bars are shown on the drawings, the joints shall incorporate an approved PVC external type waterbar complete with all necessary moulded or prefabricated intersection pieces assembled in accordance with the drawings with bends and butt joints in running lengths made by heat welding in an electricity heated jig.

[b] Jointing and fixing or waterbars shall be carried out strictly in accordance with the manufacturer's instructions.

[c] The waterbars shall be installed so that they are securely held in their correct position during the placing and compacting of the concrete.

[d] Where reinforcement is present adjacent to waterbars, adequate clearance shall be left between the reinforcement and waterbars to facilitate compaction of the concrete.

[e] Double headed nails may be used in the edge of the waterbar outside the line of the external grooves for fixing purposes, but no other holes shall be permitted through the waterbar.

3.22 Inserts

3.22.1 The contractor shall fix all necessary inserts such as steel plates, pipe sleeves, bolts etc. and make provision of holes, pockets, dowels etc. in the formwork to enable subsequent fixing of supports, brackets, ceilings, precast members etc. as indicated on the drawings, called for in the schedule of quantities or as required by the Architect/ PMC

3.22.2 In-situ concrete inserts shall be as per IS: 1946 and of a type approved by the Architect/ PMC

3.22.3 Nothing extra over and above the provision as per the priced schedule of quantities shall be paid to the contractor for placement of inserts in position before concreting.

3.22.4 With the prior agreement of the engineer, expansion type fasteners may be used by the contractor in hardened concrete.

3.23 Bearings

3.23.1 Where bearings are shown in the drawings, they shall be of an approved type, capable of meeting the performance requirements given on such drawings. They shall be fixed strictly in accordance with the manufacturer's written instructions.

3.23.2 The bearing assembly shall be so located and sealed that no concrete or laitance penetrates from the slabs when cast.

3.24 Cracks

3.24.1 If any cracks develop in the reinforced cement concrete construction which in the opinion of the Architect/ PMC may be detrimental to the strength of the construction, the contractor at his own expense shall test the structural element in question. If under these test loads the cracks shall develop further the contractor at his own expense shall dismantle the construction, cart away debris, replace the construction and carry out all consequential work there to at no extra cost.

3.24.2 If the cracks are not detrimental to the stability of the construction in the opinion of the Architect/ PMC, the contractor at his own expense shall grout the cracks with grout epoxy or other suitable materials at his own expense and risk he shall also

make good all other building works such as plaster, moulding, surface finish of floors, roofs, ceiling etc. which in the opinion of the site engineer have suffered damage either in appearance or stability owing to such cracks.

3.24.3 The repair work shall be carried out to the satisfaction of the Architect/ PMC . The decision of the site engineer as to the extent of the liability of the contractor in the above matter shall be final and binding on the contractor.

3.25 Load Testing on Completed Structures

3.25.1 During the period of construction or within the defect liability period the Architect/ PMC may at his discretion order the load testing of any completed structure or any part thereof if he has reasonable doubts about the adequacy of the strength of such structure for any of the following reasons:

i] Results of compressive strength on concrete test cubes falling below the specified strength.

ii] Premature removal of formwork.

iii] Inadequate curing of concrete.

iv] Over loading during the construction of the structure or part thereof.

v] Carrying out concreting of any portion without prior approval of the project manager/engineer.

vi] Honeycombed or damaged concrete which in the opinion of the Architect/ PMC is particularly weak and will effect the stability of the structure to carry the design load, more so in important or critical areas of the structure.

vii] Any other circumstances attributable to alleged negligence of the contractor which in the opinion of the Architect/ PMC may result in the structure or any part thereof being a less than the expected strength.

3.25.2 The contractor strictly in accordance with the instructions of the engineer shall carry out all the loading tests. IS: 456 and as indicated hereunder. Such tests should be carried out only after expiry of minimum 28 days or such longer period as directed by the Architect/ PMC.

3.25.3 The structure should be subjected to a super-imposed load equal to 1.25 times the specified superimposed load assumed in the design. This load shall be maintained for a period of 24 hours before removal. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap under the members as directed 3.25.4.

3.25.4 The deflection due to the superimposed load shall be recorded by sufficient number of approved deflectometers capable of reading upto 1/500 of a cm. and located

suitably under the structure as directed by the Architect/ PMC. If within 24 hours of the removal of the superimposed load, the structure does not recover at least 75% of the deflection under the superimposed load, the test loading shall be repeated after a lapse of 72 hours. If the recovery after the second test is less than 80% of the maximum deflection shown during the second test, the structure shall be considered to have failed to pass the test and shall be deemed to be unacceptable.

3.25.5 In such cases the part of the work concerned shall be taken down or cut out and reconstructed to comply with the specifications. Other remedial measurers may be taken to make the structure secure at the discretion of the Architect/ PMC. However, such remedial measurers shall be carried out to the complete satisfaction of the Architect/ PMC.

3.25.6 All costs involved in carrying out the tests and other incidental expense thereto shall be borne by the contractor regardless of the result of the tests. The contractor shall take down or cut out and reconstruct the defective work or shall make the remedial measures instructed, at his own cost.

3.25.7 In addition to the above load tests, no destructive test methods such as core test and ultrasonic pulse velocity test shall be carried out by the contractor at his own expense if so desired by the Architect/ PMC. Such tests shall be carried out by an agency approved by the project manager/engineer and shall be done under the guidance using only recommended testing equipment. The acceptance criteria for these tests shall be mutually agreed between the Architect/ PMC and the contractor.

3.26 Supervision of Works and Processes

3.26.1 All concreting work shall be done under strict supervision by the qualified and experienced representatives of the contractor as well as those of the Architect/ PMC The contractor's engineer and supervisor who are incharge of concreting work shall be skilled in this class of work and shall personally superintend all the concreting operations.

3.26.2 Special attention shall be paid to the following:

[a] Proportioning, mixing and quality testing of the materials with particular control on the water-cement ratio.

[b] Laying of materials in place and thorough compaction of the concrete to ensure solidity and freedom from voids and honeycombing.

[c] Proper curing for the requisite period.

[d] Reinforcement position and assurance that inserts are not disturbed during concreting and proper consolidation by vibration.

3.27 Quality Control

3.27.1 The Architect/ PMC reserves the right to make changes in the mix proportions including the increased cement content or/and a change in the contractor's control procedure, should the quality control during progress of the works prove to be inadequate in his opinion.

3.27.2 All the concrete work shall be true to level, plumb and square within the acceptable tolerance. The corners, edges and arises in all cases shall be broken and finished properly and carefully. Where form finishes are required, the instructions given by the Architect/ PMC are to be followed.

3.28 Tolerances

3.28.1 The acceptable tolerances for formed concrete surfaces shall be as given below:

[a] Variation from plumb for:

i] Columns and walls to be rendered 6 mm. in 3 meters
ii] Exposed columns and walls 3 mm. in 3 meters.

[b] Variation in cross section dimensions of columns and beams and in the thickness of slabs and walls - 6 mm. for tolerances in other structural element reference shall be made to ACI 117.

3.29 Site Laboratory

3.29.1 The contractor shall set up a full-fledged laboratory at the site in order to carry out at least the various tests specifically indicated in these specifications. All equipment, instruments, etc. to be used in the laboratory shall be proposed by the contractor and this shall be subject to the approval of the Architect/PMC various codes of practice indicated at the beginning of various chapters of these specifications shall be purchased and stocked in an orderly fashion in the site laboratory by the contractor for consultation by various persons connected with the project.

4.0 SPECIFICATIONS FOR FORMWORK

4.1 General Description

4.1.1 This section covers the requirements for providing, fabricating and erecting of formwork including propping, bracing, shoring, strutting, tying, bolting, wedging, and all other supports to the concrete during the process of setting, subsequent removal of forms.

4.1.2 *Related Work Specified Elsewhere*

[a] Cast-in-place reinforced concrete
[b] Precast concrete

4.1.3 *Applicable Codes and Standards*

The codes and standards generally applicable to the work of this section are listed hereinafter:

IS: 456 : Code of practice for plain and reinforced concrete.
IS: 4990 : Plywood for concrete shuttering work.

4.2 Submittals

IRC 87 : Guidelines for the design and erection of false work for road bridges.
IS 806 : Code of practice for use of steel tubes in general building construction.
IS 1161 : Specification of steel tubes for structural purposes.
IS 1239 : Specification for mild steel tubes. Tabular and other wrought steel fittings.
IS 2750 : Specification for steel scaffoldings.

4.2.1 *Type of Formwork*: Prior to start of delivery of material for formwork, the contractor shall prepare samples of different types of about 10 sqm. and obtain approval of the Architect / PMC.

4.2.2 *Design of Forms*: Before fabrication of forms, the contractor shall submit design calculations for the proposed formwork to the Architect/ PMC for his approval.

4.2.3 *Tie Bolts*: In case the contractor proposes to the use tie bolts running through the concrete, the location and size of such ties bolts shall be submitted to the Architect/ PMC for his approval. Should the surfaces be “form finished” the architect’s approval must be obtained.

4.3 Materials

4.3.1 Formwork shall be of timber, plywood, steel or any other material. Capable of resisting damage to the contact faces under normal conditions of erecting forms,

fixing steel and placing concrete. The selection of materials suitable for formwork shall be made by the contractor based on the quality consistent with the specified finishes and safety.

All formwork supports [centering, props, scaffolds etc.] shall only be in structural steel and preferably of pipes conforming to IS: 806, IS: 1161, IS:1239, IS: 2750. IRC: 87 shall be applicable for details as found relevant by the project manager/engineer.

4.3.2 *Timber*: Timber used for formwork shall be easily workable with rails without splitting. It shall be stable and not liable to wrap when exposed to sun and rain or wetting during concreting.

4.3.3 *Plywood*: Plywood used for formwork shall be minimum 12 mm. thick shuttering quality plywood complying with IS: 4990 and of make approved by the project manager/engineer suitable stiffeners and walers shall be provided depending on the shuttering design.

4.3.4 *Steel*: Steel formwork shall be made of 4 mm. thick black sheets stiffened with angle iron frame made out of M.S. angles 40 mm. x 40 mm. x 6 mm. supported at suitable sapcing.

4.3.5 Fiberglass, masonry and concrete may also be used as materials for forms or moulds with the approval of the project manager/engineer for Waffle slabs. The decision as to the material to be used for forms shall depend upon whether the work is to be exposed or not and the decision of the project manager will be final and binding on the contractor in this regard.

4.4 Design Criteria

4.4.1 Formwork shall be designed for the loads and lateral pressures due to dead weight of concrete, superimposed live loads of workmen, materials and plants and for other loads as indicated on the drawings.

4.4.2 Forms shall be designed to have sufficient strength to carry the hydrostatic head of concrete as a liquid without deflection tolerances exceeding the acceptable limits.

4.4.3 Where necessary to maintain the tolerances indicated on the drawings, the formwork shall be cambered to compensate for anticipated deflections due to the weight and pressure of the fresh concrete, and also due to any other construction loads. Unless otherwise shown or specified, the camber shall be provided as below:

Type of Member	Compression Steel as % of Tensile Steel	Camber Coefficient
Simple span	0%	0.066
	50%	0.037
Continuous	0%	0.032
Restrained Span	50%	0.020
Cantilever	0%	0.086
	50%	0.046

$$\text{Camber in cms.} = \frac{K \times L \times 2.54}{D}$$

Where K = Camber coefficient
L = Length of member in meter
D = Depth of member in meter

4.5 Erection of Formwork

4.5.1 Forms shall be used wherever necessary to confirm the concrete during vibration and to shape it to the required lines. The formwork shall conform to shapes, lines, levels and dimensions of the concrete shown on the drawings.

4.5.2 Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of concrete and shall be maintained rigidly in position. Formwork shall be adequately supported by adequate number and size of struts, braces, ties and props to ensure rigidity of forms during concreting. Where props rest on natural or filled up ground. All measurers shall be taken to assure there will be no settlement due to water or to earth movement. To avoid any settlement, the soil shall be thoroughly compacted and bases of props shall be sufficient in size so as to restrict the bearing pressure on the ground to four tons per squaremetre [4T/S.M.]

4.5.3 Forms shall be tight enough to prevent loss of mortar from concrete and to produce dense, homogeneous and uniformly coloured concrete completely free from honeycombing or surface roughness. Joints in formwork shall be designed to prevent leakage, not only between individual elements forming the panels but also from the horizontal and vertical junction between the panels themselves. At all joints of panels the contractor shall provide foam rubber strips of suitable width and thickness to avoid leakage.

4.5.4 If the formwork is held together by bolts or wires, those shall be so fixed that no iron shall be exposed on surface against which concrete is to be laid. The Architect/ PMC may at his discretion allow the contractor to use tie bolts running through the

concrete at his own cost. Holes left, in the concrete by these tie bolts shall be filled as specified by him at the contractor's expense.

4.5.5 Formwork shall be constructed so as to facilitate loosening and to permit removal without jarring the concrete. Wedges, clamps and bolts shall be used wherever practicable instead of nails.

4.5.6 All formwork erected shall be approved by the Architect/ PMC before concreting is started.

4.6 Cleaning and Oiling of Forms

4.6.1 At the time concrete is placed in the forms, the surface of the forms in contact with the concrete shall be free from encrustation of mortar, grout or other foreign material. Temporary openings shall be left at the bottom of formwork to enable sawdust, shavings, wire cutting and other foreign material to be worked out from the interior of the forms before the concrete is placed.

4.6.2 The surface of the forms to be in contact with the concrete shall be coated with an approved coating that will effectively prevent sticking and will not stain the concrete surface. After each use the surface of forms in contact with concrete shall be cleaned, well wetted and treated with form oil approved by the Architect/ PMC . Lubricating [machine] oils shall not be used. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position.

4.6.3 Immediately before concreting is commenced, the formwork shall be carefully examined to see that all dirt, shavings, sawdust and other refuse have been removed and the formwork shall be wetted thoroughly to prevent absorption of water from concrete. The formwork shall be kept wet during concreting and for the whole time that it is left in place.

4.7 Removal of Formwork

4.7.1 Formwork shall be removed carefully so as to prevent damage to the concrete. Wooden wedges only shall be used between the concrete surface and the form if necessary while removal. Metal wedges, bars or tools shall not be used for this purpose. Any concrete damaged in the process of removing the forms shall be repaired in accordance with the provisions of concrete specifications.

4.7.2 All non-supporting forms shall be loosened and removed during regular working hours, and as soon as the concrete has hardened sufficiently to prevent damage from the removal of the forms. All falsework and forms supporting concrete beams and slabs, or other members subject to direct bending stress, shall not be removed or released until the concrete has attained sufficient strength to ensure structural stability and to carry both the dead and live loads including any construction loads which may be placed upon it.

4.7.3 Unless otherwise permitted in writing by the Architect/ PMC, the forms shall not be stripped in less than the minimum periods specified in IS: 456. However, the project manager may increase the above period if he considers it necessary for structural stability.

4.7.4 Formwork shall be removed in such a manner so as not to impair safety and serviceability of the structure. It shall be removed gradually to prevent sudden application of loads to the concrete. All concrete to be exposed by form removal shall have sufficient strength so as not to be damaged thereby.

4.8 Reuse of Forms

4.8.1 Immediately after the forms are removed, they shall be cleaned with a jet of water and a soft brush before they are reused.

4.8.2 The contractor shall not be permitted reuse of any forms, which in the opinion of the Architect/ PMC have worn out and have become unfit for formwork. The Architect/ PMC may in his absolute discretion order rejection of any forms he considers unfit for use in the works, and order their removal from the site.

4.9 Formwork for Sloped Surfaces

4.9.1 Forms for sloped surfaces shall be built so that the formwork can be placed board-by-board immediately ahead of concrete placement so as to enable ready access for placement, vibration inspection and repair of the concrete.

4.9.2 The formwork shall also be built so that the boards can be removed one by one from the bottom up as soon as the concrete has attained sufficient stiffness to prevent sagging. Surfaces of construction joints and finished surfaces with slopes steeper than two horizontal: one vertical shall be formed as required herein.

4.10 Formwork for Curved Surfaces

4.10.1 The contractor shall interpolate intermediate sections as necessary and shall construct the forms so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form lumber shall be built up of laminated splices cut to make tight, smooth form surfaces.

4.10.2 After the forms have been constructed, all surface imperfections shall be corrected and all surface irregularities at matching faces of form materials shall be dressed to the specified curvature.

4.10.3 Where curved surfaces, jack arches vaults or other such shapes are to be constructed, the form[s] and the supporting structure of the form[s] will be designed by the contractor and approved by the Architect/ PMC.

4.11 Formwork for Exposed Concrete Surfaces

4.11.1 Where it is desired, directed or shown on the drawings to have original fair face finish of concrete surface without any rendering or plastering, formwork shall be carried out by using wood planks, plywood or steel plates of approved quality and as per direction of the Architect/ PMC.

4.11.2 The contractor shall use one type of material for all exposed concrete surfaces and the forms shall be constructed so as to produce a uniform and consistent texture and pattern on the face of the concrete. Patches or forms for these surfaces will not be permitted. The formwork shall be placed so that all horizontal form works are continuous across the entire surface. It forms are constructed of lumber and are not paneled, the formwork joints shall be staggered.

4.11.3 To achieve a finish which shall be free of board marks, the formwork shall be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features, sills, window heads or change in direction of the surface. All joints between panels shall be vertical or horizontal unless otherwise directed. Suitable joints shall be provided between sheets. The joints shall be arranged and fitted so that no blemish or mark is imparted to the finished surfaces.

4.11.4 To achieve a finish which shall give the rough appearance of concrete cast against sawn boards, average 150 mm. wide, formwork shall be securely jointed with tongued and grooved joints if required to prevent grout loss. Sawn boards shall be set horizontally, vertically or at an inclination shown in the drawings. All bolt holes shall be accurately aligned horizontally and vertically and shall be filled with matching mortar recessed 5 mm. back from the surrounding concrete face.

4.11.5 Forms for exposed concrete surfaces shall be constructed with grade strips [the underside of which indicates top of pour] at horizontal construction joints, unless the use of groove strips is specified on the drawings. The reset forms shall be tightened against the concrete so that the forms will not be spread and permit abrupt irregularities or loss or mortar. Supplementary form ties shall be used as necessary to hold the reset forms tight against the concrete.

4.11.6 For fair faced concrete, the position of through bolts will be restricted and generally as indicated on the drawings.

Chamfer strips shall be placed in the corners of forms for exposed exterior corners so as to produce 20 mm. beveled edges except where otherwise shown in the drawings. Interior corners and edges at formed joints shall not be beveled unless shown on the drawings. Mouldings for grooves, drip courses and bands shall be made in the form itself.

4.11.7 The wood planks, plywood and steel plates used in formwork for obtaining exposed surfaces shall not be used for more than three times in case of wood plans, six times for plywood and 10 times for steel plates respectively. However, no forms will be allowed for reuse if in the opinion of the project manager/engineer, it is doubtful to produce desired texture of exposed concrete.

4.11.8 In order to obtain exposed concrete work of uniform colour it shall be necessary to ensure that the same used for all exposed concrete work shall be of approved uniform colour. Moreover the cement used in the concrete for any complete elements shall be from single consignment.

No exposed concrete surface shall be rendered or painted with cement or otherwise. Plastering of defective concrete, as a means of achieving the required finish shall not be permitted, except in the case of minor porosity. On the surface the Architect/ PMC may allow a surface treatment by rubbing down with cement and sand mortar of the same richness and colour as for the concrete. This treatment shall be made immediately after removing the formworks.

The contractor shall also take all precautionary measurers to prevent breaking and chipping of corners and edges of completed work until the building is handed over.

4.11.9 Extra payment for shuttering of exposed surface of concrete shall be made for such exposed surfaces as are visible after the completion of the work. No payment for surface covered under false ceiling, skirling, veneering etc. shall be made under this item. No extra claim on account of making chamfers grooves, drip courses; band etc. shall be entertained.

5.0 SPECIFICATIONS FOR STEEL REINFORCEMENT

5.1 General Description

5.1.1 This section covers the requirements for providing, fabricating, delivering and placing of steel reinforcement for all types of concrete work.

5.1.2 *Related Work Specified Elsewhere*: Cast-in-place reinforced concrete.

5.1.3 *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 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.
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.

5.2 Submittals

5.2.1 *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 an approved testing laboratory to perform the required test and chemical at his own cost.

5.2.2 *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.

5.3 Materials

5.3.1 *Steel Reinforcement*

[a] Steel reinforcement used shall be either of the following types:

i] Mild steel of Grade-I tested quality conforming to IS: 432 - Part-I.
ii] High strength deformed steel bars of tested quality conforming to IS: 1786.
iii] Hard drawn steel wire fabric conforming to IS: 1566.
iv] Where galvanized reinforcement is specified in the drawings, the bar or mesh shall be hot-dip galvanized, after bending generally in accordance with IS: 2629 and IS: 4759. Galvanized 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.

5.3.2 *Binding Wire*: Binding wire shall be black annealed steel wire conforming to IS: 280 and minimum 18 gauge, except for galvanized reinforcement for which the wire shall be of galvanized steel.

5.3.3 *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.

5.4 Storage

5.4.1 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.

5.4.2 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.

5.4.3 Bars of different classification and diameters shall be stored separately.

5.4.4 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.

5.4.5 Welding electrodes shall be stored in a moisture, controlled environment in accordance with the manufacturer's specifications.

5.5 Fabrication

5.5.1 Reinforcement steel shall be carefully and accurately cut, bent or formed to the dimensions and configurations shown on the drawings and bar bending schedules.

5.5.2 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.

5.5.3 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 in hardened concrete.

5.5.4 Reinforcement steel having a reduced section, visible transverse cracks in bends, or otherwise damaged in any way shall not be used.

5.5.5 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.

5.5.6 Cut ends of galvanized rods shall be given a protective coat of an approved zinc paint immediately after cutting.

5.6 Lapping

5.6.1 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.

5.6.2 Not more than one third of the bars or as specified in the drawings shall be lapped at one section.

5.6.3 Reinforcement bars shall not be welded unless shown on the drawings or instructed by the Architect/ PMC.

5.7 Placement

5.7.1 All reinforcement shall be placed accurately and maintained in the position indicated on the drawings.

5.7.2 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 for 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.

5.7.3 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.

5.7.4 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.

5.7.5 Walkways and borrow runs for placing and compacting the concrete shall be independent of the reinforcement.

5.7.6 Loose binding wire and other extraneous metal shall be removed from inside the formwork prior to concrete placing.

5.7.7 Without relieving 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.

5.7.8 No part of the reinforcement shall be used for conducting electrical currents.

5.8 Cover to Reinforcement

5.8.1 Care shall be taken to maintain the correct cover to reinforcement as indicated in the drawings.

5.8.2 The maximum cover for reinforcement shall be no greater than that shown on the drawings plus 5 mm.

5.8.3 Exposed reinforcement intended for binding with future extensions shall be protected from corrosion as shown in the drawings.

5.9 Cleaning

5.9.1 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 be allowed to come in contact with the bars.

5.9.2 Before concreting is commenced, the bars shall be thoroughly cleaned with dry gunny bags if they are coated lightly with rust or other impurities.

5.10 Welded Laps

5.10.1 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.

5.10.2 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 whereby the stress is transferred across the weld will not be permitted. No welding shall be done at the bend in a bar.

5.10.3 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

5.10.4 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.

5.10.5 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.

5.10.6 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.

5.10.7 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 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.

6.0 SPECIFICATION FOR STRUCTURAL STEEL WORK

6.1 General Description

6.1.1 This section covers the requirements for providing fabrication, erection and placing of structural steelworks for building construction including temporary supports and all other work as required for structural steel construction.

6.1.2 *Applicable Codes and Standards*

The codes and standards generally applicable to the work of this section are listed hereinafter:

IS:	210	Gray iron castings.
IS:	226	Structural Steel [standard quality]
IS:	451	Technical supply conditions for wood screws
IS:	800	Code of practice for use of structural steel in general building construction
IS:	806	Code of practice for use of steel tubes in general building construction
IS:	813	Scheme of symbols for welding
IS:	814	Covered electrodes for metal arc welding of [Part I and II] structural steel
IS:	816	Code of practice for use of metal arc welding for general construction in mild steel
IS:	822	Code of practice for inspection of welds
IS:	961	Code of practice for structural steel [high tensile]
IS:	1024	Code of practice for use of welding in bridges and structures subject to dynamic loading
IS:	1030	Carbon steel casting for general engineering purposes
IS:	1120	Coach screws
IS:	1161	Steel tubes for structural purposes
IS:	1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates
IS:	1363	Black hexagon bolts, nuts and lock nuts and black hexagon screws
IS:	1365	Slotted countersunk
IS:	1367	Technical supply conditions for threaded fasteners
IS:	1915	Code of practice for steel bridges
IS:	2016	Plain washers
IS:	2062	Structural steel [fusion welding quality]
IS:	3757	Specification for high tensile friction grip bolts
IS:	5624	Specification for foundation bolts
IS:	3063	Single coil rectangular section sprint washers for bolts, nuts and screws
IS:	3442	Crane rail sections
IS:	3600	Code of practice for testing of fusion welded [Part I] joints and weld metal in steel
IS:	4923	Hollow steel sections for structural use

IS: 6227 Code of practice for use of metal arc welding in tubular structure

IS: 801 Code of practice for use of cold formed light gauge steel structural members in general building construction

IS: 811 Specifications for cold formed light gauge structural steel sections

6.2 Submittals

6.2.1 *Material Report*

[a] Prior to state of delivery of structural steel required, the contractor shall submit the following to the Architect/ PMC for review:

i] Certified copies of mill test reports including chemical analysis and physical properties as required by the applicable Indian Standards for each consignment of steel.

ii] Where such mill certificates are not available or if the project manager/engineer feels it necessary to substantiate conformance of the mill test reports, the contractor shall employ an approved testing laboratory to perform the required tests and chemical analysis at his own cost.

[b] *Shop Drawings*: Before commencement of any structural steel fabrication work, the contractor shall submit the following to the project manager/engineer for his approval:

i] Fabrication drawings including details of connections.

ii] Assembly, erection and installation drawings and manuals indicating the sequence of work, welding and bolting procedure to be used. Cambers for trusses and large span girders shall be shown.

iii] For composite construction the details and calculations of false work and forms supporting the concrete work in steel structure shall be submitted.

6.3 Materials

6.3.1 *Structural Steel*

[a] Structural steel used in the works other than steel in reinforced concrete, rails and fastenings shall be either of the following type:

i] Mild steel conforming to IS: 226 - “Structural Steel [standard quality]” or IS: 2062 - “Structural Steel [fusion welding quality” whichever is approved.

ii] Whenever high tensile steel is specified it shall be conforming to IS: 961 - "Structural Steel [high tensile"].

iii] All steel tubes shall be hot finished seamless steel tubes [HFS] of the specified strength and as approved by the Architect/ PMC and shall conform to IS: 1161. Tubes made by other processes and which have been subjected to cold working, shall be regarded as hot finished if they have been subsequently heat treated and are supplied in the normalized condition.

6.3.2 *Threaded Fasteners*

[a] All bolts and nuts shall comply with IS: 1367.

[b] Black bolts, nuts and screws shall be in accordance with IS: 1363.

[c] Wherever counter sunk screws are specified, they shall be precision grade, slotted, countersunk head, machine screws conforming to type "R" of IS: 1365.

[d] Wherever high tensile special quality bolts and nuts are specified, they shall comply with provision of IS: 800.

[e] Coach screws shall be in accordance with IS: 1120 and wood screws shall conform to IS: 451.

[f] All plain washers shall conform to requirements of IS: 2016 wherever spring washers for bolts, nuts and screws are specified, they shall be in accordance with the provisions of IS: 3063.

6.3.3 *Cast Iron*: Cast iron shall be conforming to IS: 210. All cast iron goods shall be of best quality and make and as approved by the Architect/ PMC.

6.3.4 *Cast Steel*: Cast steel shall be conforming to IS: 1030. Unless specified otherwise, the steel shall be grade two and shall cater for all tests specified in the said standard.

6.3.5 *Rails*: Rails for the cranes shall comply with the requirements of IRST-12-64 or IS: 3443 if so instructed by the Architect/ PMC they shall be obtained from an approved manufacturer.

6.3.6 *Electrodes*: Electrodes used for metal arc welding of mild steel shall be heavy coated type electrodes conforming to IS: 814 [Part I and II] and shall be of the best quality approved by the Architect/ PMC.

6.4 Handling and Storage

6.4.1 Structural steel shall be stored out of mud and dirt and proper drainage of the storage area shall be provided. Protect from damage or soiling by adjacent construction operations.

6.4.2 Fabricated steel shall not be handled until the paint has thoroughly dried. Care shall be taken to avoid paint abrasions and other damage. Steel work shall be transported in the largest practical lengths and in such a way as not to over-stress the fabricated sections. All pieces bent or otherwise damaged shall be rejected and shall be replaced by the contractor at his own cost.

6.4.3 Storage of fabricated steel at the job site shall be the responsibility of the contractor. Store material at the job site in a manner which does not overload the existing or newly constructed structures. Protect materials against excessive deflection, corrosion or deterioration.

6.5 Fabrication

6.5.1 Shop Drawings

[a] The contractor shall prepare required detailed shop drawings giving complete information necessary for the fabrication of the structures. All information should be clearly given and the drawings shall be in conformity with the best modern practice. A marking diagram allotting distinct identification marks to each separate piece of steel work shall be prepared in sufficient detail to ensure convenient assembly and erection. Symbols used for welding in the drawings shall be in accordance with IS: 813.

[b] The contractor shall prepare comprehensive bill of material sheets for each shop drawing giving therein all the items shown on the drawings together with their weights, mark numbers, cutting lengths etc. Three copies of all working drawings and bill of material sheets shall be submitted to the Architect/ PMC for approval. Fabrication shall not commence until the approval of the relevant drawings has been obtained from the Architect/ PMC . While the shop drawings prepared by the contractor and approved by the Architect/ PMC are deemed to represent the correct interpretation of the work to be done, the contractor is not relieved of the responsibility for accuracy of detailed dimensions shown therein.

6.5.2 *Templates*

[a] All fabrication shall be in accordance with IS: 800 and IS: 1915. Extensive use of templates shall be made. The templates shall be steel bushed where considered necessary by the Architect/ PMC

[b] In case actual members are used as templates for similar pieces, it will be at the discretion of the Architect/ PMC to decide whether such pieces are fit to be incorporated in the finished structure. The contractor shall arrange for corresponding parts of each unit manufactured from the same drawings to

be interchangeable as far as economic manufacturing conditions permit, and shall advise the project manager/engineer of the precise arrangements made in this respect.

6.5.3 *Straightening*: All materials shall be straight unless required to be of curvilinear from and shall be free from twists. If necessary the materials shall be straightened and/or flattened by pressure. Heating of rolled sections and plates for purpose of straightening will not be permitted. Limited straightening may however be effected by local application of heat with a gas torch.

6.5.4 *Cutting*

[a] Gas cutting shall normally be permitted for mild steel only. Gas cutting of high tensile steel may be permitted provided special care is taken to leave sufficient metal to be removed by machining so that all metal that has been hardened by flame is removed. Gas cutting shall preferably be done by machine. Hand flame cutting may only be permitted subject to the approval of the Architect/ PMC. Gas cut edges shall preferably be done by machine. Hand flame cutting may only be permitted subject to the approval of the Architect/ PMC. Gas cut edges shall be free of gauge. Any gauges that remain after cutting shall be removed by grinding.

[b] Rolled sections shall be sawed or flame cut to length. Small plate pieces like gussets may be sheared or cropped to size. Sawing, shearing and cropping shall be clean and free from any distortion. If necessary the edges shall be ground afterwards.

[c] For tubular construction cutting of the pipe and preparation of joint surface shall be done in a neat manner for a good fit up. The ends of the tubes may be flattened or otherwise formed for connections provided that the methods adopted for such flattening do not injure the material. The change of section shall be gradual.

6.5.5 *Holing*

[a] Holes shall preferably be done by drilling. Punching shall not be restored to unless previously approved by the Architect/ PMC. In any case, punching of holes in materials having a thickness in excess of the connector diameter or in the materials thicker than 16 mm. shall not be permitted. Where pushing is permitted the holes shall be punched 3 mm. less in diameter than the required size and reamed after assembly to the full size.

[b] Holes shall be drilled or punched at right angles to surface of the member, not more than 1.5 mm/2.0 mm. [as the case may be depending upon whether the connector diameter is than or more than 25 mm.] larger than the connector diameter. Holes shall not be formed or enlarged by burning or gas cutting. Holes shall be clean-cut within torn or ragged edges. Outside burrs resulting from drilling operations shall be removed.

[c] Holes through more than one thickness of material of members such as compound stanchions and girder flanges shall be drilled after the members are assembled and tightly clamped or bolted together. They shall then be separated and burrs removed if so directed by the Architect/ PMC.

[d] Steel members adjustment shall be provided with slotted holes as shown on the drawings. Suitable templates shall be used for proper location of the holes.

6.5.6 *Fabrication Tolerances*

Unless otherwise shown on the drawings, the fabricating tolerances shall generally be as follows:

[a] Compression members shall not deviate from straightness by more than 1/1000 of the axial length between points which are to be laterally supported. Completed members shall be free from twists bends and open joints. Sharp kinks or bends shall be cause for rejection of material.

[b] A variation of 1 mm. is permissible in the overall length of members with both ends finished for contact bearing. Members without ends finished for contact bearing which are to be framed to other steel parts of the structure, may have a variation from the detailed length not greater than 2 mm. for members 10 meters or less in length and not greater than 3 mm. for members over 10 meters in length.

6.6 Assembly

6.6.1 All connections shall be either bolted or welded as shown on the drawings. The contractor shall not redesign or alter any connection without prior approval of the Architect/ PMC. The component bars shall be assembled in such a manner that they are neither twisted nor otherwise damaged and shall be prepared such that the specified cambers, if any, are provided. Drifting done during assembly shall not distort the metal or enlarge the holes. Poor matching of holes shall be cause of ejection. However, if permitted by the Architect/ PMC, holes that must be enlarged due to mismatching shall be reamed.

6.6.2 *Bolting*

[a] All steel work which is bolted together shall be in close contact over the whole surface. Where two bolted surfaces are to be in permanent contact after assembly, each shall be thoroughly scraped free of loose scales, dirt and burrs and a heavy coat of red oxide, zinc chrome or other approved paint applied after cleaning and drying.

All bolts shall be provided with washers under the nuts and the washers shall be tapered on the inside of the flanges of R.S. joints and channels. Bolts and studs shall project not less than one full thread through the nut

after tightening unless otherwise specified. The ends of the bolts shall be burred after erection to prevent the removal of nuts.

[b] High strength bolts shall be used in bearing or friction as shown on the drawings. High strength bolted joints shall be made without the use of erection bolts. Bolts shall be of a length that will extend not less than 6 mm. beyond the nuts. Bolts shall be entered into the holes without damaging the thread-members. They shall be brought tightly together with sufficient high-strength fitting up bolts which shall be re-tightened as all the bolts are finally tightened. Bolt heads shall be protected from damage during placing. Bolts that have been completely tightened shall be marked for identification. Bolted parts shall fit solidly together and shall not be separated by interposed compressible materials. The contact surfaces in high strength bolted connections shall be free of oil, paint, lacquer, loose scale or other coatings. The facing surfaces shall be machined flat. Final tightening of high strength bolts shall be by turn-of-nut method. Re-tightening shall not be permitted. Whenever the contractor intends to use other means of tightening he shall obtain prior approval of the project manager/engineer.

[c] Anchor bolts shall be set by use of templates secured firmly in place to permit true positioning of the bearing plates and assemblies. When in drawings anchor bolts are shown to be installed in sleeves, the sleeves shall be completely filled with grout.

6.6.3 *Welding* - Welding shall be done in accordance with IS: 816.

[a] Welding procedure shall be based on the specific analysis of any given heat of steel [based on the certified mill test reports] and shall be subject to the review of the Architect/ PMC. These procedures shall all for one or all of the following:

i] Proper bead shape.

ii] Minimized penetration of prevent dilution of the weld metal with the alloy elements.

iii] Preheating, controlled inter pass temperature and controlled heat input.

[b] Welding shall be performed only by qualified and tested welders specifically trained and experienced for the type of job required to execute the welding work to the complete satisfaction of the Architect/ PMC.

[c] Use of standard weld symbols as adopted by IS: 813 is mandatory. Pre qualified joints which are detailed, prepared and welded in accordance with the requirement of IS: 816 shall invariably be used.

[d] Structural welding shall not commence until joint elements are bolted or tacked in intimate contact and adjusted to dimensions shown with allowance

for any weld shrinkage that is expected. Welding sequence shall be planned and controlled to minimize undue stress increase or undue distortion in restrained members. Heavy sections and those having a high degree or restraint shall be welded with low hydrogen type electrodes.

[e] If copper wire spacers are used between the two surfaces to be welded to reduce transverse stresses in the weld, care shall be taken that it does not mix with the weld metal.

[f] Concave bead shape shall be avoided. Ratio of weld width to weld depth shall preferably vary from a minimum of one to one to a maximum 1.4 to 1.

$$\frac{\text{Width of weld}}{\text{Depth of fusion}} = 1 \text{ to } 1.4$$

[g] Field welding shall not be permitted unless shown on the drawings.

[h] Subsequent to fabrication, the overlapping or contacting surfaces or other closed sections [such as tubular, box section] which are inaccessible to painting shall be seal welded. When the end of the tube is not automatically sealed by virtue of its connection by welding to another member the end shall be properly and completely sealed. Before sealing, the inside of the tube shall be made dry and free from loose scale.

[i] Order of assembly of the tubular sections shall consist of welding the tensile member to the main member first. Compression member shall be cut back to overlap the tensile member and then welded to both of these members.

6.6.4 *Testing of Welds*

[a] All welded connections shall be inspected as per IS: 822.

[b] All welds shall be tested by "Dye penetration test" as per current practices.

[c] Atleast 25% of the welds shall be tested by "radiographic examination" as per IS: 1182 at the locations specified by the Architect/PMC percentage of weld to be tested may be increased or decreased by the Architect/PMC depending on the quality of welds and results obtained for previous weld tests. All expenses on such testing shall be borne by the contractor.

[d] Agency for testing of weld shall be approved by the Architect/ PMC prior to testing.

[e] Defected welds shall be repaired or replaced as decided by the Architect/ PMC. The repaired or replaced welds shall be tested using the same methods as above. Additionally, when defective welds are found, the cause

of the defective welding shall be determined and the contractor shall institute immediate corrective action.

6.7 Shop Painting

6.7.1 All structural steel work shall be thoroughly wire brushed to remove all rust, loose mill scales, dirt and other foreign material. Greasy and oily surfaces shall be cleaned with solvent and dry rags. Unless otherwise specified the contractor shall not sand blast, flame clear or pickle the steelwork prior to painting. The cleaned surface shall be inspected and approved by the Architect/ PMC.

6.7.2 With four hours of cleaning the surface, a coat of approved priming paint shall be applied, preferably by brushing. Within the week a second coat of approved priming paint shall be applied by brushing or spraying. Each coat shall be allowed to dry thoroughly before the subsequent coat is applied.

6.7.3 The following shall be thoroughly cleaned but shall not be painted or oiled:

[a] Members to be encased in concrete.
[b] Contact surfaces of welded connections.
[c] Contact surfaces of high-strength bolted [friction type] connections.
[d] Milled surfaces.
[e] Top surfaces of steel beam flanges to receive shear connectors, but not supporting metal deck.
[f] Members to receive some other special treatment.

6.8 Shop Erection

6.8.1 Steel work shall be temporarily shop erected completely or partially as directed by the project manager/engineer so that the accuracy of fit may be checked before dispatch. Due notice shall be give to the Architect/ PMC so that the accuracy of fit may be checked or dispatch. Due notice shall be given to the Architect/ PMC then the work is ready for inspection and the assembly shall not be dismantled until it has been inspected and approval obtained.

6.8.2 The parts shall be assembled with a sufficient number of parallel drifts to bring and keep the components in place. In the case of parts drilled or punched through steel jigs with bushes resulting in similar parts being inter-changeable for portion of the steel work, trial assembly shall be carried out to the extent required by IS: 1915.

6.8.3 All erection marks shall be dye-stamped and also distinctly stenciled inpaint. The marking shall be as per the marking diagram approved by the Architect/ PMC.

6.9 Erection

6.9.1 As far as possible, the contractor shall deliver the fabricated steel work to the site in the same sequence as that which he wishes to follow for the erection. Dispatch

should be scheduled to avoid cluttering up of the site. The bolts required for erection shall be bagged according to size prior to dispatch.

6.9.2 All structural work shall be erected in accordance with IS: 800, IS: 806 and IS: 1915 and as per the approved erection drawings. The contractor shall be responsible for setting out the works. The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the Architect/ PMC. These shall be regularly serviced and maintained. Occupational safety practices shall be strictly adhered to and shall be to the satisfaction of the Architect/ PMC.

6.9.3 Individual pieces shall be plumbed, leveled and aligned. Drift pins may be used only to bring together the several parts. They shall not be used in such manner as to distort or damage the metal. Temporary bracing, guy-line and staging shall be provided to ensure proper alignment and to adequately protect all persons, property and to withstand all loading to which the structure may be subjected during erection.

Attachment of such temporary steel work to the permanent steel work shall only be done with the approval of the project manager/engineer. Temporary steel work shall remain in position until the structure is stable and self supporting and permanently bolted or welded to the satisfaction of the Architect/ PMC after removal of temporary steel work, the permanent structure shall be made good to the complete satisfaction of the Architect/ PMC.

No permanent bolting or welding shall be done until proper alignment has been obtained. Erection of the parts with any moderate amount of remaining, chipping or cutting shall be immediately reported to the Architect/ PMC. The steel work shall be rejected unless corrective action is approved by the Architect/ PMC.

6.9.4 No erection shall be permitted more than two storey above a complete bolted and/or welded floor or above a decked surface.

6.9.5 Placement of joists shall not start until the supporting work is secured. Temporary bridging, connections and anchors shall be provided to assure lateral stability during erection. Bridging to steel joists shall be installed immediately after joint erection, before any construction loads are applied. Horizontal or vertical bridging shall be provided in accordance with the type of span of the joists. Ends of the bridging lines shall be anchored at top and bottom chords where terminating to walls or beams.

6.9.6 *Erection Tolerances*

The contractor shall control the erection of steel structures in such a way that in level no components are more than 10 mm. out of their correct position nor shall the lines of the structure depart from straightness of plumb by more than plus or minus 3 mm. in 3 metres. The error shall be measured from the designed position or level given by the dimensions and coordinates on the drawings.

In structures where movements due to temperature change are considerable the deviations listed above will apply at the mean position of the member being checked.

6.10 Field Modifications

Corrections to accommodate minor misfits in steel structure by moderate use of drift pins and reaming will be permitted. Errors that cannot be corrected by these measures, but require modifications must be reported immediately to the project manager/engineer alongwith contractor's proposed solution.

6.11 Grouting under Base Plates

Grouting under base plates shall be done after erection of the structural steel, unless otherwise approved by the Architect/ PMC. All bearing plates, bearing assemblies and masonry plates shall be set level and to the elevations shown on plans. These shall be shimmed with approved means and grouted to assure full bearings on the supporting substrata regardless of the tolerances otherwise permitted.

6.11.1 The grout to be used in superstructure stanchion bases shall be cement mortar 1:2 [1 cement, 2 coarse sand] and shall have a 28 days compressive strength of at least 300 kg./sq.cm. The surfaces which are to receive the grout shall be thoroughly cleaned immediately prior to the grouting operation.

6.12 Cleaning and Paint Touching

After erection, exposed surfaces of filed connections, unpainted areas adjacent to field connections and damaged areas in the shop coat shall be cleaned to the same standards required for the shop coat. These shall then be painted with the same paint used in the shop coat.

6.13 Inserts and Embodiments

Various steel inserts and embodiments are required under the contract to be fabricated, positioned and secured firmly into place inside the formwork prior to concrete being poured. There are requirements of jointing, threading, bolting and welding inserts and embodiments of different concrete and structural steel elements in order to establish structural continuity and connection. Great care shall be exercised by the contractor in executing all aspects of the work related to inserts and embodiments - including tolerances - so that the final assembly of the concrete elements can meet satisfactorily the continuity and contiguity requirements intended in the structure.

6.14 Painting

Painting to steel work:

6.14.1 Painting work shall be carried out in accordance with IS: 8629 [Parts I to III] and also in accordance with the requirements laid down under "painting" specifications.

6.14.2 The steelwork, prior to delivery, shall be cleaned from scale, rust, dirt and grease etc. by means of chipping, scraping and wire brushing using skilled operators. The cleaning shall be thorough and to the entire satisfaction and approval of the Architect/ PMC. The cleaning shall proceed each day over the extent of surfaces, which can be painted on that day.

6.14.3 Immediately after cleaning as described above, the surfaces shall be phosphated, primed etc. as described under the section "Painting."

6.15 Shop Painting

The structural steel work shall be thoroughly cleaned, phosphated and painted with one coat of red oxide primer in the fabrication shop.

6.16 Contact Surface etc.

The following specification shall apply to the shop painting of contact and inaccessible surfaces:

Surfaces to be painted shall be thoroughly cleaned from scale, rust, dirt, grease etc.

Surfaces which are to be brought permanently into close contact or made inaccessible either in the shops or upon erection shall, after cleaning, be given two coats or Red Lead priming paint after phosphating. The surfaces shall be brought into contact while the paint is still wet.

All enclosed surfaces of box members shall be completely sealed by oiling or by coating with an approved bitumen paint and all such members and tubes shall have their ends closed by suitable plates welded in position.

The contractor shall take all precautions to prevent dust and dirt coming in contact with freshly painted surfaces or with surface being painted. The second coat of paint shall only be applied when the first coat has dried.

6.17 Final Painting

Where called for, three coats of enamel paint of approved shade shall be applied to all steel work after erection. Particular care shall be taken to clean, wire brush, spot prime welded and other areas where priming coat has been marred during the course of erection before application of final painting.

8.0 SPECIFICATION FOR BRICK MASONRY WORK

8.1 Extent and Intent

The contractor shall provide all labour, materials, operations, equipment and incidentals necessary and required for the completion of all brick work called for.

8.2 General Description

Bricks and tiles shall be of selected quality, thoroughly burnt without being vitrified, of uniform deep red or copper colour, regular min shape and size and shall have sharp and square sides and edges and parallel faces to ensure uniformity in the thickness of the courses of brickwork. They shall be free from cracks, chips, flaws, stone or lumps of any kind.

8.3 Bricks

Conventional bricks shall normally be locally available first class bricks of class designation 100. However, in case the locally available bricks are not of acceptable quality to the architect/project manager then the contractor shall have to arrange from other sources, at their own cost.
Bricks shall be of actual size 9" X 4 3/8" X 2 ¾" (22.9 cm x 11.2 cm x 7.0 cm) unless otherwise,specified.

8.4 Samples

Samples of each type of brick and tiles taken at random from the load shall be deposited with the Architect/ PMC for his approval before being used in the work. All subsequent deliveries shall be up to the standard of the sample approved.

8.5 Soaking of Bricks and Tiles

All bricks and tiles shall be thoroughly soaked before use, in specially prepared vats, tubs or tanks for not less than two hours and until air bubbles stop being given off. The duration of soaking may be modified by the Architect/PMC after trials at site. The soaked bricks and tiles shall be kept on wooden planks or brick platforms to avoid earth being smeared on them.

8.6 Mortar

Mortar for all brickwork shall consist of cement and clean, sharp coarse sand.

8.7 Cement

Portland cement conforming to IS: 269-1967 shall be used, unless otherwise specified. Cement shall be fresh when delivered at site.

8.8 Sand

Sand shall be clean, not too fine nor too coarse and shall fall within the grading zones I to IV given in Table III of IS: 383-1963.

8.9 Water

Water used for mixing mortar shall be in accordance with clause 4.3 of IS: 456-1964.

8.10 Mix Protection

The mortar shall consist of one part cement and six parts sand for brick work and tile work 230 mm. thick and above. For brick piers, half brick walls and honey combed brick work the mortar mix shall consist of one part cement and four parts sand.

8.11 Mortar Mixing

Mixing of mortar shall be done in a mechanical mixer. Hand mixing shall be restored to only when specifically permitted by the Architect/ PMC. Cement and sand shall be mixed dry thoroughly and then water shall be added gradually. Wet mixing shall be continued till mortar of the consistency of a stiff paste and uniform colour is obtained. Only the quantity of mortar which can be used up within 30 minutes of its mixing shall be prepared at a time.

Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within 30 minutes after the water is added to the dry mixture. Mortar left unused for more than 30 minutes after mixing shall be rejected and removed from the site of work.

8.12 Laying of Brickwork

All brickwork shall be built in English bond with frong upwards. Each brick shall be set with bed and vertical joints filled completely with mortar. Vertical faces of bricks should be thoroughly buttered with mortar pressed into place and tamped. Selected bricks shall be used for the facework. The walls shall be taken up truly plumb. All courses shall be laid truly horizontal and vertical joints shall be truly vertical. Vertical joints in alternate course shall come directly over the other. The thickness of brick courses shall be kept uniform and for this purpose wooden straight edge with upgradation giving thickness of each brick course including joint shall be used. Necessary tools comprising of wooden straight edge, mason's spirit level, square, foot rule, plumb line and pins etc. shall be frequently and fully used by the masons to ensure that the walls are taken up true to plumb, line and levels.

Both the faces of walls of thickness greater than 23 cm. shall be kept in proper plane. All the connected brickwork shall be carried up nearly at one level and no portion of the work shall be raised more than one meter above the rest of the work. Any dislodged brick shall be removed and rest in fresh mortar. Before commencing any brickwork, the contractor shall confer with other traders to ensure that all pipes,

conduit, drains, sleeves, bolts hangers, or any other materials necessary to be installed in the brickwork at the time it is built, have been fixed or provided for.

8.13 Joints

Bricks shall be so laid that all joints are full of mortar. The thickness of joints shall normally be 10 mm. with a tolerance limit of + 2 mm. The face joints shall be raked to a minimum depth of 12 mm. by a raking tool during the progress of the work when the mortar is still green, so as to provide proper key for the plaster or pointing to be done. Where plastering or pointing is not to be done, the joints shall be struck flus and finished at the time of laying. The face of brickwork shall be cleaned daily and mortar droppings removed.

8.14 Reinforced Brickwork

Brickwork half brick thick and others where called for shall be reinforced with hoop iron [16 gauge, 25 mm. wide] at every eighth course. The hoop iron, cleaned of rust and loose flakes with brush shall be embedded thoroughly in cement mortar at every fourth course. It shall be cast in or securely fixed to adjoining columns or walls. Alternatively M.S. bars or tor-steel bars may be used as reinforcement as directed.

8.15 Curing

All fresh brickwork shall be protected from the effects of sun, rain etc. by suitable covering. All brickwork shall be kept constantly moist on all the faces for atleast ten days.

8.16 Scaffolding

Unless otherwise instructed by the Architect/ PMC, double scaffolding having two sets of vertical supports shall be provided for all building work, the supports shall be sound, strong and tied together with horizontal pieces over which the scaffolding planks shall be fixed.

The contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come up on it.

8.17 Openings

Openings in brickwork for air-conditioning ducts, grills, pipes etc. shall be provided at the time of laying brickwork.

8.18 Caulking

After installation of piping, conduits, grilles etc. all openings left around pipes, conduits, grilles etc. shall be checked and caulked with cement mortar to render the whole work vermin proof and tidily finished.

8.19 Samples Erected on Site

A sample wall of about one brass in area shall be erected on site for approval by the Architect/PMC where exposed work is called for.

8.20 Protection

When RCC work is being executed above or nearby exposed brick work it is the duty and obligation of the contractor to protect bricks from cement slashing, or other defacement caused by such operations. The contractor will be responsible for final cleaning ultimately should these precautions fail.

SECTION VIII

BILL OF QUANTITIES.

SECTION IX

TENDER DRAWINGS.

TENDER DRAWINGS –

a. ARCHITECTURAL DRAWINGS-

01 - 050613_CENTER LINE & PLINTH LEVEL PLAN (A4 SIZE)
02 - 030613_GROUND FLOOR PLAN (A4 SIZE)
03 - 030613_FIRST FLOOR PLAN (A4 SIZE)
04 - 030613_SECTIONS (A3 SIZE)

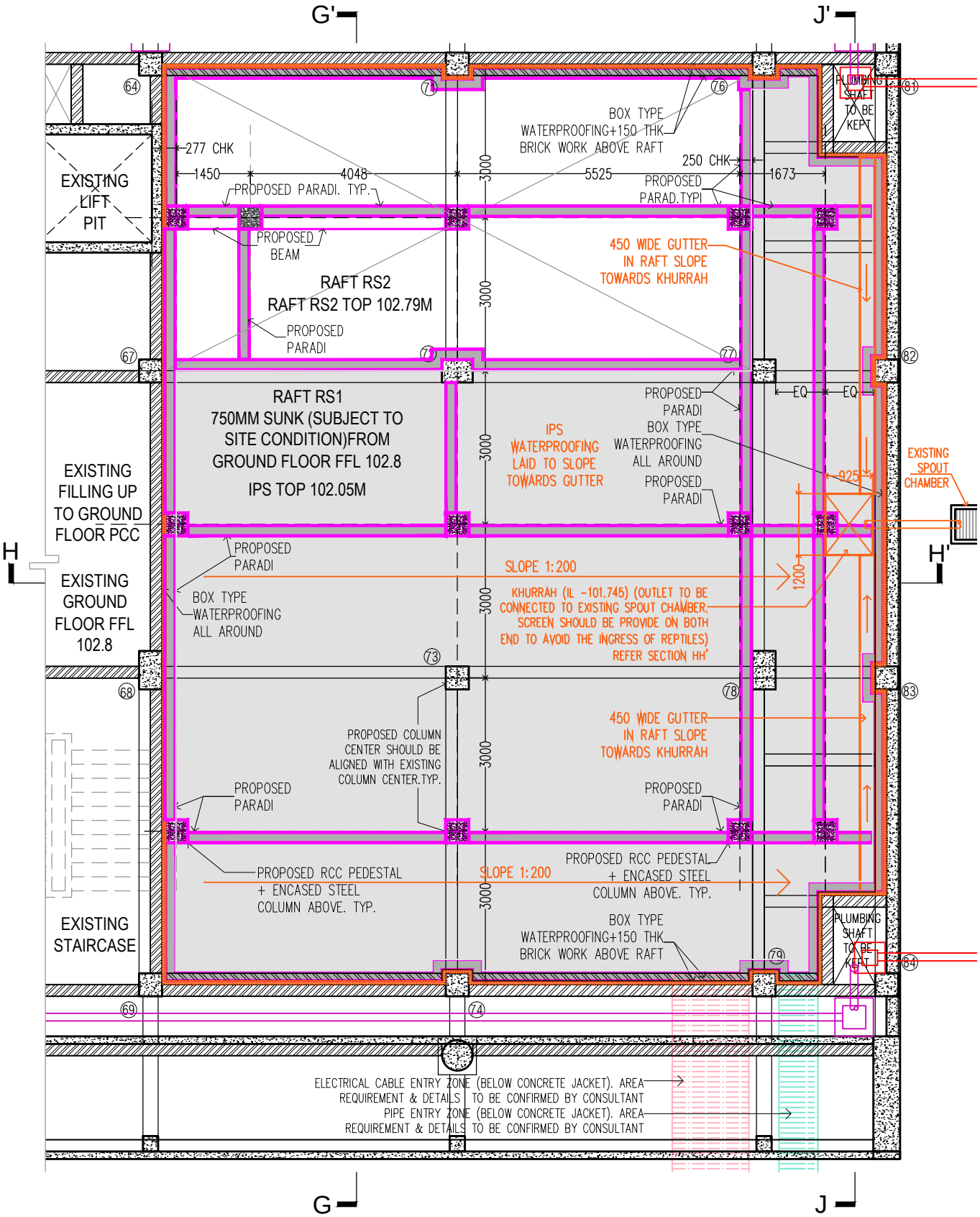
b. STRUCTURAL STRENGTHENING DRAWINGS-

01_050613_FOUNDATION LEVEL PLAN (A3 SIZE)
02_050613_PLINTH LEVEL PLAN (A3 SIZE)
03_050613_FIRST SLAB LEVEL PLAN (A3 SIZE)

c. EXTERNAL LAYOUTS-

01_050613_EXTERNAL ELECTRICAL LAYOUT 1-2 (A2 SIZE)
02_050613_EXTERNAL ELECTRICAL LAYOUT 2-2 & HVAC LAYOUT (A2 SIZE)

TENDER DRAWING



NOTE -

1.VENDOR & CONSULTANT SHOULD CHECK ALL EXISTING SITE DIMENSIONS

2.VENDOR & CONSULTANT SHOULD CONSIDER INSTALLATION TOLERANCE WITH RESPECT TO EXISTING & PROPOSED STRUCTURE.

IMPORTANT
1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METERS, UNLESS OTHERWISE MENTIONED.
2. THE DRAWING IS NOT TO BE SCALED
3. THIS DRAWING IS TO READ IN CONJUNCTION WITH OTHER RELEVANT ARCHITECTURAL / ENGINEERING DRAWINGS.
4. DISCREPANCIES IF ANY SHOULD BE IMMEDIATELY BROUGHT TO THE NOTICE OF THE ARCHITECT

REVISIONS			
NO	DATE	DETAILS	

ISSUED TO		
NO.	DATED	ISSUED TO
1	270513	IITM & HCEPL (MAIL FOR APPROVAL)
2	030613	HCEPL (MAIL FOR TENDER)

PROJECT
PROPOSED HPC II AT PASHAN, PUNE

CLIENT
INSTITUTE OF TROPICAL METEOROLOGY, PUNE

ARCHITECTS
MADHAV JOSHI AND ASSOCIATES
ARCHITECTS AND URBAN PLANNERS
FLAT NO. O8, MATRUSMURTY APT, PLOT NO 92, MAYUR COLONY, KOTHRUD, PUNE.

DRAWING TITLE
CENTER LINE & PLINTH LEVEL

TENDER DRAWING

PROJECT NO.	DRAWING NO.	REVISION
0510	101	R0

SCALE	1:100
DATE	030613
DEALT	AH
CHECKED	

TENDER DRAWING

EXISTING CTPT & RMU BUILDING

PROPOSED HT CABLE ROUTE
DETAILS AS PER SERVICES CONSULTANT

EXISTING ROAD

EXISTING ROAD 12M WIDE

GUEST HOUSE
G+2

REFER CONSULTANTS RESPECTIVE DRAWINGS IN CONJUNCTION WITH THIS DRAWING.

NOTES -
1. TRENCH & CHAMBER SIZE, ORIENTATION, EXTENT, RELATION WITH NGL & OTHER DETAILS AS PER SERVICES CONSULTANT'S DRAWING
2. LAYOUT MARKING SHOULD BE DONE AS PER DRAWING & GET APPROVED BY SERVICES CONSULTANT BEFORE START THE WORK.
3. CHAMBER DETAILS, ROUTING, FOUNDATION DETAILS & LAYOUTS MAY CHANGED AS PER CONSULTANT'S REQUIREMENT.

REF. DWG. –
1) EQUIPMENT LAYOUT ITM_137_PD_ELEC_EQ_001 (MAIL 010613)
2) EXTERNAL EQUIPMENT LAYOUT ITM_137_PD_ELEC_SP_001 (MAIL 010613)

EXISTING ROAD

LIBRARY
G+2

PROPOSED 6.0 M WIDE ROAD

EXISTING GARAGE (G)

SERVICE ROAD 6M WIDE

EXISTING CANTEEN BUILDING (G)

EXISTING GARAGE (G)

EXISTING WELL & PUMP HOUSE

2TIERS OF 4NOS.
Ø300MM RCC HUME PIPE
1.80 FRM FINISHED FACE OF BUILDING
NEW TRENCH

12.30 FRM FINISHED FACE OF BUILDING

11.25 FRM FINISHED FACE OF BUILDING

2500X2500X2000mm.
DEEP CABLE CHAMBER

2.00 FRM FINISHED FACE OF BUILDING

2TIERS OF 4NOS.
Ø300MM RCC HUME PIPE
ALIGN CHAMBER CENTER WITH INSIDE TRENCH CENTER
4000X2500X2000mm.
DEEP CABLE CHAMBER

11.25 FRM FINISHED FACE OF BUILDING
NEW TRENCH

2TIERS OF 4NOS.
Ø300MM RCC HUME PIPE

EXISTING SUBSTATION BUILDING

1.00 FRM FINISHED FACE OF BUILDING

13.75

3TIERS OF 5NOS.
Ø300MM RCC HUME PIPE

11.25 FRM FINISHED FACE OF BUILDING

2500X2500X2000mm.
DEEP CABLE CHAMBER

3.35 FRM FINISHED FACE OF BUILDING

1500X2000(D)mm.
CABLE TRENCH

2000X2000X2000mm.
DEEP CABLE CHAMBER

FINISHED FACE OF BUILDING

3TIERS OF 5NOS.
Ø300MM RCC HUME PIPE

14.25

10.70

21.20

8.30

TRANSFORMER FOUNDATION. 2NO
(4.6M X 4.06M X 0.75M ABOVE NGL). TYP.

3000X2500X2000mm.
DEEP CABLE CHAMBER

2TIERS OF 4NOS.
Ø300MM RCC HUME PIPE

2000X2000X2000mm.
DEEP CABLE CHAMBER

4000X2000X2000mm.
DEEP CABLE CHAMBER

4HOURS FIRE RATED WALL

3.5 MTR. WIDE GATE

4RXØ300mm.
RCC HUME PIPE

1200X1200(D)mm.
CABLE TRENCH

3.5 MTR. GATE

17.95

DG FOUNDATION. 6NO
(7.1M X 3.1M X 0.3M ABOVE NGL). TYP.

EXISTING ROAD

9M WID

46.30 CHK

6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00

36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11

LG LF LE LD LC LB LA A B C D E F G H J K L M N P Q R S

PLAN (1:500)

IMPORTANT
1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METERS, UNLESS OTHERWISE MENTIONED.
2. THE DRAWING IS NOT TO BE SCALED
3. THIS DRAWING IS TO READ IN CONJUNCTION WITH OTHER RELEVANT ARCHITECTURAL / ENGINEERING DRAWINGS.
4. DISCREPANCIES IF ANY SHOULD BE IMMEDIATELY BROUGHT TO THE NOTICE OF THE ARCHITECT

CONSULTANTS
STRUCTURE - STRUCTURE: G.A.BHILARE CONSULTANTS PVT, LTD
SERVICES CONSULTANTS:
1.ARCHIVISTA (ELECTRICAL)
2.ARCHIVISTA (HVAC)

DRAWING REFERENCES:

CONSULTANTS	DRG.NO.	REV.NO.	DATE
STRUCTURAL			
SERVICES			

SYMBOLS:

REVISIONS

NO.	DATE	DETAILS

ISSUED TO

NO.	DATED	ISSUED TO

PROJECT
PROPOSED CCCR BUILDING AT PASHAN, PUNE
CLIENT
INSTITUTE OF TROPICAL METEREOLOGY, PUNE
ARCHITECTS
MADHAV JOSHI AND ASSOCIATES ARCHITECTS AND URBAN PLANNERS
FLAT NO. 08, MATRUSMURTY APT, PLOT NO 92, MAYUR COLONY, KOTHRUD, PUNE.

DRAWING TITLE
EXTERNAL ELECTRICAL LAYOUT 1/2

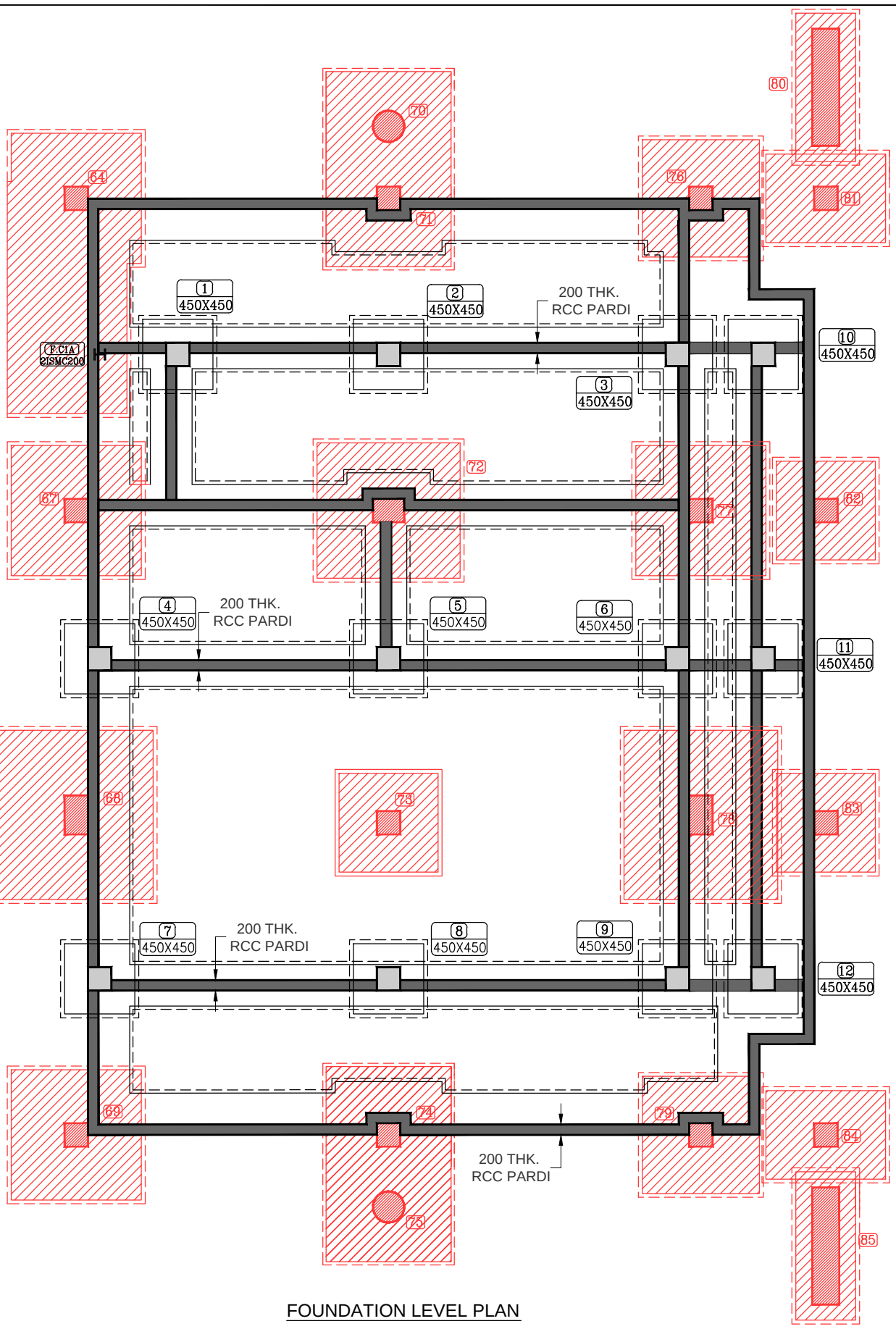
TENDER DRAWING

PROJECT NO.	DRAWING NO.	REVISION
0510	105	R0

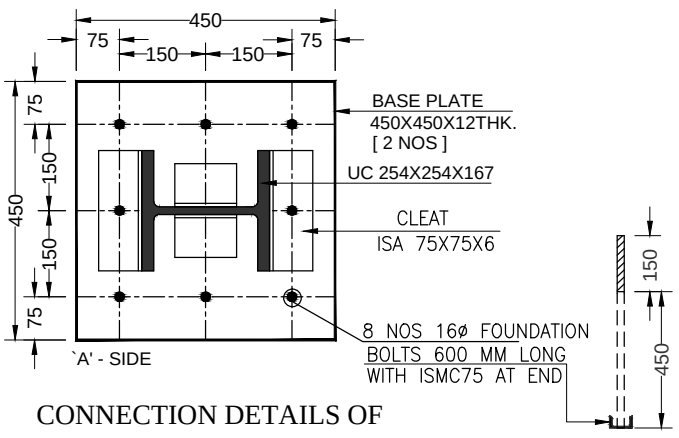
SCALE	AS SHOWN
DATE	030613
DEALT	AH
CHECKED	

TENDER DRAWING

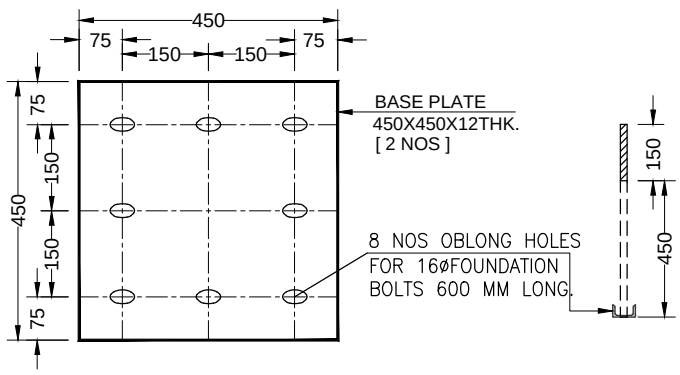
	COLUMNS ABOVE PLINTH LEVEL	SIZE		H UC 254X254X167	H UC 254X254X167
		STEEL			
M25	COLUMNS FROM FOOTING TO PLINTH LEVEL	SIZE	450X450		450X450
		STEEL	12–16ϕ		12–16ϕ
M25	FOOTING DETAILS	STEEL ALONG SHORT SPAN	11NOS–10ϕ		11NOS–10ϕ
		STEEL ALONG LONG SPAN	11NOS–10ϕ		11NOS–10ϕ
		D	450		450
		RCC SIZE	1350X1350		1350X1350
		PCC SIZE (150mm THK.)	1500X1500		1500X1500
	COLUMN NOS.		C 1 UP TO PLINTH LEVEL	FC 1A ABOVE PLINTH LEVEL	C 2,3,4,5,6,7, 8,9,10,11,12



FOUNDATION LEVEL PLAN



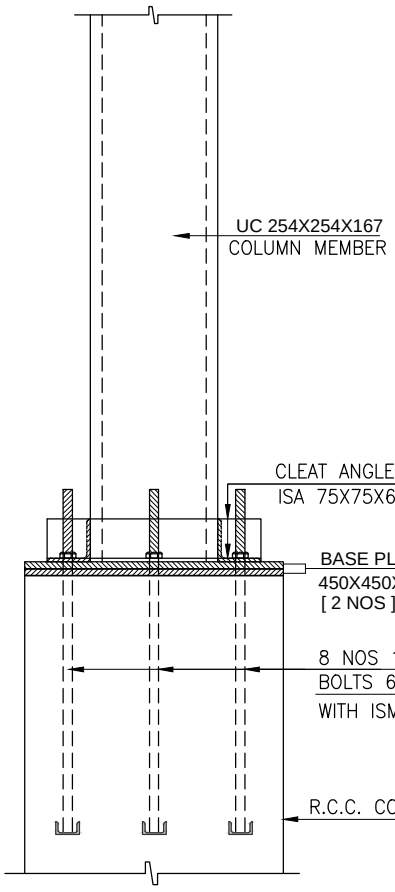
CONNECTION DETAILS OF BASE PLATE & COLUMN FOR UC 203X203X86



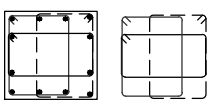
DETAILS OF BASE PLATE

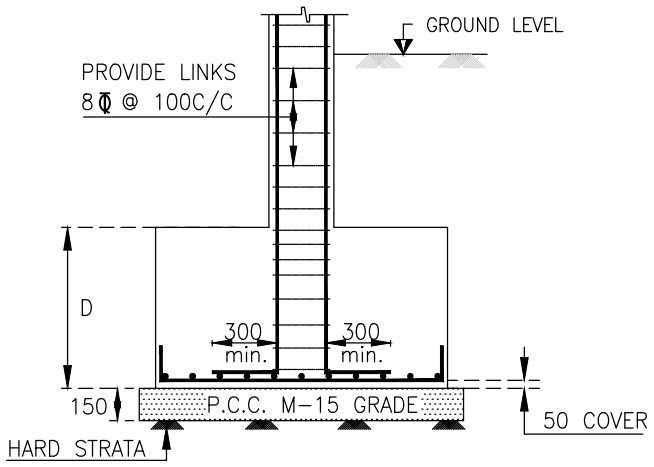
NOTES :—

* ALL STRUCTURAL STEEL SHALL CONFIRM TO IS : 800–1984.
* WELDING SHALL CONFIRM TO IS : 816–1969.
* WELD LENGTH & SIZE OF GUSSET PLATE HAS NOT BEEN SPECIFIED IN THE DRAWINGS. THOSE WILL HAVE TO WORKED OUT AT THE TIME OF FABRICATION & MINIMUM WELD LENGTH 50 MM
* ALL STRUCTURES AFTER FABRICATION SHALL BE PAINTED BY ANTI CORROSIVE TREATMENT
* ALL WELDS ARE 6 MM THK. FILLET WELD.
* ALL DIMENSIONS ARE IN MILLIMETERS OTHERWISE SPECIFIED
* **ALL FABRICATION TO BE CHECKED BEFORE ERECTION BY STRUCTURAL ENGINEERS.**
* **ALL DIMENSION TO BE VERIFIED ON SITE BEFORE EXECUTION OF WORK.**
* THIS DRAWING IS TO READ IN CONJUNCTION WITH RELEVANT DRGS.
* IF IN DOUBT "ASK" DO NOT INTERPRETE.
* DO NOT SCALE THE DRAWING.



`A' - SIDE ELEVATION

SCHEMATIC DETAILS OF LINKS ARRANGEMENTS	
COLUMN SIZE	450X450
NO. OF MAIN BARS	12 BARS
LINK DETAILS	



TYP. SECTION THROUGH FOOTING
[FIG. NO.–100]

NOTES =

1) EXPOSURE CONDITION–MILD
2) GRADE OF CONCRETE:
   i) FOOTING = M25
   ii) COLUMNS = M25
   AS PER DESIGN MIX.
3) PROVIDE HOOKS [⊂⊃] @ TWO TIME OF MAIN LINKS [i. e. 300 C/C] [UNLESS NOTED].

EXISTING STRUCTURE

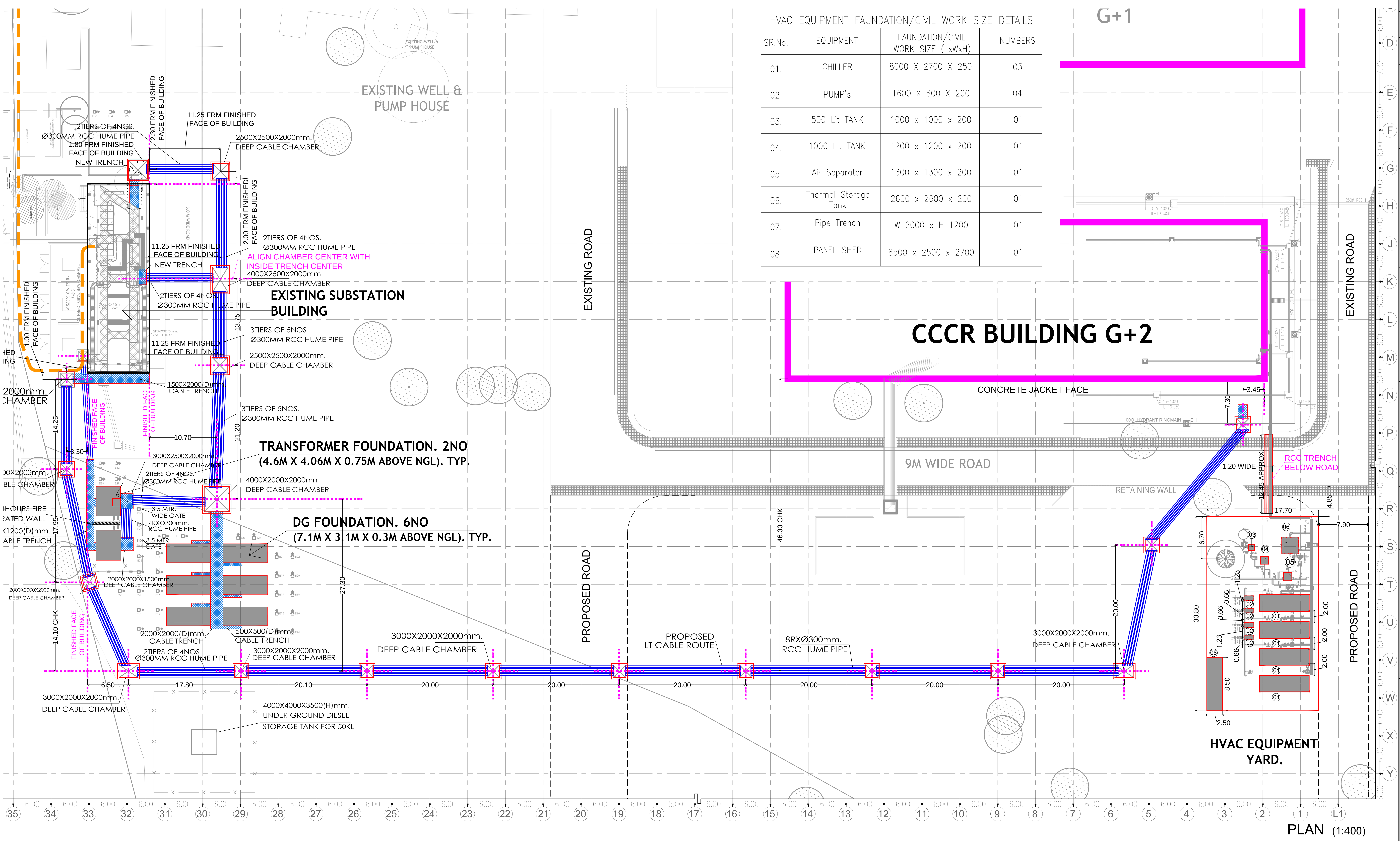
STRENGTHENING OF EXISTING STRUCTURE FOUNDATION LEVEL PLAN

REVISION & DATE	DESCRIPTION	RESPONSIBLE PARTY FOR CONSTRUCTION	PARTICULARS	PROPOSED (GROUND+2 UPPER FLOOR'S) CCCR BUILDING AT – PASHAN., PUNE.	
		-			
		SERVICES CONSULTANTS	JOB NO. 1248/10	G. A. BHILARE CONSULTANTS PVT. LTD. CONSULTING ENGINEERS I STRUCTURAL DESIGNERS CHARTERED ENGINEER I GOVT. REGD. VALUERS	
		PLUMBING	DRG. NO.	GAURINANDAN, PLOT NO.13, SHANTISHEELA SOCIETY, NEAR FTII, LAW COLLEGE ROAD, ERANDAWANE, PUNE 411004 Telefax : +91 20 2544 6001/2/3, www.gabcpl.com, Email: info@gabcpl.com	
DATE	PRINTS ISSUED TO NOS	-	BGA/CCC/STR 101		
15.05.2013	E - MAIL	ELECTRICAL	REVISION R0	ARCHITECT - MADHAV JOSHI & ASSOCIATES	
20.05.2013	E - MAIL	-			
22.05.2013	E - MAIL	LANDSCAPE	DATE 04.04.2013	CLIENT - INSTITUTE OF TROPICAL METEREOLOGY , PUNE.	
24.05.2013	E - MAIL	-			
		PROJECT MANAGEMENT CONSULTANTS	DRAWN BY	DESIGN BY	CHECKED BY / APPROVED BY
		-	YOGESH	AMOL	AJAY / G. A. B

TENDER DRAWING

HVAC EQUIPMENT FOUNDATION/CIVIL WORK SIZE DETAILS

SR.No.	EQUIPMENT	FAUNDATION/CIVIL WORK SIZE (LxWxH)	NUMBERS
01.	CHILLER	8000 X 2700 X 250	03
02.	PUMP's	1600 X 800 X 200	04
03.	500 Lit TANK	1000 x 1000 x 200	01
04.	1000 Lit TANK	1200 x 1200 x 200	01
05.	Air Separator	1300 x 1300 x 200	01
06.	Thermal Storage Tank	2600 x 2600 x 200	01
07.	Pipe Trench	W 2000 x H 1200	01
08.	PANEL SHED	8500 x 2500 x 2700	01



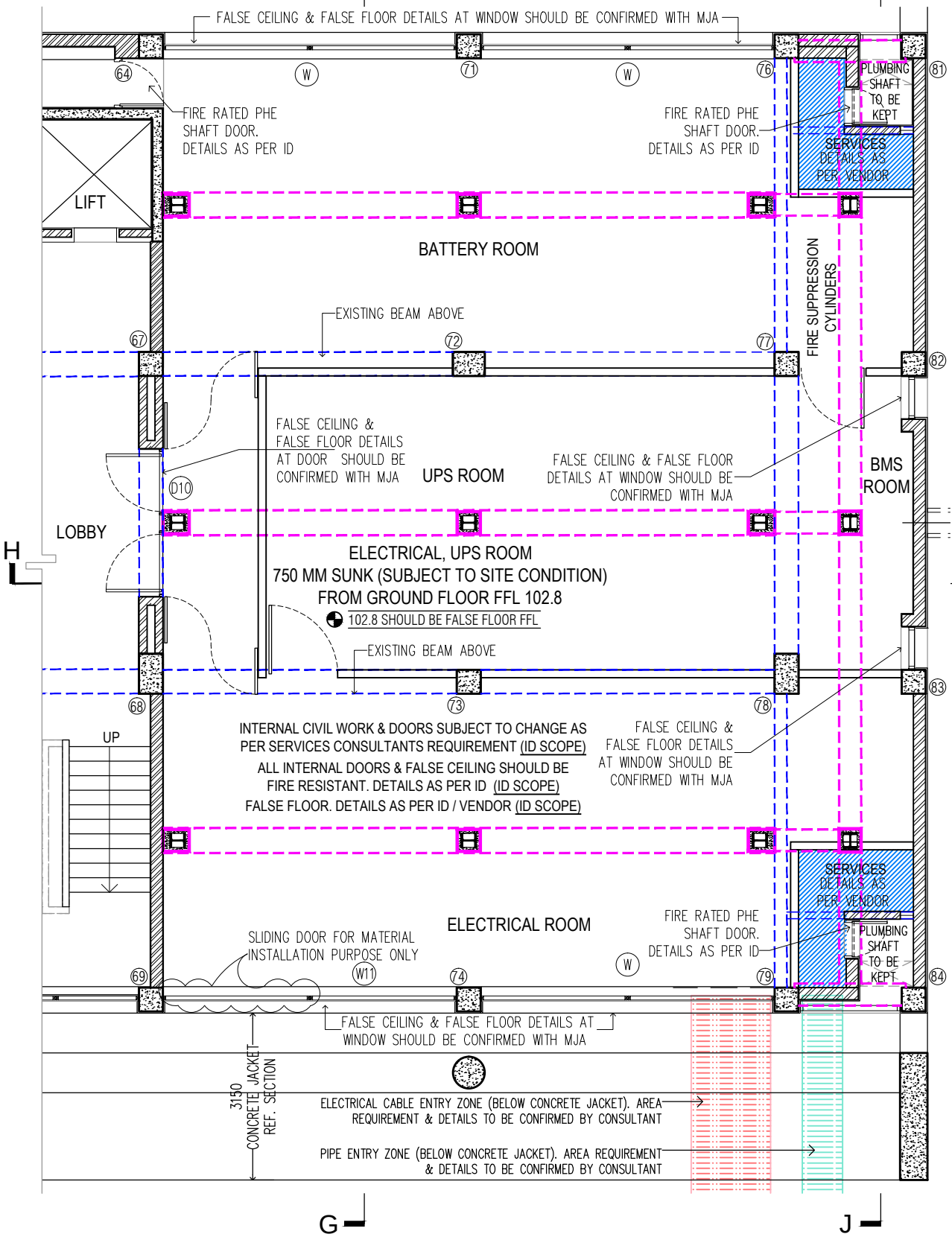
REFER CONSULTANTS RESPECTIVE DRAWINGS IN CONJUNCTION WITH THIS DRAWING.

NOTES -
1. TRENCH & CHAMBER SIZE, ORIENTATION, EXTENT, RELATION WITH NGL & OTHER DETAILS AS PER SERVICES CONSULTANT'S DRAWING.
2. LAYOUT MARKING SHOULD BE DONE AS PER DRAWING & GET APPROVED BY SERVICES CONSULTANT BEFORE START THE WORK.
3. CHAMBER DETAILS, ROUTING, FOUNDATION DETAILS & LAYOUTS MAY CHANGED AS PER CONSULTANT'S REQUIREMENT.

REF. DWG. -
1) EQUIPMENT LAYOUT ITM_137_PD_ELEC_EQ_001 (MAIL 010613)
2) EXTERNAL EQUIPMENT LAYOUT ITM_137_PD_ELEC_SP_001 (MAIL 010613)
3) EXTERNAL HVAC EQUIPMENT LAYOUT IITM_DC_TD_HVAC_100 (MAIL 010613)

PROJECT: PROPOSED CCCR BUILDING AT PASHAN, PUNE
CLIENT: INSTITUTE OF TROPICAL METEREOLOGY, PUNE
DRAWING TITLE: EXTERNAL ELECTRICAL LAYOUT 2/2 & HVAC LAYOUT
TENDER DRAWING
ARCHITECTS: MADHAV JOSHI AND ASSOCIATES, ARCHITECTS AND URBAN PLANNERS
PROJECT NO. 0510 — DRAWING NO. 106 — REVISION R0 — SCALE AS SHOWN

TENDER DRAWING



NOTES -

1.VENDOR & CONSULTANT SHOULD CHECK ALL EXISTING SITE DIMENSIONS

2.VENDOR & CONSULTANT SHOULD CONSIDER INSTALLATION TOLERANCE WITH RESPECT TO EXISTING & PROPOSED STRUCTURE.

IMPORTANT
1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METERS, UNLESS OTHERWISE MENTIONED.
2. THE DRAWING IS NOT TO BE SCALED
3. THIS DRAWING IS TO READ IN CONJUNCTION WITH OTHER RELEVANT ARCHITECTURAL / ENGINEERING DRAWINGS.
4. DISCREPANCIES IF ANY SHOULD BE IMMEDIATELY BROUGHT TO THE NOTICE OF THE ARCHITECT

REVISIONS			
NO	DATE	DETAILS	

ISSUED TO		
NO.	DATED	ISSUED TO
1	270513	IITM & HCEPL (MAIL FOR APPROVAL)
2	030613	HCEPL (MAIL FOR TENDER)

PROJECT
PROPOSED HPC II AT PASHAN, PUNE

CLIENT
INSTITUTE OF TROPICAL METEOROLOGY, PUNE

ARCHITECTS
MADHAV JOSHI AND ASSOCIATES
ARCHITECTS AND URBAN PLANNERS
FLAT NO. O8, MATRUSMURTY APT, PLOT NO 92, MAYUR COLONY, KOTHRUD, PUNE.

DRAWING TITLE
GROUND FLOOR PLAN

TENDER DRAWING

PROJECT NO.	DRAWING NO.	REVISION
0510	102	R0

SCALE	1:100
DATE	030613
DEALT	AH
CHECKED	

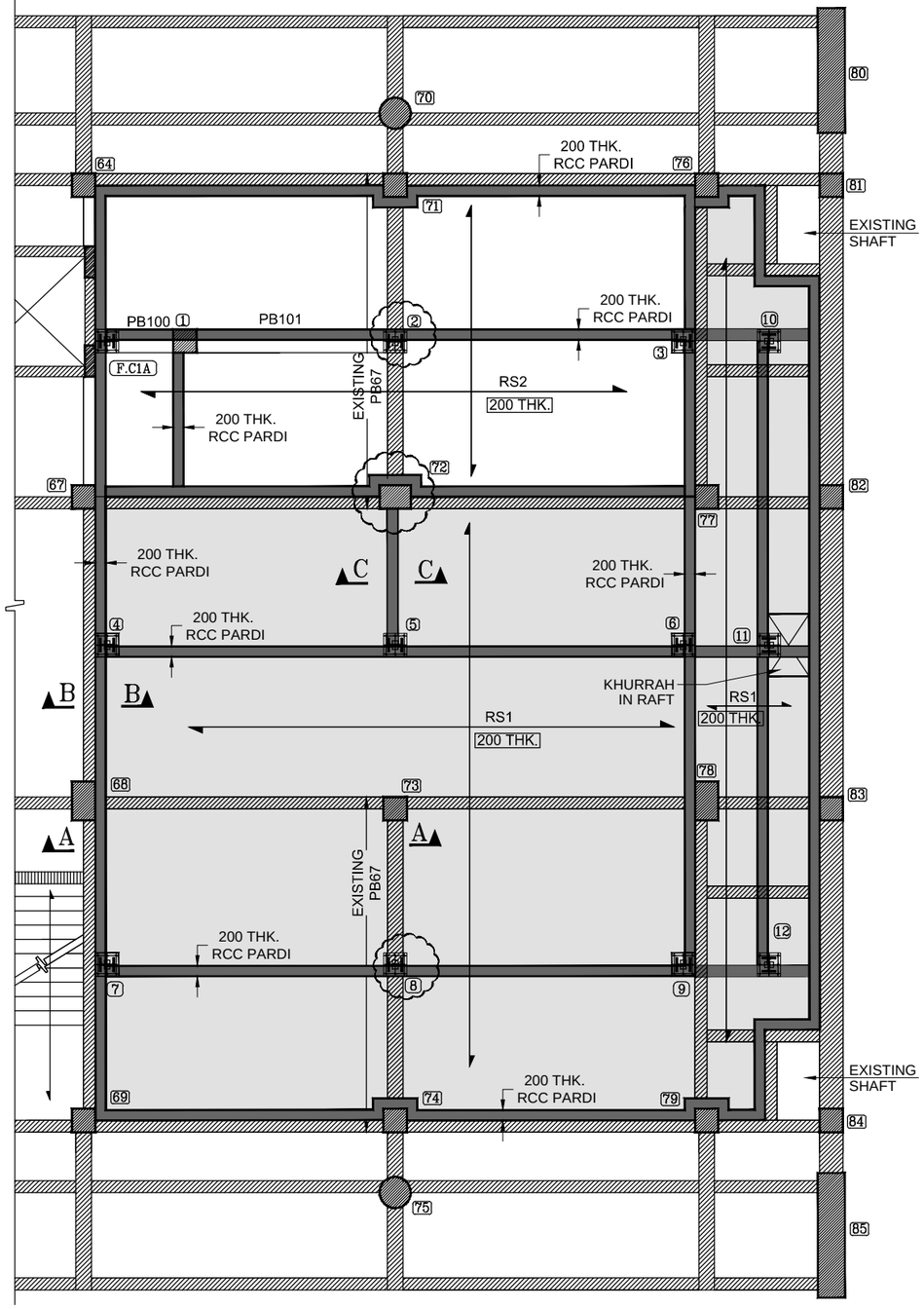
TENDER DRAWING

SCHEDULE OF BEAMS [AT PLINTH LEVEL]

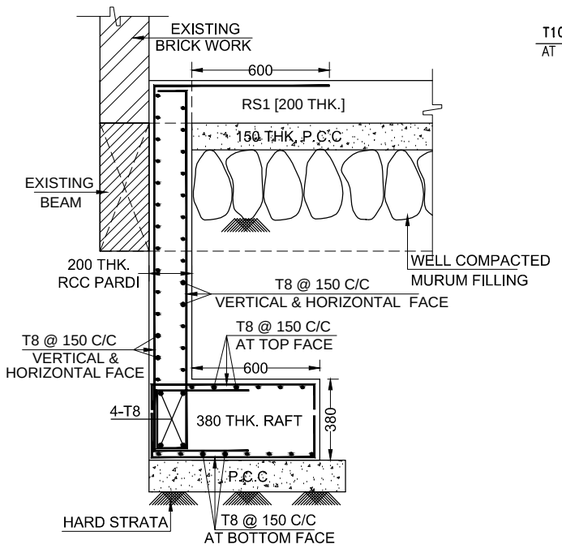
BEAM NOS.	BEAM SIZE [B X D]	BOTTOM REINFORCEMENT		TOP REINFORCEMENT		STIRRUPS		REMARKS
		FULL SPAN	CURTAILED CENTRALLY PLACED	FULL SPAN	EXTRA AT CONTINUOUS SUPPORT	DIA.	NOS. AND SPACING	
PB100	450X750	4–25 ϕ		4–25ϕ+4–25ϕ ON PINS		10ϕ	@ 100 C/C ALL OVER FOUR LEGGED STIRRUPS	CANTILEVER ⌐150 ¬150 PROVIDE CAMBER 13 4–25ϕ+4–25ϕ
PB101	450X750	4–25 ϕ		4–25ϕ+4–25ϕ ON PINS FROM PB1		8ϕ	@ 100 C/C ALL OVER FOUR LEGGED STIRRUPS	

SCHEDULE OF SLABS [AT RAFT SLAB LEVEL] [LIVE LOAD ASSUMED 15KN/M^2]

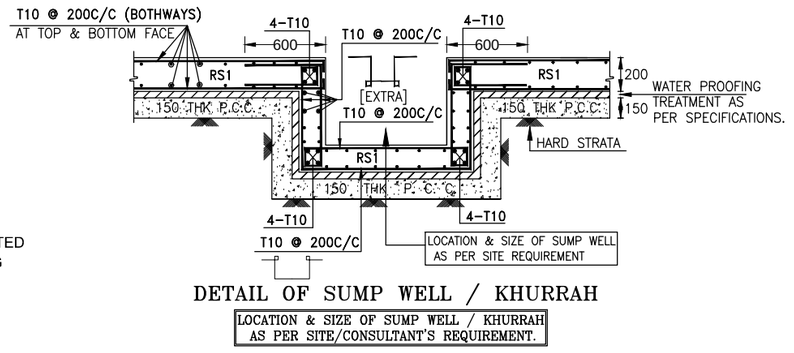
SLAB TYPE	SLAB Thk.	REINFORCEMENT ALONG			REMARKS
		SHORT SPAN	LONG SPAN		
RS1,RS2	200	10ϕ @ 200C/C THROUGH BAR	10ϕ @ 200C/C THROUGH BAR	AT TOP FACE	TWO WAY RAFT SLAB
		10ϕ @ 200C/C THROUGH BAR	10ϕ @ 200C/C THROUGH BAR	AT BOTTOM FACE	



PLINTH LEVEL PLAN



[SECTION B-B]

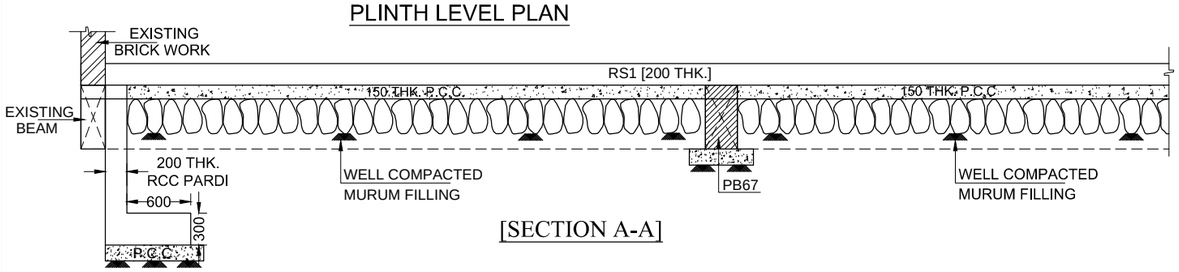


DETAIL OF SUMP WELL / KHURRAH

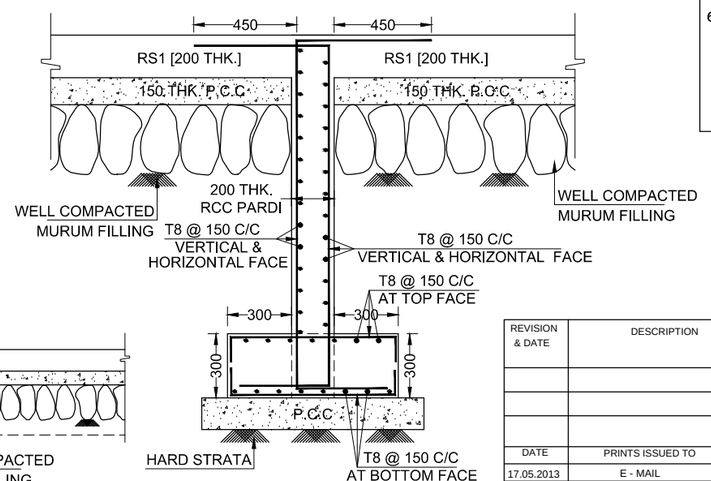
LOCATION & SIZE OF SUMP WELL / KHURRAH AS PER SITE/CONSULTANT'S REQUIREMENT.

NOTES =

1) EXPOSURE CONDITION–MILD
2) GRADE OF CONCRETE:
   i) COLUMNS = M25
   ii) BEAMS = M25
   AS PER DESIGN MIX.
4) PLEASE CHECK BEAM FACES WITH RESPECT TO COLUMN FACES AS PER ARCHITECTURAL WORKING DRAWINGS.
5) PROVIDE 150 END HOOKS [150⌐] FOR SLABS REINFORCEMENT COMPULSORY [AT DISCONTINUOUS END]
6) WHEN THE CANTILEVER BEAM AND ITS TIE BACK BEAM HAS A CONTINUITY AT OTHER END, PROVIDE EXTRA TOP REINFORCEMENT OVER CONTINUOUS SUPPORT BETWEEN TIE BACK BEAM AND ITS CONTINUOUS BEAM IF SHOWN IN SCHEDULE OF BEAMS.



[SECTION A-A]



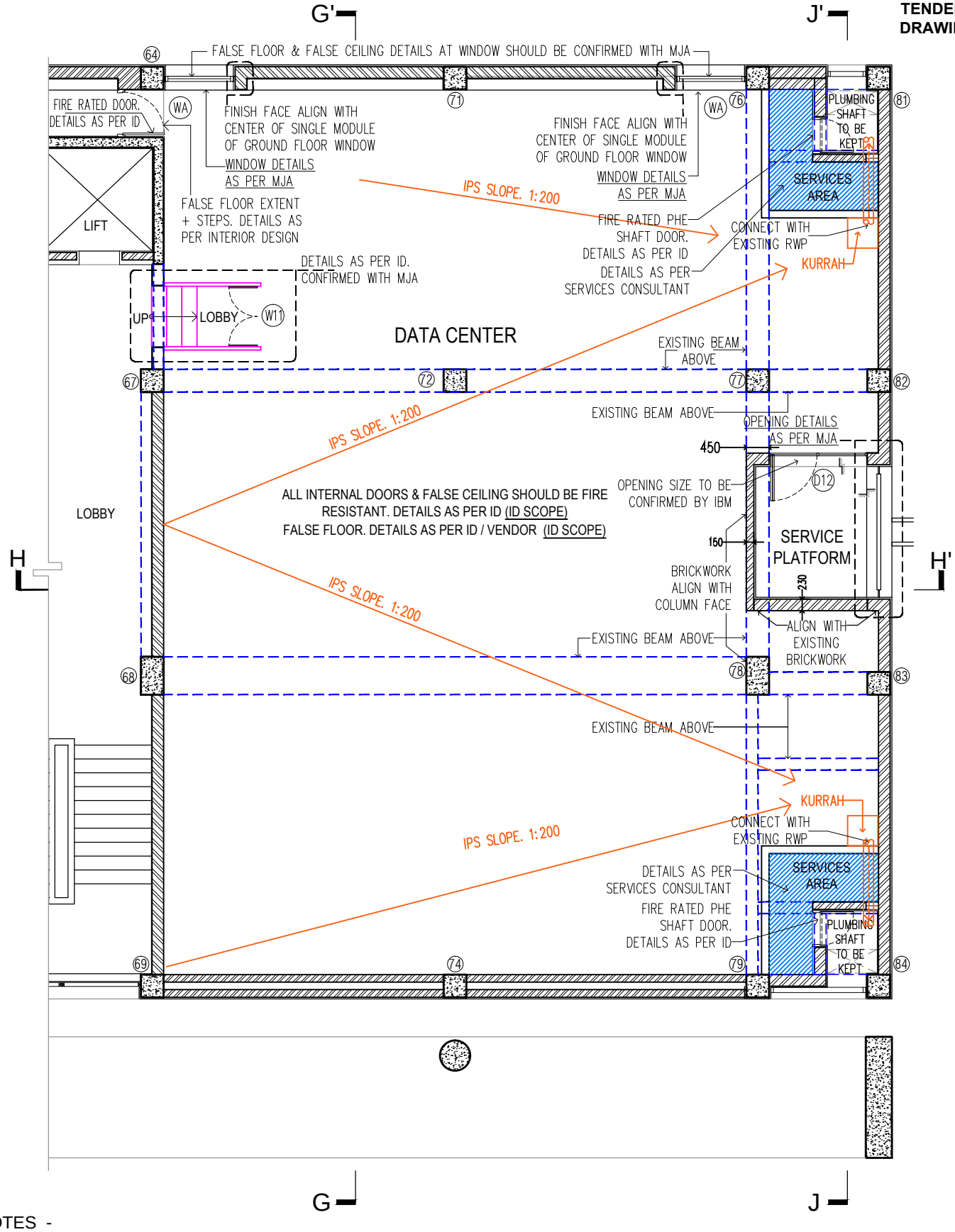
[SECTION C-C]

EXISTING STRUCTURE

STRENGTHENING OF EXISTING STRUCTURE
PLINTH LEVEL PLAN

REVISION & DATE	DESCRIPTION	RESPONSIBLE PARTY FOR CONSTRUCTION	PARTICULARS	PROPOSED (GROUND+2 UPPER FLOOR'S) CCCR BUILDING AT – PASHAN., PUNE.	
		-			
		SERVICES CONSULTANTS	JOB NO.	1248/10	G. A. BHILARE CONSULTANTS PVT. LTD. CONSULTING ENGINEERS I STRUCTURAL DESIGNERS CHARTERED ENGINEER I GOVT. REGD. VALUERS
		PLUMBING	DRG. NO.	BGA/CCC/STR 102	GAURINANDAN, PLOT NO.13, SHANTISHEELA SOCIETY, NEAR FTII, LAW COLLEGE ROAD, ERANDAWANE, PUNE 411004 Telefax : +91 20 2544 6001/2/3, www.gabcsl.com, Email: info@gabcsl.com
DATE	PRINTS ISSUED TO NOS	-			
17.05.2013	E - MAIL -	ELECTRICAL	REVISION	R0	ARCHITECT - MADHAV JOSHI & ASSOCIATES
20.05.2013	E - MAIL	-			
22.05.2013	E - MAIL	LANDSCAPE	DATE	04.04.2013	CLIENT - INSTITUTE OF TROPICAL METEREOLOGY , PUNE.
24.05.2013	E - MAIL	-			
		PROJECT MANAGEMENT CONSULTANTS	DRAWN BY	DESIGN BY	CHECKED BY / APPROVED BY
		-	YOGESH	AMOL	AJAY / G. A. B

TENDER DRAWING



NOTES -

1.VENDOR & CONSULTANT SHOULD CHECK ALL EXISTING SITE DIMENSIONS

2.VENDOR & CONSULTANT SHOULD CONSIDER INSTALLATION TOLERANCE WITH RESPECT TO EXISTING & PROPOSED STRUCTURE.

IMPORTANT
1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METERS, UNLESS OTHERWISE MENTIONED.
2. THE DRAWING IS NOT TO BE SCALED
3. THIS DRAWING IS TO READ IN CONJUNCTION WITH OTHER RELEVANT ARCHITECTURAL / ENGINEERING DRAWINGS.
4. DISCREPANCIES IF ANY SHOULD BE IMMEDIATELY BROUGHT TO THE NOTICE OF THE ARCHITECT

REVISIONS			
NO	DATE	DETAILS	

ISSUED TO			
NO.	DATED	ISSUED TO	
1	270513	IITM & HCEPL (MAIL FOR APPROVAL)	
2	030613	HCEPL (MAIL FOR TENDER)	

PROJECT
PROPOSED HPC II AT PASHAN, PUNE

CLIENT
INSTITUTE OF TROPICAL METEOROLOGY, PUNE

ARCHITECTS
MADHAV JOSHI AND ASSOCIATES
ARCHITECTS AND URBAN PLANNERS
FLAT NO. 08, MATRUSMURTY APT, PLOT NO 92, MAYUR COLONY, KOTHRUD, PUNE.

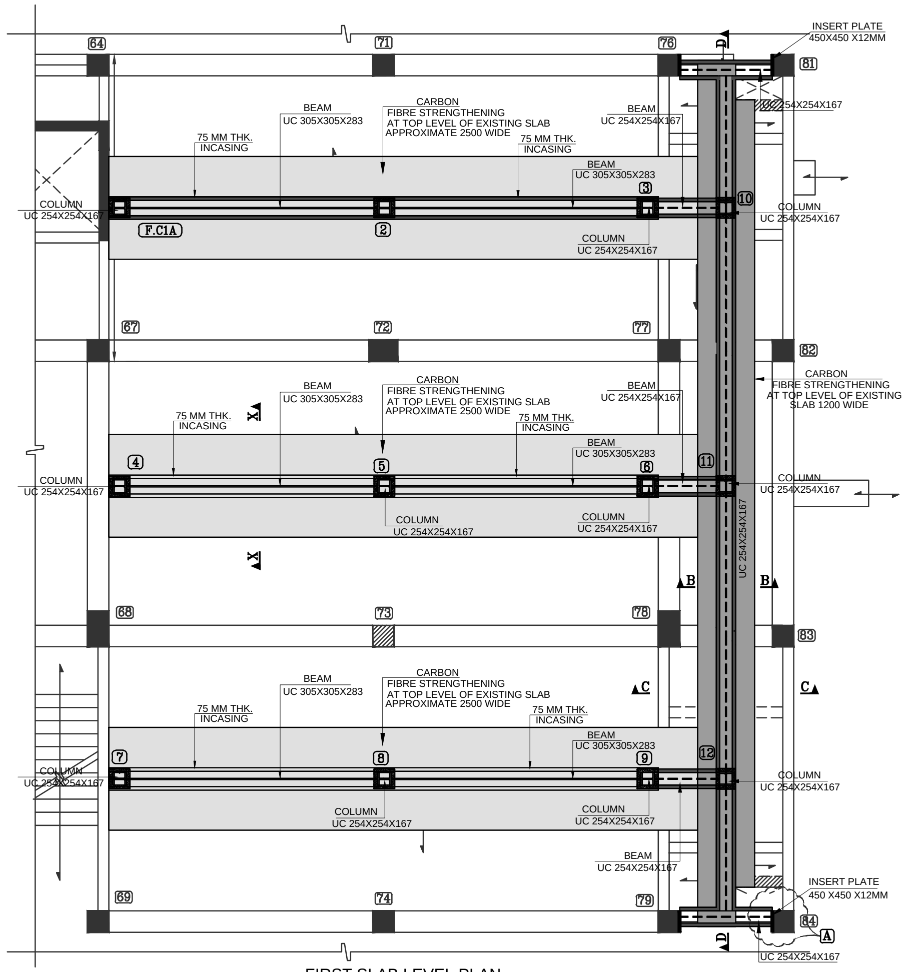
DRAWING TITLE
FIRST FLOOR PLAN

TENDER DRAWING

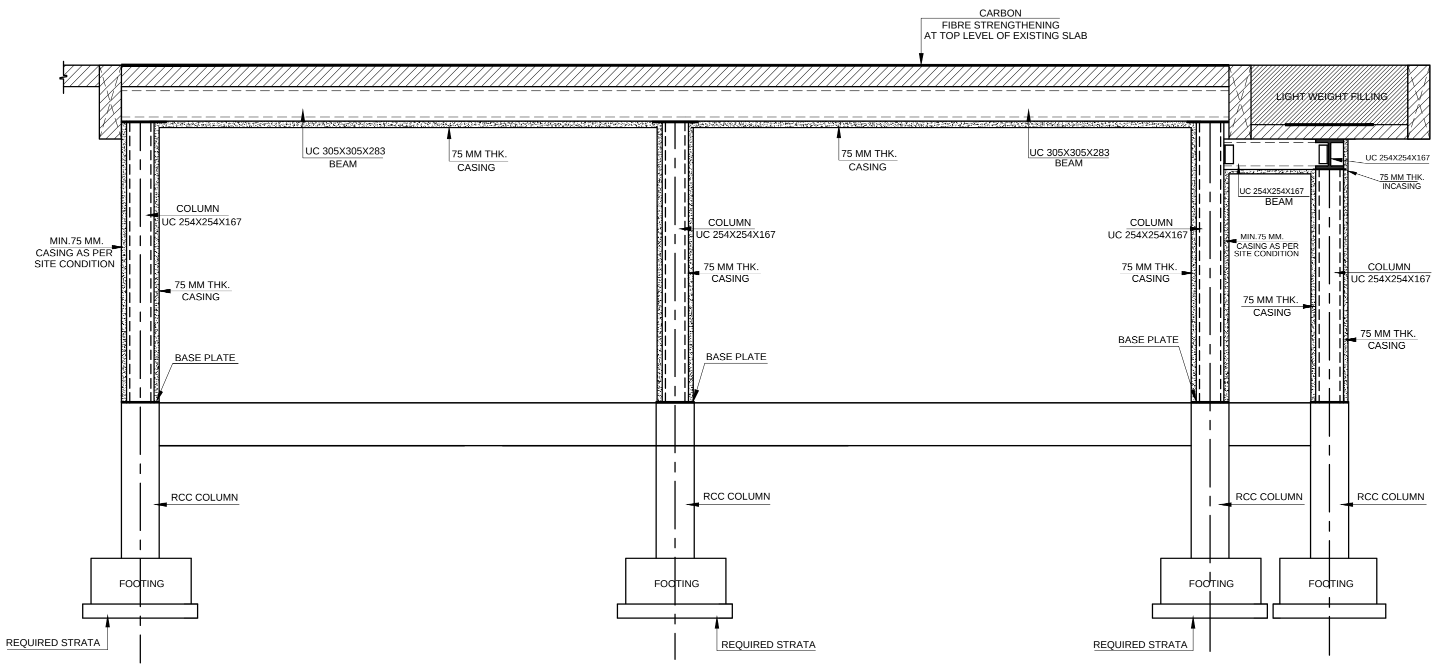
PROJECT NO.	DRAWING NO.	REVISION
0510	103	R0

SCALE	1:100
DATE	030613
DEALT	AH
CHECKED	

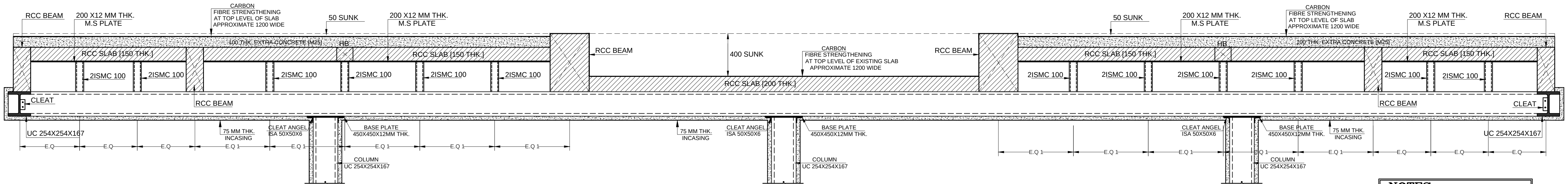
TENDER DRAWING



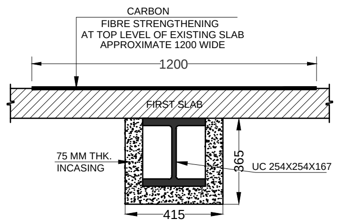
FIRST SLAB LEVEL PLAN



SECTIONAL ELEVATION

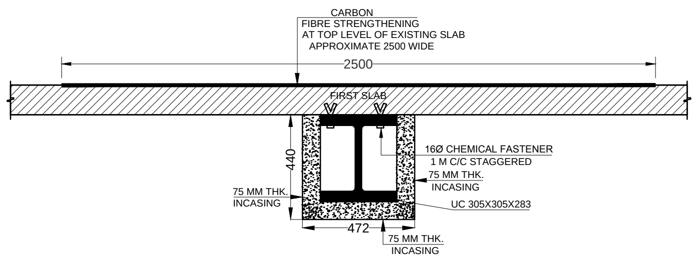


[SECTION D-D]



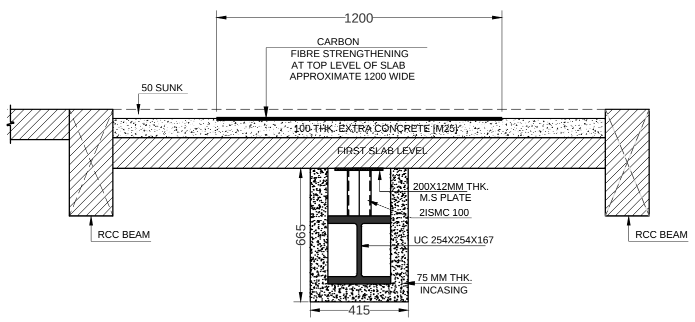
DETAILS OF BEAM

SECTION B-B

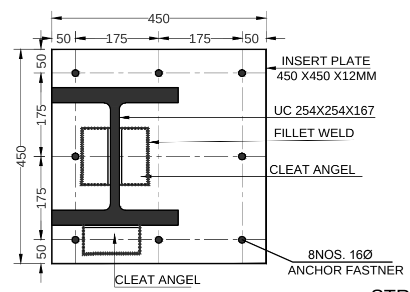


DETAILS OF BEAM

SECTION X-X



SECTION C-C



DETAILS OF INSERT PLATE

DETAIL - A

EXISTING STRUCTURE

NOTES :—

* ALL STRUCTURAL STEEL SHALL CONFIRM TO IS : 800–1984.
* WELDING SHALL CONFIRM TO IS : 816–1969.
* WELD LENGTH & SIZE OF GUSSET PLATE HAS NOT BEEN SPECIFIED IN THE DRAWINGS. THOSE WILL HAVE TO WORKED OUT AT THE TIME OF FABRICATION & MINIMUM WELD LENGTH 50 MM
* ALL STRUCTURES AFTER FABRICATION SHALL BE PAINTED BY ANTI CORROSIVE TREATMENT
* ALL WELDS ARE 6 MM THK. FILLET WELD.
* ALL DIMENSIONS ARE IN MILLIMETERS OTHERWISE SPECIFIED
* **ALL FABRICATION TO BE CHECKED BEFORE ERECTION BY STRUCTURAL ENGINEERS.**
* **ALL DIMENSION TO BE VERIFIED ON SITE BEFORE EXECUTION OF WORK.**
* THIS DRAWING IS TO READ IN CONJUNCTION WITH RELEVANT DRGS.
* IF IN DOUBT "ASK" DO NOT INTERPRETE.
* DO NOT SCALE THE DRAWING.

STRENGTHENING OF EXISTING STRUCTURE
FIRST SLAB LEVEL PLAN

REVISION & DATE	DESCRIPTION	

DATE	PRINTS ISSUED TO	NOS
04.04.2013	E - MAIL	
08.04.2013	SITE	03
16.04.2013	E - MAIL	
03.05.2013	SITE / E - MAIL	01
16.05.2013	E - MAIL	
22.05.2013	E - MAIL	
24.05.2013	E - MAIL	

RESPONSIBLE PARTY FOR CONSTRUCTION: -
SERVICES CONSULTANTS
PLUMBING: -
ELECTRICAL: -
LANDSCAPE: -
PROJECT MANAGEMENT CONSULTANTS: -

PARTICULARS: PROPOSED (GROUND+2 UPPER FLOOR'S) CCCR BUILDING AT – PASHAN., PUNE.

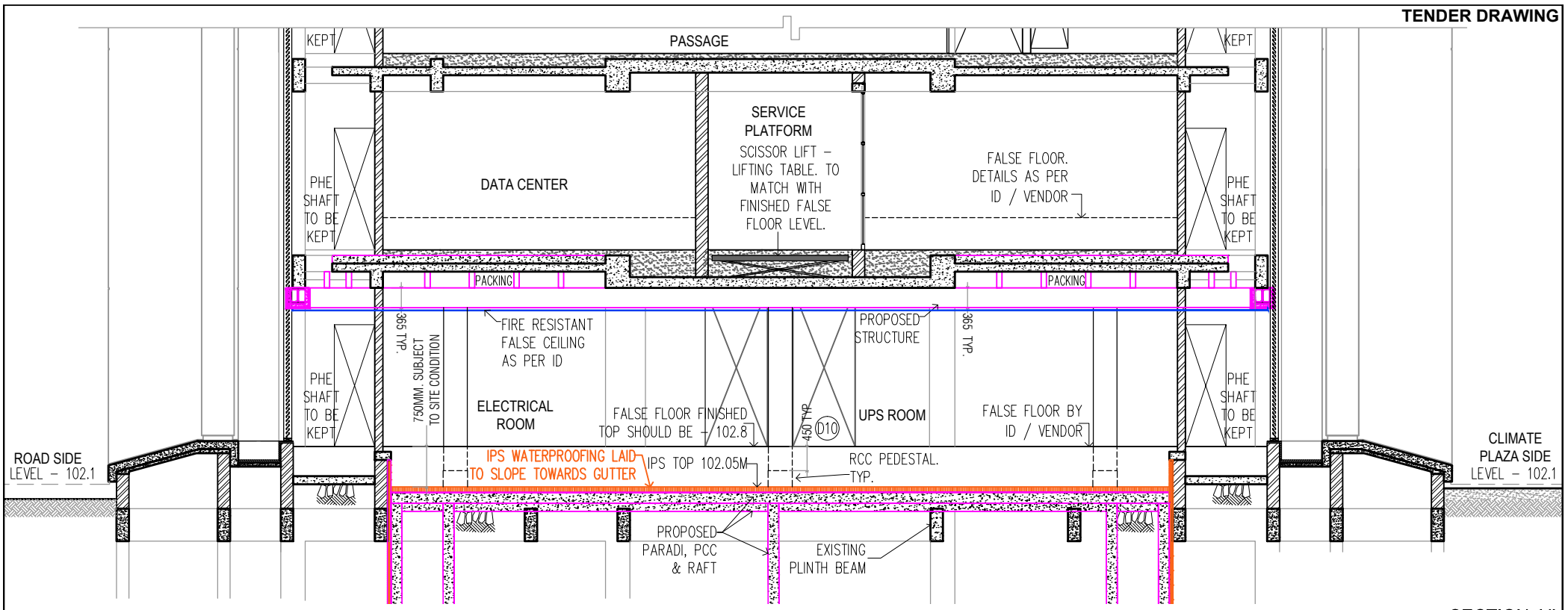
JOB NO. 1248/10
DRG. NO. BGA/CCC/STR 103
REVISION R0
DATE 04.04.2013

G. A. BHILARE CONSULTANTS PVT. LTD.
CONSULTING ENGINEERS I STRUCTURAL DESIGNERS
CHARTERED ENGINEER I GOVT. REGD. VALUERS
GAURINANDAN, PLOT NO.13, SHANTISHEELA SOCIETY, NEAR FTII, LAW COLLEGE ROAD, ERANDAWANE, PUNE 411004 Telefax : +91 20 2544 6001/2/3, www.gabcpl.com, Email: info@gabcpl.com

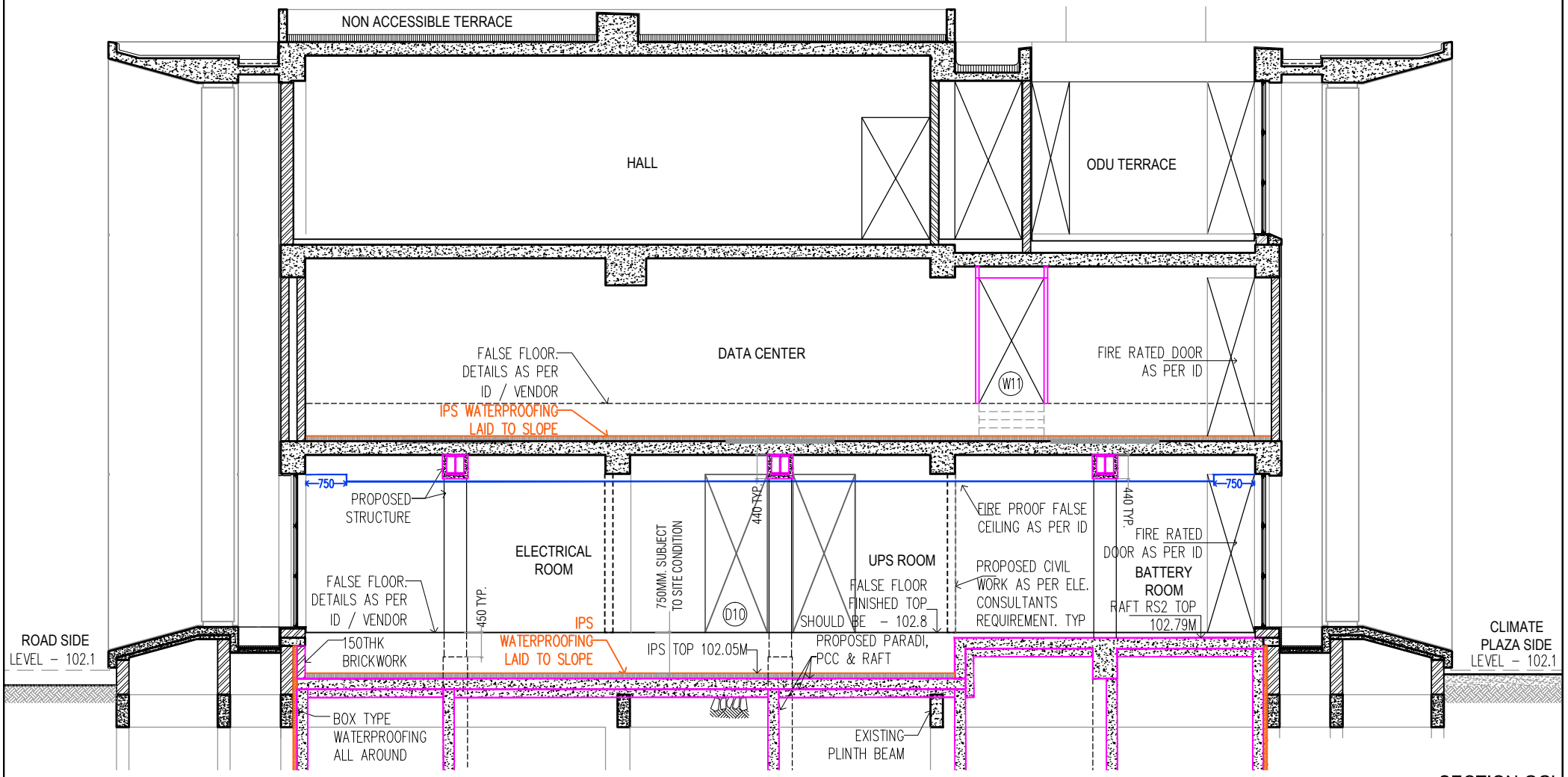
ARCHITECT - MADHAV JOSHI & ASSOCIATES
CLIENT - INSTITUTE OF TROPICAL METEREOLOGY , PUNE.

DRAWN BY	DESIGN BY	CHECKED BY	APPROVED BY
YOGESH	AMOL	AJAY	G. A. B

TENDER DRAWING



SECTION JJ'



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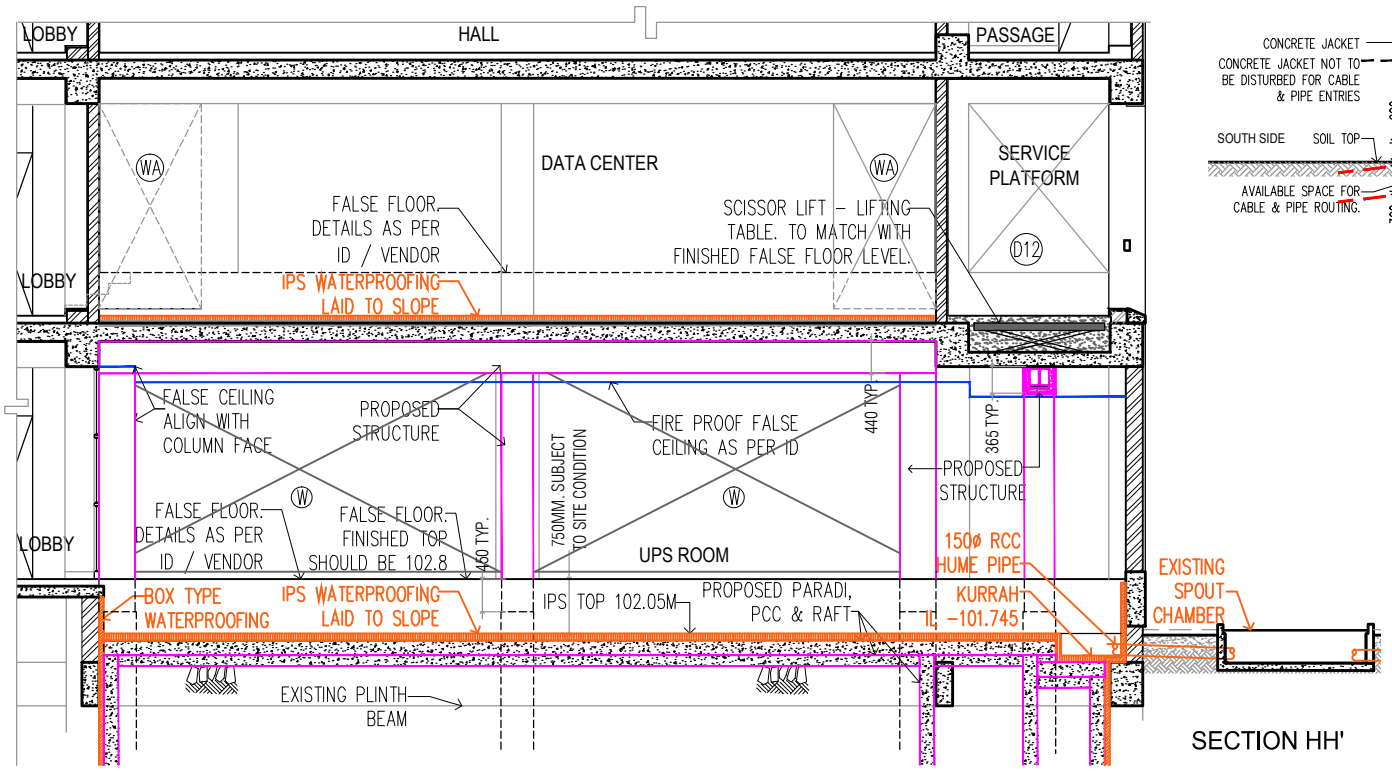
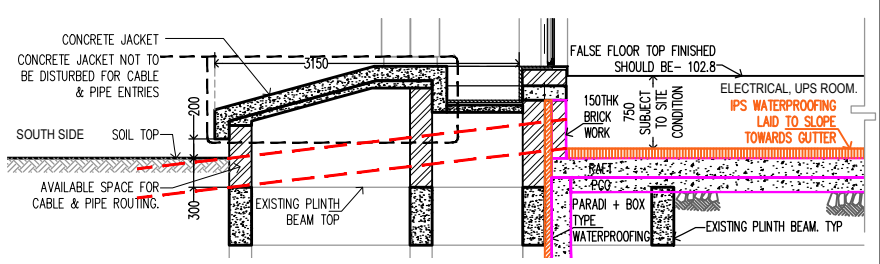


SECTION HH'



SECTION THROUGH CONCRETE JACKET (1:75)

NOTES -

1.VENDOR & CONSULTANT SHOULD CHECK ALL EXISTING SITE DIMENSIONS 2.VENDOR & CONSULTANT SHOULD CONSIDER INSTALLATION TOLERANCE WITH RESPECT TO EXISTING & PROPOSED STRUCTURE.

IMPORTANT
1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METERS, UNLESS OTHERWISE MENTIONED.
2. THE DRAWING IS NOT TO BE SCALED
3. THIS DRAWING IS TO READ IN CONJUNCTION WITH OTHER RELEVANT ARCHITECTURAL / ENGINEERING DRAWINGS.
4. DISCREPANCIES IF ANY SHOULD BE IMMEDIATELY BROUGHT TO THE NOTICE OF THE ARCHITECT

REVISIONS

NO	DATE	DETAILS

ISSUED TO

NO.	DATED	ISSUED TO
1	270513	IITM & HCEPL (MAIL FOR APPROVAL)
2	030613	HCEPL (MAIL FOR TENDER)

PROJECT
PROPOSED HPC II AT PASHAN, PUNE

CLIENT
INSTITUTE OF TROPICAL METEOROLOGY, PUNE

ARCHITECTS
MADHAV JOSHI AND ASSOCIATES
ARCHITECTS AND URBAN PLANNERS
FLAT NO. O8, MATRUSMURTY APT, PLOT NO 92, MAYUR COLONY, KOTHRUD, PUNE.

DRAWING TITLE
SECTIONS

TENDER DRAWING

PROJECT NO.	DRAWING NO.	REVISION
0510	104	R0
SCALE	1:100	
DATE	030613	
DEALT	AH	
CHECKED		

SUMMARY			
SECTION NO	DESCRIPTION	AMOUNT IN RS.	
		NUMBER	WORDS
1.00	DISMENTALLING & EARTH WORK		
2.00	STRUCTURAL STEEL WORK :		
3.00	ROOFING AND CLADDING		
4.00	PLAIN CEMENT CONCRETE		
5.00	REINFORCED CEMENT CONCRETE		
6.00	BRICK WORK		
7.00	WATER PROOFING		
8.00	PLASTERING AND POINTING		
9.00	DOOR, WINDOWS, VENTILATORS, GLAZING, ALUMINIUM LOUVERS		
10.0	EXTERNAL RCC HUME PIPES & CHEMBARS		
11.0	MISCELLENIOUS ITEMS		
	TOTAL		

BILL OF QUANTITY - HPC II - CIVIL WORKS - BUILDING STRENGTHENING & RENOVATION

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
1	**DISMENTALLING & EARTH WORK**					
1.1	Mass excavation in all types of soil [except rock which requires blasting] to any depth including disposal of the excavated soil out side the institute premises as directed with the use of mechanical equipments, supporting accessories, including all leads from site of work by mechanical transport and all lifts, including the cost of bailing out water from foundation trenches, pits etc. using engine and pump, and/or motor and pump, of suitable capacity including hire charges for machinery, erection cost, cost of fuel and oil, power, labour etc. complete as per the directions of the site in-charge.	1005.00	Cum			
1.2	Excavation for foundation in Hard murum including removing the excavated material upto a distance of 50 metres beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (Lift from 1.5 to 3.0 m.)	482.00	Cum			
1.3	Excavation for foundation in soft rock and old cement and lime masonry foundations including removing the excavated materials upto a distance of 50 metres beyond the building area and stacking as directed including dewatering preparing the bed for the foundation and necessary back filling with available earth murum, ramming, watering including shoring and strutting etc. complete. (Lift from 1.5m To 3.0 m.)	25.00	Cum			
1.4	Filling in plinth and floors with approved available excavated materials in 15 cm to 20 cm layers including watering and compaction with 10 to 12 Ton Power Roller maintaining optimum moisture and compacting up to 95 % of standard Proctor density etc. complete.	90.00	Cum.			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
1.5	Providing and laying dry rubble soiling up to any consolidated thickness of 230 mm as per specifications, including binding with soft murum / screened stone cheaps, compacting the same with power roller or vibratory compactor to the satisfaction of Engineer In Charge , including the cost of bailing out water from foundation trenches, pits etc using engine and pump, and/or motor and pump of suitable capacity including hire charges for machinery, errction cost, cost of fuel and oil, power, labour etc complete.	175.00	Cum			
1.6	Carrying away and disposing the excess and unusable excavated material by mechanical transport including loading, traspotation up to point of disposal, unloading, and levelling the same at point of disposal as directed, with all leads and lifts at all levels upto lead of 5.0 kms. etc. complete. (Spec. As directed by Engineer In Charge)	1512.00	Cum			
	TOTAL FOR EARTHWORK					
2	**STRUCTURAL STEEL WORK :**					
2.1	Supplying, fabricating and erecting structural steel as per drawings including all required material, labour, errection equipments, crains, tools, tackles, cutting, welding, consumables, wastage, assembly, bolts, chemical fasteners, anchor bolts Clamps, nuts, washers, scaffolding, working platforms at all heights etc. and two coats of zinc chromate primer and two coats of Synthetic enamel paint of approved make and shade to be applied before or after erection as directed after surface preparation by at site & wire brushing, preparation of fabrication drawings and obtaining approval well in advance from consultant or client as specified, all as per specifications and for following sub-items -					
2,1,1	For columns, beams, Portals, trusses, Plate Girder, Purlins, bracings, Tie beams, Sag rods, Cleats, Cladding runners, Gutter beams, etc.as per detailed design and drawing.	15.00	MT			
2.1.2	For Platforms, Trench covers as per detailed drawing and specification	2.00	MT			
	TOTAL FOR STRUCTURAL STEEL					

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
3.00	**ROOFING AND CLADDING**					
3.1	Providing and fixing in position, PVC downtake pipes including 50 mm. x 6 mm. clamps and bolts at every joint including coupling, bends, shoes etc. for the following items:					
3.1.1	150 mm. dia.	60.00	Rmt.			
	TOTAL FOR ROOFING AND CLADDING					
4.00	**PLAIN CEMENT CONCRETE**					
4.1	Providing and laying in situ, cement concrete in M 10 / 1:3:6 of trap/granite/quartzite/gneiss metal for foundation and bedding including bailing out water manually, formwork, compacting and curing.	9.00	Cum.			
4.2	Providing and laying in situ, cement concrete M15 /1:2:4 of trap/granite/quartzite/gneiss metal for foundation, Plinth protection and bedding including bailing out water manually, formwork, compacting and curing.	101.00	Cum.			
4.3	Providing and laying plum concrete in 60 % Cement concrete of 1:2:4 and 40 % boulders of size not exeeding 230 mm by manually laying the boulders in each alternate layers etc including bailing out water manually, formwork, compacting and curing. Complete	522.00	Cum			
	TOTAL FOR PLAIN CEMENT CONCRETE					
5.0	**REINFORCED CEMENT CONCRETE**					
	Use of Approved make and brand blendded fly ash as part replacement of cement in Mix design with in IS code specified limits shall be allowed. Use of Ready Mix Concrete shall not be considered unless mentioned separatlly.					
5.1	Providing and laying in situ cement concrete M-25 of trap/granite/quartzite/gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions including bailing out water manually formwork, compaction and curing roughening the surface if special finish is to be provided and curing etc complete	190.00	Cum.			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
5.2	Providing and casting in situ cement concrete M-25 of trap granite/quartzite/gneiss metal for R.C.C. Pedestals (Columns from footing top up to plinth) as per detailed designs and drawing or as directed including centering, formwork of plywood / steel, compacting finishing the formed surface with CM 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening the surface if special finish is to be provided and curing	18.00	Cum.			
5.3	Providing & casting in situ cement concrete M-25 of trap/granite/quartzite/ gneiss metal for R.C.C. Tie, plinth, roof beams and lintels at all heights as per detailed designs & drawings or as directed including centering, formwork of plywood / steel, compaction finishing the formed surface with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening the surface if special finish is to be provided & curing etc. complete.	5.00	Cum			
5.4	Providing and casting in situ cement concrete in M-20 of trap/granite/quartzite/gneiss metal for R.C.C. pardi at all heights and **up to 230 mm thick** including centering, formwork, compacting finishing the formed surface with CM 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing.	70.00	Cum			
5.5	Supplying and Fixing in position mild steel/ HYSD/TMT bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, balconies, staircase, newels, chajjas, lintels pardis, copings, fins, arches, Trimix etc. as per detailed designs, drawings and schedules including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required completed.	46.00	MT			
	TOTAL FOR RCC WORK					
6.00	**BRICK WORK**					
6.1	Providing second class Burnt Brick masonry at all heights with conventional / I.S. type bricks in cement mortar 1:6 in foundations and plinth of inner walls/in plinth external walls including bailing out water manually, striking joints on unexposed faces, raking out joints on exposed faces and watering Complete.	15.00	Cum			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
6.2	Providing flyash Bricks masonry 230 mm thick with fly ash bricks of size 230 x 100 x 75 mm in cement mortar 1:4 in superstructure including striking joints, raking out joints, watering and scaffolding complete.	10.00	Cum			
6.3	Providing flyash Bricks masonry 150 mm thick with fly ash bricks of size 230 x 150 x 75 mm thick in cement mortar 1:4 in single brick wall including RCC coping band with steel longitudinal reinforcement of 2 bars of 8 mm & stirrups of 6 mm diameterat every 1500 mm interval vertically, scaffolding, racking out joints and watering complete. (RCC Coping and steel reinforcement shall be paid separatly in BOQ items for RCC Coping & steel)	10.00	Sqm			
	TOTAL FOR BRICKWORK					
7.00	**WATER PROOFING**					
7.1	Providing and fixing 20 to 25 mm thick rough shahabad box type waterproofing treatment to verticle out side face of wall of basement or underground floor including filling the gap of 25 mm between rough shahabad and wall with cement grout mixed with waterproof liquid ulgiproof or equivalaent with one tile lift method brushing the joints horizontally with cement slurry mixed with water proofing liquid for width 30 to 35 mm and sloping coping over topmost tile with cement mortar 1 : 3 butting the bottom most with cement concrete 1:2:4 mixed with waterproof loiquid curing with 7 year guarantee with ponding test etc complete.	225.00	Sqm			
7.2	Providing & laying IPS M20 grade screed concrete of average 65 mm thick including laying, compacting, finishing the surface with CM 1:3 to give a smooth and even surface, making chequers at 300 mm C/C along both directions and curing etc. complete.	16.00	Cum			
	TOTAL FOR WATERPROOFING WORK.					
8.00	**PLASTERING AND POINTING**					
8.1	Providing internal cement plaster 6mm / 8 mm thick in a single coat in cement mortar 1:4 to ceilling and concrete surface in all positions including scaffolding and curing complete.	25.00	Sqm			
8.2	Providing internal cement plaster 12mm to 15 mm thick in single coat in cement mortar 1:4 to brick surfaces, in all positions including scaffolding and curing complete.	90.00	Sqm			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
8.3	Providing sand faced plaster externally on vertical building surfaces & soffits both, in cement mortar using Kharsalia/Kasaba or similar type of sand,in all positions including base coat of 15mm thick in C.M. 1:4 using waterproofing compound at 1kg.per cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8mm thick in C.M. 1:3 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.The surfaces shall be clearly defined by (i) 100(wide)x15 (deep) square groove at made up ground level & (ii)25 (wide)x10mm (deep) square grooves on building surface at varied levels as shown in architectural drawing.The grooves shall be of uniform width,straight and shall have clear,sharp edges as approved by the architects. Item shall be for all heights and shall be inclusive of groove battens, drip groove etc complete	25.00	Sqm			
8.4	Providing aggregate plaster to external wall faces of 30mm thick in two coats.First coat(base coat) of 15mm thick with one part cement and five part clean coarse sand,surface shall be combed with wire brush to proper bond for the top coat.It shall be kept damp for 48 hours before the application of the finishing coat.Finish coat of 15mm thick with one part cement and one and half part of crushed stone chips with proportion, shade, size of stone chips as approved by architects,(shade and size varying between 6 to 15mm).The finish surface shall be carefully pressed down with a flat torowel as much as possible after 6 to 8 hours.The finished surface shall show very little[10 to 15%]of matrix and maximum of exposed aggregates.The plaster shall be laid in panels of sizes as shown in architectural drawing.The panels shall be clearly defined by 10 to 15 mm.wide square grooves.The grooves shall be of uniform width,straight and shall have clear,sharp edges as approved by the architects.The finished surface shall be kept continuously wet for ten days....etc.complete. Item shall be for all heights and shall be inclusive of groove panel	50.00	Sqm			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
8.5	Providing and fixing about 30cm width chicken mesh of 22 gauge over external joints of R.C.C. member and brick wall of approved quality including fixing of mesh necessary nailing, drilling, tying etc. complete as directed.	25.00	Sqm			
	TOTAL PLASTERING AND POINTING					
9.00	**DOOR, WINDOWS, VENTILATORS, GLAZING, ALUMINIUM LOUVERS**					
	Refer Drawing of Door and window schedule and door and window details for all items of Door, window, ventilator, louvers. The aluminium sections, glass, anodizing, joinery, accessories, hardware etc shall be as per Architectural drawings.					
9.1	Supplying and fixing in position alluminium extruded sections anodized in approved shed and finish windows and ventilators including extruded subframe, extruded groove section and all necessary accesories like nylon encased stainless rollers, neoprine gasket, e max hinges, pigstay, locking arrangement of best & approved quality, handle, etc and providing drain holes to sections in situ where ever required etc complete as per Architechtural detailed drawings and Schedule of Doors & Windows for following sub items -					
9.1.1	Window	75.00	Sqm			
9.2	Supplying and fixing in position alluminium extruded sections anodized in approved shed and finish Doors including all necessary accesories like nylon encased stainless rollers, neoprine gasket, e max hinges, pigstay, floor springs, magnetic door stoper, locking arrangement of best & approved quality, handle, etc and providing drain holes to sections in situ where ever required etc complete (As per Architectural drawings) for following sub items -					
9.2.1	Door	6.75	Sqm			
	TOTAL FOR DOORS & WINDOWS					
10.00	**EXTERNAL RCC HUME PIPE LINES & CHEMBARS**					

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
10.1	Providing,laying, jointing and testing **socketed and spigotted RCC pipes** (NP2 class) conforming to IS:458 collars jointed with stiff mixture of cement mortar in the proporation of 1:2 (1 cement : 2 find sand) laid to correct levels below ground in trenches upto required depth including excavation in all kind of soil (hard / soft), dewatering, refilling, watering, ramming and removing the surplus excavated material and making good the same complete as required. Cost shall be inclusive of Providing and laying cement concrete 1:2:4 mix up to haunches of R.C.C.pipes including bed concrete 15 cms thick as per standard design & specification.					
10.1.1	300 mm dia R.C.C. Pipe	2500.00	Meter			
10.2	Providing & Constructing **brick masonry chamber** of following different dimensions as per detailed drawings & design up to maximum 3000 mm depth with Ist class bricks in cement mortar 1:5, With base of foundation PCC of M 15 Grade, inside and outside plastering 12 mm thick with cement mortar 1:3 finished with a floating coat of neat cement inside and rough plaster on outside and Providing 7 fixing in position Chembar top covers made in Precast RCC slabs of M 25 Grade and of maximum width of 600 mm & 100 mm thickness and Of required lengths as per dimensions of chembars and with proper arrangements for lifting as per standard design including excavation refilling, compaction and disposal of surplus earth, curing, cleaning, etc complete.					
10.2.1	Hume pipe connecting chembars of 2000 x 2000 x 1500 mm size	1.00	Each			
10.2.2	Hume pipe connecting chembars of 2000 x 2000 x 2000 mm size	5.00	Each			
10.2.3	Hume pipe connecting chembars of 2500 x 2500 x 2000 mm size	3.00	Each			
10.2.4	Hume pipe connecting chembars of 3000 x 2000 x 2000 mm size	13.00	Each			
10.2.5	Hume pipe connecting chembars of 3000 x 2500 x 2000 mm size	1.00	Each			
10.2.6	Hume pipe connecting chembars of 4000 x 2000 x 2000 mm size	1.00	Each			
10.2.7	Hume pipe connecting chembars of 4000 x 2500 x 2000 mm size	1.00	Each			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
10.3	**Part Demolition and reconstruction of existing brick masonry chamber** of following different dimensions as per instructions of Engineer In charge including excavation to expose the chemar, backfilling and compaction, disposal of surplus excavated stuff, Demolition & Removing the brick masonry chembar to the half depth of the chembar, and reconstructing the brick masonry chembar after the new pipes are laid & inserted, with redoing of inside and outside plaster in cement mortar 1:4, curing, cleaning, etc complete.					
10.3.1	Existing Hume pipe connecting chembars of 2000 x 2000 x 2000 mm size	11.00	Each			
10.4	Providing & fixing in position interlocking Precast RCC M 15 Grade Trench Covers of required legths and of maximum width 600 mm and 100 mm thickness with hook arrangements for lifting including all leads & lifts, trasport, fixing in place, levelling, alignment, curing, cleaning etc complete	100.00	Sqm			
	TOTAL FOR EXTERNAL RCC HUME PIPELINE & CHEMBARS					
11.0	**MISCLLENIOUS ITEMS**					
11.1	Dismentalling & demolition for following sub items including disposing off debris outside institute premices, and handing over back reusable stuff to institute as directed					
11.1.1	RCC Concrete of any grade	45.00	Cum			
11.1.2	Brick masonry	50.00	Cum			
11.1.3	Only Plaster internal & external to fix inserts	50.00	Sqmt			
11.1.4	Soiling	60.00	Cum			
11.1.5	Granite frame dado	10.00	Sqmt			
11.1.6	Flooring, Skirting & dado tile	75.00	Sqmt			
11.1.7	Elecrical ressways, conduits	100.00	Rmt			
11.1.8	Sanitary fixtures	18.00	Nos.			
11.1.9	UPVC Downtake pipes	60.00	Rmt			
11.1.10	Toilet door	2.00	nos			
11.2	Providing and laying in position 250 micron HDP sheet laid with hot air welded double seemed joints in both directions	275.00	Sqmt			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
11.3	P/F Carbon fibre membrane					
11.3.1	Chipping and removing the existing finishes such as POP, plaster etc. and grinding the concrete surface to remove cement Laitance and rounding off the edges as per consultants / manufacturer's specification	100.00	Sqmt			
11.3.2	THIN LAYER TFR - PM					
	Providing and applying a thin layer of Polymer modified single component thixotropic repair mortar Sikatop 122 HS or polymeric cementitious putty for levelling or coving of surfaces	100.00	Sqmt			
11.3.3	Fiber Wrapping Works					
	Providing and placing SIKA carbon wraps of required GSM on suitably prepared concrete substrate complete including application of primers, saturants and sprikling of sand as per manufacturer's specification and consultants direction. (Measurement basis will be the area of fiber consumed)					
	450 GSM Carbon Fiber - (SIKAWRAP 450C)	100.00	Sqm			
11.3.4	Carbon Fiber Anchors					
	Providing and installing carbon fiber anchors at locations as provided for in the drawings and as per directions of the EIC	100.00	Nos			
11.4	Providing & fixing in position fencing of required height made with Hot deep hot galvanized GI wire 10 Gauge thick and in diamond pattern mesh of size 50 X 50 mm, including Providing & errecting MS angle posts of size 50 x 50 x 6 mm, MS angles at every 2.5 mtr c/c and stays of size 50 x 50 x 6 mm, MS angles at every 15 mtr c/c and at all corners & junctions, including providing & fixing all posts & stays in cement Concrete bed blocks in PCC M 10 and of size 450 x 450 x 600 mm, including excavation, back filling, compaction, disposal of excess earth, hold fats for posts & stays, 6 mm steel bars & J hook for fixing chain link on posts, 4 mm GI wire one row at top and at bottom of fencing, all screws, nuts, bolts, hooks, binding, painting the MS angles with one coat of primer & two coats of approved synthetic enamle curing, cleaning etc complete	110.00	Sqm			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
11.5	Providing and fixing in position mild steel Openable Gate fabricated in MS Flat, Tee, hollow tube & square bright bars, weighing @ 35 kg/sqm as per architectural drawing, Including fabricating, side posts fabricated in MS Channels and gate fixed on posts with heavy duty MS Hinges with standard bearings, erecting, painting the grill work with one coat of anticorrosive paint and two coats of oil paint in matt finish with approved colour and shed as per detailed drawing etc. complete. (As per Architectural drawing)	8.00	Sqm			
	TOTAL FOR MISCLLENIOUS ITEMS					
	TOTAL FOR ALL SECTIONS					

COMMERCIAL BID

BOQ

SUMMARY			
SECTION NO	DESCRIPTION	AMOUNT IN RS.	
		NUMBER	WORDS
1.00	DISMENTALLING & EARTH WORK		
2.00	STRUCTURAL STEEL WORK :		
3.00	ROOFING AND CLADDING		
4.00	PLAIN CEMENT CONCRETE		
5.00	REINFORCED CEMENT CONCRETE		
6.00	BRICK WORK		
7.00	WATER PROOFING		
8.00	PLASTERING AND POINTING		
9.00	DOOR, WINDOWS, VENTILATORS, GLAZING, ALUMINIUM LOUVERS		
10.0	EXTERNAL RCC HUME PIPES & CHEMBARS		
11.0	MISCELLENIOUS ITEMS		
	TOTAL		

BILL OF QUANTITY - HPC II - CIVIL WORKS - BUILDING STRENGTHENING & RENOVATION

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
1	**DISMENTALLING & EARTH WORK**					
1.1	Mass excavation in all types of soil [except rock which requires blasting] to any depth including disposal of the excavated soil out side the institute premises as directed with the use of mechanical equipments, supporting accessories, including all leads from site of work by mechanical transport and all lifts, including the cost of bailing out water from foundation trenches, pits etc. using engine and pump, and/or motor and pump, of suitable capacity including hire charges for machinery, erection cost, cost of fuel and oil, power, labour etc. complete as per the directions of the site in-charge.	1005.00	Cum			
1.2	Excavation for foundation in Hard murum including removing the excavated material upto a distance of 50 metres beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (Lift from 1.5 to 3.0 m.)	482.00	Cum			
1.3	Excavation for foundation in soft rock and old cement and lime masonry foundations including removing the excavated materials upto a distance of 50 metres beyond the building area and stacking as directed including dewatering preparing the bed for the foundation and necessary back filling with available earth murum, ramming, watering including shoring and strutting etc. complete. (Lift from 1.5m To 3.0 m.)	25.00	Cum			
1.4	Filling in plinth and floors with approved available excavated materials in 15 cm to 20 cm layers including watering and compaction with 10 to 12 Ton Power Roller maintaining optimum moisture and compacting up to 95 % of standard Proctor density etc. complete.	90.00	Cum.			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
1.5	Providing and laying dry rubble soiling up to any consolidated thickness of 230 mm as per specifications, including binding with soft murum / screened stone cheaps, compacting the same with power roller or vibratory compactor to the satisfaction of Engineer In Charge , including the cost of bailing out water from foundation trenches, pits etc using engine and pump, and/or motor and pump of suitable capacity including hire charges for machinery, errction cost, cost of fuel and oil, power, labour etc complete.	175.00	Cum			
1.6	Carrying away and disposing the excess and unusable excavated material by mechanical transport including loading, traspotation up to point of disposal, unloading, and levelling the same at point of disposal as directed, with all leads and lifts at all levels upto lead of 5.0 kms. etc. complete. (Spec. As directed by Engineer In Charge)	1512.00	Cum			
	TOTAL FOR EARTHWORK					
2	**STRUCTURAL STEEL WORK :**					
2.1	Supplying, fabricating and erecting structural steel as per drawings including all required material, labour, errection equipments, crains, tools, tackles, cutting, welding, consumables, wastage, assembly, bolts, chemical fasteners, anchor bolts Clamps, nuts, washers, scaffolding, working platforms at all heights etc. and two coats of zinc chromate primer and two coats of Synthetic enamel paint of approved make and shade to be applied before or after erection as directed after surface preparation by at site & wire brushing, preparation of fabrication drawings and obtaining approval well in advance from consultant or client as specified, all as per specifications and for following sub-items -					
2,1,1	For columns, beams, Portals, trusses, Plate Girder, Purlins, bracings, Tie beams, Sag rods, Cleats, Cladding runners, Gutter beams, etc.as per detailed design and drawing.	15.00	MT			
2.1.2	For Platforms, Trench covers as per detailed drawing and specification	2.00	MT			
	TOTAL FOR STRUCTURAL STEEL					

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
3.00	**ROOFING AND CLADDING**					
3.1	Providing and fixing in position, PVC downtake pipes including 50 mm. x 6 mm. clamps and bolts at every joint including coupling, bends, shoes etc. for the following items:					
3.1.1	150 mm. dia.	60.00	Rmt.			
	TOTAL FOR ROOFING AND CLADDING					
4.00	**PLAIN CEMENT CONCRETE**					
4.1	Providing and laying in situ, cement concrete in M 10 / 1:3:6 of trap/granite/quartzite/gneiss metal for foundation and bedding including bailing out water manually, formwork, compacting and curing.	9.00	Cum.			
4.2	Providing and laying in situ, cement concrete M15 /1:2:4 of trap/granite/quartzite/gneiss metal for foundation, Plinth protection and bedding including bailing out water manually, formwork, compacting and curing.	101.00	Cum.			
4.3	Providing and laying plum concrete in 60 % Cement concrete of 1:2:4 and 40 % boulders of size not exeeding 230 mm by manually laying the boulders in each alternate layers etc including bailing out water manually, formwork, compacting and curing. Complete	522.00	Cum			
	TOTAL FOR PLAIN CEMENT CONCRETE					
5.0	**REINFORCED CEMENT CONCRETE**					
	Use of Approved make and brand blendded fly ash as part replacement of cement in Mix design with in IS code specified limits shall be allowed. Use of Ready Mix Concrete shall not be considered unless mentioned separatlly.					
5.1	Providing and laying in situ cement concrete M-25 of trap/granite/quartzite/gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions including bailing out water manually formwork, compaction and curing roughening the surface if special finish is to be provided and curing etc complete	190.00	Cum.			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
5.2	Providing and casting in situ cement concrete M-25 of trap granite/quartzite/gneiss metal for R.C.C. Pedestals (Columns from footing top up to plinth) as per detailed designs and drawing or as directed including centering, formwork of plywood / steel, compacting finishing the formed surface with CM 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening the surface if special finish is to be provided and curing	18.00	Cum.			
5.3	Providing & casting in situ cement concrete M-25 of trap/granite/quartzite/ gneiss metal for R.C.C. Tie, plinth, roof beams and lintels at all heights as per detailed designs & drawings or as directed including centering, formwork of plywood / steel, compaction finishing the formed surface with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening the surface if special finish is to be provided & curing etc. complete.	5.00	Cum			
5.4	Providing and casting in situ cement concrete in M-20 of trap/granite/quartzite/gneiss metal for R.C.C. pardi at all heights and **up to 230 mm thick** including centering, formwork, compacting finishing the formed surface with CM 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing.	70.00	Cum			
5.5	Supplying and Fixing in position mild steel/ HYSD/TMT bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, balconies, staircase, newels, chajjas, lintels pardis, copings, fins, arches, Trimix etc. as per detailed designs, drawings and schedules including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required completed.	46.00	MT			
	TOTAL FOR RCC WORK					
6.00	**BRICK WORK**					
6.1	Providing second class Burnt Brick masonry at all heights with conventional / I.S. type bricks in cement mortar 1:6 in foundations and plinth of inner walls/in plinth external walls including bailing out water manually, striking joints on unexposed faces, raking out joints on exposed faces and watering Complete.	15.00	Cum			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
6.2	Providing flyash Bricks masonry 230 mm thick with fly ash bricks of size 230 x 100 x 75 mm in cement mortar 1:4 in superstructure including striking joints, raking out joints, watering and scaffolding complete.	10.00	Cum			
6.3	Providing flyash Bricks masonry 150 mm thick with fly ash bricks of size 230 x 150 x 75 mm thick in cement mortar 1:4 in single brick wall including RCC coping band with steel longitudinal reinforcement of 2 bars of 8 mm & stirrups of 6 mm diameterat every 1500 mm interval vertically, scaffolding, racking out joints and watering complete. (RCC Coping and steel reinforcement shall be paid separatly in BOQ items for RCC Coping & steel)	10.00	Sqm			
	TOTAL FOR BRICKWORK					
7.00	**WATER PROOFING**					
7.1	Providing and fixing 20 to 25 mm thick rough shahabad box type waterproofing treatment to verticle out side face of wall of basement or underground floor including filling the gap of 25 mm between rough shahabad and wall with cement grout mixed with waterproof liquid ulgiproof or equivalaent with one tile lift method brushing the joints horizontally with cement slurry mixed with water proofing liquid for width 30 to 35 mm and sloping coping over topmost tile with cement mortar 1 : 3 butting the bottom most with cement concrete 1:2:4 mixed with waterproof loiquid curing with 7 year guarantee with ponding test etc complete.	225.00	Sqm			
7.2	Providing & laying IPS M20 grade screed concrete of average 65 mm thick including laying, compacting, finishing the surface with CM 1:3 to give a smooth and even surface, making chequers at 300 mm C/C along both directions and curing etc. complete.	16.00	Cum			
	TOTAL FOR WATERPROOFING WORK.					
8.00	**PLASTERING AND POINTING**					
8.1	Providing internal cement plaster 6mm / 8 mm thick in a single coat in cement mortar 1:4 to ceilling and concrete surface in all positions including scaffolding and curing complete.	25.00	Sqm			
8.2	Providing internal cement plaster 12mm to 15 mm thick in single coat in cement mortar 1:4 to brick surfaces, in all positions including scaffolding and curing complete.	90.00	Sqm			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
8.3	Providing sand faced plaster externally on vertical building surfaces & soffits both, in cement mortar using Kharsalia/Kasaba or similar type of sand,in all positions including base coat of 15mm thick in C.M. 1:4 using waterproofing compound at 1kg.per cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8mm thick in C.M. 1:3 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.The surfaces shall be clearly defined by (i) 100(wide)x15 (deep) square groove at made up ground level & (ii)25 (wide)x10mm (deep) square grooves on building surface at varied levels as shown in architectural drawing.The grooves shall be of uniform width,straight and shall have clear,sharp edges as approved by the architects. Item shall be for all heights and shall be inclusive of groove battens, drip groove etc complete	25.00	Sqm			
8.4	Providing aggregate plaster to external wall faces of 30mm thick in two coats.First coat(base coat) of 15mm thick with one part cement and five part clean coarse sand,surface shall be combed with wire brush to proper bond for the top coat.It shall be kept damp for 48 hours before the application of the finishing coat.Finish coat of 15mm thick with one part cement and one and half part of crushed stone chips with proportion, shade, size of stone chips as approved by architects,(shade and size varying between 6 to 15mm).The finish surface shall be carefully pressed down with a flat torowel as much as possible after 6 to 8 hours.The finished surface shall show very little[10 to 15%]of matrix and maximum of exposed aggregates.The plaster shall be laid in panels of sizes as shown in architectural drawing.The panels shall be clearly defined by 10 to 15 mm.wide square grooves.The grooves shall be of uniform width,straight and shall have clear,sharp edges as approved by the architects.The finished surface shall be kept continuously wet for ten days....etc.complete. Item shall be for all heights and shall be inclusive of groove panel	50.00	Sqm			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
8.5	Providing and fixing about 30cm width chicken mesh of 22 gauge over external joints of R.C.C. member and brick wall of approved quality including fixing of mesh necessary nailing, drilling, tying etc. complete as directed.	25.00	Sqm			
	TOTAL PLASTERING AND POINTING					
9.00	**DOOR, WINDOWS, VENTILATORS, GLAZING, ALUMINIUM LOUVERS**					
	Refer Drawing of Door and window schedule and door and window details for all items of Door, window, ventilator, louvers. The aluminium sections, glass, anodizing, joinery, accessories, hardware etc shall be as per Architectural drawings.					
9.1	Supplying and fixing in position alluminium extruded sections anodized in approved shed and finish windows and ventilators including extruded subframe, extruded groove section and all necessary accesories like nylon encased stainless rollers, neoprine gasket, e max hinges, pigstay, locking arrangement of best & approved quality, handle, etc and providing drain holes to sections in situ where ever required etc complete as per Architechtural detailed drawings and Schedule of Doors & Windows for following sub items -					
9.1.1	Window	75.00	Sqm			
9.2	Supplying and fixing in position alluminium extruded sections anodized in approved shed and finish Doors including all necessary accesories like nylon encased stainless rollers, neoprine gasket, e max hinges, pigstay, floor springs, magnetic door stoper, locking arrangement of best & approved quality, handle, etc and providing drain holes to sections in situ where ever required etc complete (As per Architectural drawings) for following sub items -					
9.2.1	Door	6.75	Sqm			
	TOTAL FOR DOORS & WINDOWS					
10.00	**EXTERNAL RCC HUME PIPE LINES & CHEMBARS**					

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
10.1	Providing,laying, jointing and testing **socketed and spigotted RCC pipes** (NP2 class) conforming to IS:458 collars jointed with stiff mixture of cement mortar in the proporation of 1:2 (1 cement : 2 find sand) laid to correct levels below ground in trenches upto required depth including excavation in all kind of soil (hard / soft), dewatering, refilling, watering, ramming and removing the surplus excavated material and making good the same complete as required. Cost shall be inclusive of Providing and laying cement concrete 1:2:4 mix up to haunches of R.C.C.pipes including bed concrete 15 cms thick as per standard design & specification.					
10.1.1	300 mm dia R.C.C. Pipe	2500.00	Meter			
10.2	Providing & Constructing **brick masonry chamber** of following different dimensions as per detailed drawings & design up to maximum 3000 mm depth with Ist class bricks in cement mortar 1:5, With base of foundation PCC of M 15 Grade, inside and outside plastering 12 mm thick with cement mortar 1:3 finished with a floating coat of neat cement inside and rough plaster on outside and Providing 7 fixing in position Chembar top covers made in Precast RCC slabs of M 25 Grade and of maximum width of 600 mm & 100 mm thickness and Of required lengths as per dimensions of chembars and with proper arrangements for lifting as per standard design including excavation refilling, compaction and disposal of surplus earth, curing, cleaning, etc complete.					
10.2.1	Hume pipe connecting chembars of 2000 x 2000 x 1500 mm size	1.00	Each			
10.2.2	Hume pipe connecting chembars of 2000 x 2000 x 2000 mm size	5.00	Each			
10.2.3	Hume pipe connecting chembars of 2500 x 2500 x 2000 mm size	3.00	Each			
10.2.4	Hume pipe connecting chembars of 3000 x 2000 x 2000 mm size	13.00	Each			
10.2.5	Hume pipe connecting chembars of 3000 x 2500 x 2000 mm size	1.00	Each			
10.2.6	Hume pipe connecting chembars of 4000 x 2000 x 2000 mm size	1.00	Each			
10.2.7	Hume pipe connecting chembars of 4000 x 2500 x 2000 mm size	1.00	Each			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
10.3	**Part Demolition and reconstruction of existing brick masonry chamber** of following different dimensions as per instructions of Engineer In charge including excavation to expose the chemar, backfilling and compaction, disposal of surplus excavated stuff, Demolition & Removing the brick masonry chembar to the half depth of the chembar, and reconstructing the brick masonry chembar after the new pipes are laid & inserted, with redoing of inside and outside plaster in cement mortar 1:4, curing, cleaning, etc complete.					
10.3.1	Existing Hume pipe connecting chembars of 2000 x 2000 x 2000 mm size	11.00	Each			
10.4	Providing & fixing in position interlocking Precast RCC M 15 Grade Trench Covers of required legths and of maximum width 600 mm and 100 mm thickness with hook arrangements for lifting including all leads & lifts, trasport, fixing in place, levelling, alignment, curing, cleaning etc complete	100.00	Sqm			
	TOTAL FOR EXTERNAL RCC HUME PIPELINE & CHEMBARS					
11.0	**MISCLLENIOUS ITEMS**					
11.1	Dismentalling & demolition for following sub items including disposing off debris outside institute premices, and handing over back reusable stuff to institute as directed					
11.1.1	RCC Concrete of any grade	45.00	Cum			
11.1.2	Brick masonry	50.00	Cum			
11.1.3	Only Plaster internal & external to fix inserts	50.00	Sqmt			
11.1.4	Soiling	60.00	Cum			
11.1.5	Granite frame dado	10.00	Sqmt			
11.1.6	Flooring, Skirting & dado tile	75.00	Sqmt			
11.1.7	Elecrical ressways, conduits	100.00	Rmt			
11.1.8	Sanitary fixtures	18.00	Nos.			
11.1.9	UPVC Downtake pipes	60.00	Rmt			
11.1.10	Toilet door	2.00	nos			
11.2	Providing and laying in position 250 micron HDP sheet laid with hot air welded double seemed joints in both directions	275.00	Sqmt			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
11.3	P/F Carbon fibre membrane					
11.3.1	Chipping and removing the existing finishes such as POP, plaster etc. and grinding the concrete surface to remove cement Laitance and rounding off the edges as per consultants / manufacturer's specification	100.00	Sqmt			
11.3.2	THIN LAYER TFR - PM					
	Providing and applying a thin layer of Polymer modified single component thixotropic repair mortar Sikatop 122 HS or polymeric cementitious putty for levelling or coving of surfaces	100.00	Sqmt			
11.3.3	Fiber Wrapping Works					
	Providing and placing SIKA carbon wraps of required GSM on suitably prepared concrete substrate complete including application of primers, saturants and sprikling of sand as per manufacturer's specification and consultants direction. (Measurement basis will be the area of fiber consumed)					
	450 GSM Carbon Fiber - (SIKAWRAP 450C)	100.00	Sqm			
11.3.4	Carbon Fiber Anchors					
	Providing and installing carbon fiber anchors at locations as provided for in the drawings and as per directions of the EIC	100.00	Nos			
11.4	Providing & fixing in position fencing of required height made with Hot deep hot galvanized GI wire 10 Gauge thick and in diamond pattern mesh of size 50 X 50 mm, including Providing & errecting MS angle posts of size 50 x 50 x 6 mm, MS angles at every 2.5 mtr c/c and stays of size 50 x 50 x 6 mm, MS angles at every 15 mtr c/c and at all corners & junctions, including providing & fixing all posts & stays in cement Concrete bed blocks in PCC M 10 and of size 450 x 450 x 600 mm, including excavation, back filling, compaction, disposal of excess earth, hold fats for posts & stays, 6 mm steel bars & J hook for fixing chain link on posts, 4 mm GI wire one row at top and at bottom of fencing, all screws, nuts, bolts, hooks, binding, painting the MS angles with one coat of primer & two coats of approved synthetic enamle curing, cleaning etc complete	110.00	Sqm			

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT RS. (IN NUMBER)	AMOUNT RS. (IN WORDS)
11.5	Providing and fixing in position mild steel Openable Gate fabricated in MS Flat, Tee, hollow tube & square bright bars, weighing @ 35 kg/sqm as per architectural drawing, Including fabricating, side posts fabricated in MS Channels and gate fixed on posts with heavy duty MS Hinges with standard bearings, erecting, painting the grill work with one coat of anticorrosive paint and two coats of oil paint in matt finish with approved colour and shed as per detailed drawing etc. complete. (As per Architectural drawing)	8.00	Sqm			
	TOTAL FOR MISCLLENIOUS ITEMS					
	TOTAL FOR ALL SECTIONS					