Indian Institute of Information Technology Sri City, Chittoor

NOTICE INVITING TENDER
[Technical bid and Price bid system – CPP Portal mode]
NIT N0: **IIITS/NIT/MAIN GATE COMPLEX/2024/025, Dt. 08/08/2024.**

Notice inviting E-Tenders through CPP Portal from eligibility bidders under two bid systems (Technical bid and Financial bid) for the work "**Construction of Main Entrance Gate Complex and short length Boundary Wall on both sides at IIIT Sri City Campus"** addressed to the Registrar, IIIT Sri City, Chittoor along with all specified documents**.**

Name of the work	**Construction of Main Entrance Gate Complex and short length Boundary Wall on both sides at IIIT Sri City Campus**
Bid Published Date	08 August 2024
Bid Download Start Date & Time	08 August 2024 at 16:00 Hrs
Seek Clarification Start Date & Time	08 August 2024 at 16:00 Hrs
Seek Clarifications End Date & Time [through mail only]	15 August 2024 up to 17:00 Hrs
Pre-bid Meeting [Hybrid Mode]	16 August 2024 at 11:00 Hrs
Last Date for submission of e-bids	21 August 2024 up to 16:00 Hrs
Due Date for opening of e-bids	22 August 2024 at 16:00 Hrs
Submission of offer	E-Tender in Two bid System through CPP Portal ENVELOPE 1: Technical Bid ENVELOPE 2: Financial Bid
Address for submission	**E-Tender through CPP Portal only** https://etenders.gov.in/eprocure/app
Earnest Money Deposit (EMD)	The Earnest Money Deposit amounting to 3% of the bid value must be deposited through RTGS / NEFT to IIIT Sri City Chittoor Opex Account. (Bank details are available in Page 3)

PART – I
TECHNICAL BID

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PART – II
PRICE BID

Bidders to Refer/use the online CPP Portal BOQ for Pricing

GENERAL CONDITIONS OF CONTRACT

IIIT Sri City invites online tenders in two cover system from the eligible / resourceful agencies:

1. Tender Documents: The interested parties may download the tender document from websites https://etenders.gov.in/eprocure/app and https://www.iiits.ac.in/tenders
2. Bidders are advised to visit the website frequently to find any addendum, corrigendum issued, extension of due date for submission, etc. No separate intimation will be issued or advertised in this regard.
3. You are requested to go through the terms and conditions carefully and also visit / inspect the site to familiarize and submit your tender as per procedure explained in the tender document.
4. The tenderer(s) if required, may submit queries, if any, through E-mail to tenders.2024@iiits.in to seek clarifications. IIIT Sri City will reply only those queries which are essentially required for the submission of bids.

5. IIIT Sri City will not reply the queries which are not considered fit like replies of which can be implied /found in the NIT/ Tender Documents or which are not relevant or in contravention to NIT/Tender Documents or queries received after stipulated, extension of time for opening of technical bids, etc.

6. Technical Bids will be open on the scheduled dates. Requests for extension of opening of Technical Bids will not be entertained.

7. **Earnest Money Deposit:**
   The Earnest Money Deposit amounting to 3% (Three Percentage only) of the bid value must be credited in the form of NEFT/RTGS to "IIIT Sri City Chittoor Opex Account" (A/c. No. 110167506587, IFSC Code CNRB0013247 - Sri City, Opp. Sri City Business Center, Chittoor District, AP - 517 588.

   All the bidders participating in the tender shall remit the EMD. There is NO exemption to any category. Bids that are submitted without EMD will not be admitted for evaluation.

8. **Completion Time:** All the specified works shall be completed **within 120 days** of award of work including necessary approval if any.

9. **Site Visit:** Before tendering, every bidder has to compulsorily visit and inspect the site/locations of work and its environments between Monday to Saturday from 10:00 Hrs to 16:00 Hrs except Sunday and Govt. holidays, to ascertain the exact requirement of the NIT, at his own cost.

The visiting bidder has to obtain the site visit confirmation certificate from the IIIT Sri City – PMC Office and it should be uploaded along with the technical bid submission. Bids without this certificate shall be rejected.

10. Minimum Eligibility Criteria: Satisfactory completion of at least

i. three similar works each of value not less than Rs. 80.00 lakhs or
ii. two similar works each of value not less than Rs. 120.00 lakhs or
iii. One work of value not less than Rs. 160.00 lakhs within last 5 years ending March, 2024.
iv. Similar work shall mean Civil work for buildings, gate complex, concrete works, road works etc., at any University, reputed educational institute, Government Organizations and in any reputed private companies during the last five (5) financial years ending **31st March 2024.**
v. The firms should have an average annual financial turnover of Rs. 160.00 lakhs of civil works during the last five (5) financial years ending **31st March 2023.**
vi. The firms should have valid registration for GST and should have Permanent Account Number (PAN).
vii. Documentary evidence for work experience, Signed Tender Document, turnover, GST, PAN all as indicated & required in the tender document should be furnished without which it will not be taken into account.

11. If the date of opening of the tender is declared as holiday, it will be opened on the next working day at the same time.

12. Bidder shall have their operating office in Andhra Pradesh state or within a radius of 200 km from the proposed construction site.. If not available at the time of bidding, successful bidder shall have to establish functional office within 30 days of award of contract. Payment shall be made only after submission of documentary evidence of having functional office.

13. All work and materials brought and left upon the ground by the contractor or by his orders for the purpose of forming part of the works, are to be considered to be the property of the IIIT Sri City and the same are not to be removed or taken away by the contractor or any other person without consent in writing of the Engineer-in-charge, but the IIIT Sri City is not to be in any way responsible for any loss or damage which may happen to or in respect of any such work or materials either by the same being lost or damaged by weather or otherwise.

14. **Bid Evaluation:**

The Technical Evaluation Committee (TEC) constituted by the competent authority, IIIT Sri City Chittoor will open the technical bid to decide the technical suitability of their service based on the pre-laid terms and conditions. Appropriate norms as stipulated in the NIT will be decided by the committee before the opening of the technical bid for evaluation of bids. After evaluation of the technical aspects of the bid,

the committee will give suitable recommendations about the shortlisted firms. The recommendation of the TEC shall be final and binding on all the parties.

Further, the TEC may seek additional information from the existing users at IIIT Sri City Chittoor or from other Institutes.

15. IIIT Sri City reserves the right:

a. To accept or reject any or all bids either in whole or in part or to invite revised price bids or to annul the bidding process.
b. To postpone and/or extend the date of receipt/opening of quotation or to withdraw the same at any time before finalization without incurring any liability to the affected Tenderer / Bidder.
c. To omit/delete any item(s) of work from the schedule at the time of allotment or before the commencement of work or during the execution of work without assigning any reason whatsoever.
d. To change the quantity or add the item or cancel the item/service required.
e. To accept or reject any or all the Tenders without assigning any reason.

16. Bids shall be adjudged as non-responsive due to any of the following reasons:

a. Bids submitted without Earnest money.
b. Bids submitted without certificate(s) in respect of the financial and technical qualification criteria.
c. Bids submitted without documents to establish the eligibility criteria.
d. Bids submitted without photocopies of the receipted copies of GST, IT and PF returns from the respective Competent Authority.
e. Bids without site visit certificate issued by PMC Office of IIIT Sri City.
f. Any other reason as applicable.

17. Bidders shall clearly indicate their legal constitution and the person signing the bid shall state his capacity and also the source of his ability to bind the bidder. The power of attorney or authorization or any other document constituting adequate proof of the ability of the signatory to bind the bidder shall be annexed to the bid. The owner may reject outright any bid unsupported by inadequate proof of the signatory's authority.

18. The bid document shall be completed in all respects and shall be uploaded in the portal together with the requisite information and appendices. They shall be completed and free from ambiguity, change or inter-lineation.

19. IIIT Sri City shall have unqualified option under the said bid bound to forfeit the EMD in the event of bidder failing to keep the bid valid up to the date specified or refusing to accept work or carry it out in accordance with the bid if the IIIT Sri City decides to award the work to the Bidder.

20. The EMD shall be retained with the IIIT Sri City until finalization of tenders. If any statements documents/information submitted by tenderer is found false/incorrect,

willful misrepresented or omission of facts or fake/forged documents, the EMD shall be forfeited.

21. IIIT Sri City shall, however, release the EMD in respect of unsuccessful bidders within 30 (thirty) days of placement of order to successful bidder. No interest shall be payable on EMD by IIIT Sri City. EMD of successful bidder will be converted into security refundable deposit. In case of any breach of contract, the EMD will be forfeited.

22. The work shall be carried out in the IIIT Campus as per the directions of Engineer In-charge, Safety procedure, specifications and standard code of practice.

23. This tender notice (NIT) shall be deemed to form an integral part of the contract to be entered into for this work.

24. The successful bidder should submit shop drawing(s) / Material Approvals / Method statements for approval from official concerned from IIIT Sri City.

25. The successful bidder needs to arrange for the required materials, tools & plants including scaffolding & staging and manpower to the locations at his own cost as per the scope of the work. Accommodation and Transportation should be arranged by the contractor themselves.

26. The successful bidder has to ensure the safety of the manpower/vehicles deployed in the premises. IIIT Sri City will not be responsible for any incident arising during execution of the work.

27. Water for works shall be provided by IIITS on chargeable basis as per Sri City charges. Electricity for work shall be provided on chargeable basis as per government charges.

28. Since the work to be carried out in a operational Main entrance area if the Institute, the rates quoted should be inclusive of all preliminaries like site hoarding, barricading, site sign boards, safety boards, gangmen etc.,

29. If a bidder does not quote rate of any item under schedule of quantities or left the rate column blank, then their bid will be liable for treated as unresponsive & not be considered.

30. PAYMENT TERMS:

i. Running Bills to be paid based on the execution of work. After submission of invoice within 30 days up to 95% of work done value with applicable tax deductions.
ii. 5% of the work value will be retained as Security Deposit and it will be paid after the completion of the Defect Liability Period.
iii. Payment will be initiated only after receipt of the certificate from the official concerned from IIIT Sri City Chittoor.

iv. All taxes must be clearly mentioned in the financial bid.
v. No escalation of prices for services will be entertained later in any case.

31. SECURITY DEPOSIT:

The Security Deposit shall be deducted from each running bill and the final bill to the extent of 5% of the gross amount payable subject to a maximum limit of 10% of the tendered value of work. The earnest money deposit shall be adjusted against this security deposit. The security deposit shall be released on the expiry of the Defect Liability Period of 12 months from the date of recording of the Virtual completion of the project as per the contract.

32. TAXES AND DUTIES:

As per the CPP Portal standards and format. Bidders are required to provide the GST amount for each item of work in the CPP Portal format BOQ. If the GST values are not provided in the financial bid by the bidders, then the financial bid of the bidder will not be admitted for evaluation as per government norms.

On account of security considerations, some restrictions may be imposed by the security staff on the working and/ movement of men and materials etc. The contractor will be bound to follow all such restrictions/ instructions and he shall organize his work accordingly. No claim on this account, whatsoever, shall be payable.

33. RIGHT OF REJECTION:

The IIIT Sri City reserves the right to reject any proposal that does not address all the requirements of the NIT. In addition, the IIIT Sri City reserves the right to accept or reject any proposal submitted by the tenderers, and to cancel the NIT process and reject all proposal submissions at any time, without thereby incurring any liability to the affected Consultant or any obligation to inform the affected tenderer the grounds for IIIT Sri City action.

34. FORCE MAJEURE

IIIT Sri City, Chittoor may consider relaxing the penalty and delivery requirements, as specified in this document, if and to the extent that the delay, in performance or other failure to perform its obligations under the contract, is the result of a force majeure.

35. ARBITRATION

All disputes of any kind arising out of supply, commissioning, acceptance, warranty maintenance etc., shall be referred by either party (IIIT Sri City, Chittoor or the bidder) after issuance of 30 days' notice in writing to the other party clearly mentioning the nature of dispute and will be referred to the arbitrator to be nominated by The Director, IIIT Sri City, Chittoor. The Venue for arbitration shall be Tirupathi District, Andhra Pradesh – 517 646.

36. JURISDICTION:

All the disputes arising out of this tender shall have exclusive jurisdiction of Tirupati, Andhra Pradesh.

INSTRUCTIONS FOR SUBMISSION OF ONLINE BID:

The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal. More information useful for submitting online bids on the CPP Portal may be obtained at: https://eprocure.gov.in/eprocure/app.

REGISTRATION

1. Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal URL: https://etenders.gov.in/eprocure/app by clicking on **"Online Bidder Enrollment"** on the CPP Portal which is free of charge.
2. As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
3. Bidders are advised to register their valid email and mobile number(s) as part of the registration process. These would be used for any communication from the CPP Portal.
4. Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.)
5. Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.
6. Bidder then logs in to the site through the secured log-in by entering their user ID / password and the password of the DSC / e-Token.

SEARCHING FOR TENDER DOCUMENTS

7. There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
8. Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective "My Tender" folder. This would enable the CPP Portal to intimate the bidders through SMS / email in case there is any corrigendum issued to the tender document.
9. The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.
10.

PREPARATION OF BIDS

11. Bidder should take into account any corrigendum published on the tender document before submitting their bids.
12. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
13. Bidder, in advance, should prepare the bid documents to be submitted as indicated in the tender document / schedule and generally shall be in PDF / XLS / RAR / DWF / JPG formats as the case may be. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
14. To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every Bid, a provision of uploading such standard documents (e.g. PAN card copy, GSTIN Details, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Documents" area available to them to upload such documents. These documents may be directly submitted from the "My Documents" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

SUBMISSION OF BIDS

15. Bidder should log into the site well in advance for bid submission so that he/she upload the Bid in time i.e. on or before the bid submission date and time. Bidder will be responsible for any delay due to other issues. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
16. Bidder has to select the payment option as “offline” to pay the tender fee / EMD as applicable and enter details of the instrument. A standard BOQ format has been provided with the tender document to be filled by all the bidders.
17. Bidders are requested to note that they should submit their financial bids in the format provided and that no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the detail with their respective financial quotes and other details (such as the bidder's name). If the BOQ file is found to be modified by the bidder, the Bid will be rejected.
18. The server time (displayed on the bidders' dashboard) will be considered the standard time for referencing the deadlines for submitting bids by the bidders, opening of bids, etc. The bidders should follow this time during bid submission.
19. The Tender Inviting Authority will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders due to local issues.
20. The uploaded tender documents become readable only to public view after the tender opening by authorized bid openers.
21. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the Bid no. and the Date & time of submission of the Bid with all other relevant details.
22. Any queries relating to the tender document and the terms and conditions contained

therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.

23. Any queries relating to online bid submission or CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

SPECIAL CONDITIONS OF CONTRACT

1. Rates:

The rates quoted by the tenderer should be as per the CPP Portal standard online BOQ. However, the fee for inspections, if any shall NOT be borne by the Institute.

2. Completeness of tender:

2.1 All sundry civil works& electrical connections, and all other items which are useful and necessary for efficient functioning of the entire facility and part of the work shall be deemed to have been included in the tender irrespective of the fact whether such items are specifically mentioned in the tender documents or not.

2.2 For item/equipment requiring initial inspection at manufacturer's works, the contractor will intimate the date of testing of equipment's at the manufacturer's works before dispatch. The Institute also reserves the right to inspect the equipment's at factory and the successful tenderer has to make the arrangement for the same. The successful tenderer shall give sufficient advance notice regarding the dates proposed for such tests/inspection to the Institute's representative(s) to facilitate his presence during testing/fabrication.

3. Storage and custody of materials:

The agency has to make his own arrangements for storage of sundry materials and installation equipment's. No separate storage accommodation shall be provided by the Institute. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final taking over the installation by the Institute.

4. Care of the Building:

Care shall be taken by the contractor while handling and installing the various equipment and components of the work to avoid damage to the existing infrastructure. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of the installation from the site of work.

5. Completion of period

The completion period of **120 Days** indicated in the tender documents is for the entire work of supplying, installation, Testing & Commissioning and handing over of the entire Scope of work to the satisfaction of the Engineer-in-charge.

6. Performance Guarantee:

6.1 The tenderer shall guarantee among other things, the following

a. Quality, strength and performance of the materials used.
b. Safe mechanical and electrical stress on all parts under all specified conditions of operation.
c. Satisfactory operation during the Defect Liability Period.

6.2 The successful tenderer shall submit an irrevocable performance guarantee of 5% of the tendered amount in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract agreement within 15 days of issue of letter of intent (LOI). This guarantee shall be in the form of government securities or fixed deposit receipts or guarantee bonds of any scheduled bank in the specified format. The performance guarantee shall be initially valid up to the stipulated date of completion plus 60 days beyond. After 60 days from the date of recording of the Virtual completion certificate for the work by the Competent Authority, the performance guarantee shall be returned to the contractor, without any interest.

7. Validity

Tenders shall be valid for acceptance for a period of **150 days** from the date of opening of price bid.

8. Compensation for Delay

The contractor is to complete his work under this contract on or-before the date mentioned in the tender failing which he shall be subject to pay or allow deduction of one (1) percent on the total amount of the contract for every week of delay subject to a total deduction of 10% of the tender value/agreement amount or the value of final bill whichever is more as liquidated damages **(LD)** to the IIIT Sri City.

9. Milestone Schedule:

After the contract is concluded the contractor shall submit a Time and Progress Chart for each mile stone and get it approved by IIIT. The Chart shall be prepared in direct relation to the time stated in the contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various milestones.

S. No	Description of Milestone (Physical)	Time allowed (from date of start)	Amount to be with-held in case of non - achievements of milestone
1	Work completion up to Plinth	25 days	1.00 %
2	Super structure concrete works	20 days	0.50 %
3	Block work and Plastering	20 days	0.50 %
4	Flooring & Painting Works	15 days	0.50 %
5	Completion of Boundary wall	15 days	0.50 %
6	Completion of Plumbing & Electrical Works	15 days	0.50 %

7	Snag & Handing Over	10 days	0.50 %
	Total	**120 Days**	**Four Percent**

In case, the contractor does not achieve a particular milestone mentioned above, the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. With-holding of this amount of failure to achieve a milestone, shall be automatic without any notice to the contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

10. If the contractor shall be hindered in the execution of work so as to necessitate an extension of the time allowed in this tender, he shall apply in writing to the Engineer-in-charge who shall grant it in writing if there are reasonable ground for it, and without such Authority in writing by the Engineer-in-charge, the contractor shall not claim exempted from the fine livable under Clause 8. For the completion of the rest of the works the contractor shall be entitled such extension of time as may be determined by the Engineer-in-charge.

11. The contractor shall inform the Engineer-in-charge of his intention of making delivery of materials and on the materials being approved the Engineer-in-charge or his authorized representative shall grant a receipt to him no material will be considered as delivered until so approved.

12. On the completion of the delivery of material the contractor shall be furnished with a certificate to that effect by the Engineer-in-charge but the delivery will not be considered complete until the contractor shall have removed all rejected materials and shall have the approved materials stocked or placed in such positions as be pointed out to him.

13. The materials shall be of the best description and in strict accordance with the specification and the contractor shall receive payment for such materials only as are approved and passed by the Engineer-in-charge.

14. Under no circumstances shall the successfully firm appoint any sub-contractor or sub-lease the contract.

15. Power Supply

Temporary Electric service connection of 415 V, 3 Phase, 4 Wire, 50 Hz, AC supply shall be provided by the Institute for construction purpose at chargeable basis at the actual Government commercial rates. A sub energy meter to be installed by the contractor at his own cost for the power consumption calculation.

16. Water Supply

Water supply shall be made available by the Institute at one point. The bidder has to make all tapping arrangements including installation of Water meter at his own cost.

17. The successful tenderer should furnish well in advance three copies each of detailed instructions and manuals of manufactures for all items of materials regarding installation, adjustments operation and maintenance i/c preventive maintenance & trouble shooting together with all the relevant data sheets, spare parts catalogue and workshop procedure for repairs, assembly and adjustment etc. all in triplicate.

18. Extent of work

18.1 The work shall comprise of entire labor including supervision and all materials necessary to make a complete installation and such tests and adjustments and commissioning as may be required by the Institute. The terms complete installation shall not only mean major items of the items covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charges whether or not those have been mentioned in details in the tender document in connection with this contract.

18.2 The work is a turnkey project. Any item required for completion of the project but left inadvertently shall be executed within the quoted rates.

19. Compliance with regulations and Indian standards

19.1 All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

(i) Factories Act.
(ii) Indian Electricity Rules.
(iii) IS & BS Standards as applicable.
(iv) Workmen's compensation Act.
(v) Statutory norms prescribed by local bodies like CEA, NDMC etc.

19.2 Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the entire scope of work under this contract in accordance with currently applicable statutory regulations and safety codes.

19.3 Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and Institute's requirements of safety codes in respect of labour employed on the work by the tenderer. Failure to provide such safety requirement would make the tenderer liable for penalty of Rs. 250/- for each default. In addition, the Institute will be at liberty to make arrangement for the safety requirements at the cost of tenderer and recover the cost thereof from him.

20. Indemnity

The successful tenderer shall at all times indemnify the Institute, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the Institute shall not be responsible for any accident or damage incurred or claims arising therefrom during the period of erection, construction and putting into operation the equipment's and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance (Contractor All risk policy) as may be necessary to cover the risk. No extra payment would be made to the successful tenderer due to the above.

21. Erection Tools

No tools and tackles either for unloading or for shifting the equipment for erections purposes would be made available by the Institute. The successful tenderer shall make his own arrangement for all these facilities.

22. Cooperation with other agencies

The successful tenderer shall co-ordinate with other contractors and agencies engaged in the construction of building, if any, exchange freely all technical information so as to make the execution of this works contract smooth. No remuneration should be claimed from the Institute for such technical cooperation. If any unreasonable hindrance is caused to other agencies and any completed portion of the work has to be dismantled and re-done for want of cooperation and coordination by the successful tenderer during the course of work, such expenditure incurred will be recovered from the successful tenderer if the restoration work to the original condition or specification of the dismantled portion of the work was not undertaken by the successful tenderer himself.

23. The successful bidder is required to extend their cooperation to the IIIT Sri City appointed PMC team / supervising Team at site and follow the due instructions for timely and quality completion of the project.

24. Mobilization Advance

No mobilization advance shall be paid for this work.

25. Defect Liability Period

Twelve (12) months from the date of virtual completion of the entire work and handing over to IIIT Sri City. During the Defect Liability Period, the successful bidder should rectify and make good any defects notified on the workmanship or quantity of material in the scope of work.

26. Warranty:

OEM warranty certificates of all materials, equipment's used in this scope should be obtained in the name of IIIT Sri City and submitted.

INTEGRITY PACT

To,

The Registrar,
Indian Institute of Information Technology Sri City, Chittoor
630, Gnan Marg, Sri City
Tirupati District – 517646
Andhra Pradesh.

Sub: Construction of Main Entrance Gate Complex and short length Boundary Wall on both sides at IIIT Sri City Campus.

Dear Sir,

I/We acknowledge that IIIT Sri City is committed to follow the principles thereof as enumerated in the Integrity Agreement enclosed with the tender/bid document.

I/We agree that the Notice Inviting Tender (NIT) is an invitation to offer made onthe condition that I/We will sign the enclosed integrity Agreement, which is an integral part of tender documents, failing which I/We will stand disqualified from the tendering process.

I/We acknowledge that the making of the bid shall be regarded as an unconditional and absolute acceptance of this condition of the NIT.

I/We confirm acceptance and compliance with the Integrity Agreement in letter and spirit and further agree that execution of the said Integrity Agreement shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by IIIT Sri City. I/We acknowledge and accept the duration of the Integrity Agreement, which shall be in line with Article 1 of the enclosed Integrity Agreement.

I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Agreement, while submitting the tender/bid, IIIT Sri City shall have unqualified, absolute and unfettered right to disqualify the tenderer/bidder and reject the tender/bid is accordance with terms and conditions of the tender/bid.

Yours faithfully

(Duly authorized signatory of the Bidder(s)

INTEGRITY AGREEMENT

This Integrity Agreement is made at ..... on this ..... Day of..... 2024

BETWEEN

The Registrar, Indian Institute of Information Technology Sri City, Chittoor, 630, Gnan Marg, Sri City, Chittoor District – 517 646, Andhra Pradesh.

IIIT Sri City, (Hereinafter referred as the 'Institute', which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

AND

.....
(Name and Address of the Individual/Firm/Company) through
..... (Hereinafter referred to as
(Details of duly authorized signatory)
the "Bidder/Contractor" and which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

Preamble

WHEREAS the Institute has floated the Tender [NIT No. IIITS/NIT/ Sports Court/2023/020] (hereinafter referred to as "Tender/Bid") and intends to award, under laid down organizational procedure, contract for **Construction of Main Entrance Gate Complex and short length Boundary Wall on both sides at IIIT Sri City Campus** here in after referred to as the "Contract".

AND WHEREAS the Institute values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/transparency in its relation with its Bidder(s) and Contractor(s).

AND WHEREAS to meet the purpose aforesaid both the parties have agreed to enter into this Integrity Agreement (hereinafter referred to as "Integrity Pact" or "Pact"), the terms and conditions of which shall also be read as integral part and parcel of the Tender/Bid documents and Contract between the parties.

NOW, THEREFORE, in consideration of mutual covenants contained in this Pact, the parties hereby agree as follows and this Pact witnesses as under:

Article 1: Commitment of the Institute

1) The Institute commits itself to take all measures necessary to prevent corruption and to observe the following principles:
   (a) No employee of the Institute, personally or through any of his/her family members, will in connection with the Tender, or the execution of the Contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

(b) The Institute will, during the Tender process, treat all Bidder(s) with equity and reason. The Principal/Owner will, in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the Tender process or the Contractexecution.

(c) The Institute shall endeavor to exclude from the Tender process any person, whose conduct in the past has been of biased nature.

2) If the Institute obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal code (IPC)/Prevention of Corruption Act,1988 (PC Act) or is in violation of the principles herein mentioned or if there be a substantive suspicion in this regard, the Institute will inform the Chief Vigilance Officer and in addition can also initiate disciplinary actions as per its internal laid down policies and procedures.

Article 2: Commitment of the Bidder (s) / Contractor (s)

1) It is required that each Bidder/Contractor (including their respective officers, employees and agents) adhere to the highest ethical standards, and report to the IIIT Sri City all suspected acts of fraud or corruption or Coercion or Collusion of which it has knowledge or becomes aware, during the tendering process and throughout the negotiation or award of a contract.

2) The Bidder(s)/Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the Tender process and during the Contract execution:

a) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal/Owner's employees involved in the tender process or execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the Tender process or during the execution of the contract.

b) The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to cartelize in the bidding process.

c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act. Further the Bidder(s)/Contract(s) will not use improperly, (for the purpose of competition or personal gain), or pass on to others, any information or documents provided by the Principal/Owner as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the names and addresses of agents/representatives in India, if any. Similarly, Bidder(s)/Contractor(s) of Indian Nationality shall disclose names and addresses of foreign agents/representatives, if

any. Either the Indian agent on behalf of the foreign principal or the foreign principal directly could bid in a tender but not both. Further, in cases where an agent participates in a tender on behalf of one manufacturer, he shall not be allowed to quote on behalf of another manufacturer along with the first manufacturer in a subsequent/parallel tender for the same item.

e) The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.

3) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

4) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practice means a willful misrepresentation or omission of factsor submission of fake/forged documents in order to induce public official to act in reliance thereof, with the purpose of obtaining unjust advantage by or causing damage to justified interest of others and/or to influence the procurement process to the detriment of the Government interests.

5) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use Coercive Practices (means the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/ her reputation or property to influence their participation in the tendering process).

Article 3: Consequences of Breach

Without prejudice to any rights that may be available to the Institute under law or the Contract or its established policies and laid down procedures, the Institute shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) and the bidder/contractor accepts and undertakes to respect and uphold the Institute's absolute right:

1) If the Bidder(s)/Contractor(s), either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Institute after giving 14 days' notice to the contractor shall have powers to disqualify the Bidder(s)/Contractor(s) from the tender process or terminate/determine the Contract, if already executed or exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of transgression and determined by the Institute. Such exclusion may be forever or for a limited period as decided by the Institute.

2) Forfeiture of EMD/Performance Guarantee/Security Deposit: If the Institute has disqualified the Bidder(s) from the tender process prior to the award of the contract or terminated/determined the contract or has accrued the right to terminate/determine the contract according to Article 3(1), the Institute apart from exercising any legal rights that may have accrued to the Institute, may in its considered opinion forfeit the entire amount

of Earnest Money Deposit, Performance Guarantee and Security Deposit of the Bidder/Contractor.

3) Criminal Liability: If the Institute obtains knowledge of conduct of a bidder or Contractor, or of an employee or a representative or an associate of a bidder or Contractor which constitutes corruption within the meaning of IPC Act, or if the Institute has substantive suspicion in this regard, the Institute will inform the same to law enforcing agencies for further investigation.

Article 4: Previous Transgression

1) The Bidder declares that no previous transgressions occurred in the last 5 years with any other Company in any country confirming to the anticorruption approach or with Central Government or State Government or any other Central/State Public Sector Enterprises in India that could justify his exclusion from the Tender process.

2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the Tender process or action can be taken for banning of business dealings/ holiday listing of the Bidder/Contractor as deemed fit by the Institute.

3) If the Bidder/Contractor can prove that he has resorted / recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal/Owner may, at its own discretion, revoke the exclusion prematurely.

Article 5: Equal Treatment of all Bidders/Contractors/Subcontractors

1) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the principles laid down in this agreement/Pact by any of its Subcontractors/ sub-vendors.

2) The Institute will enter into Pacts on identical terms as this one with all Bidders and Contractors.

3) The Institute will disqualify Bidders, who do not submit, the duly signed Pact between the Institute and the bidder, along with the Tender or violate its provisions at any stage of the Tender process, from the Tender process.

Article 6: Duration of the Pact

This Pact begins when both the parties have legally signed it. It expires for the Contractor/Vendor 12 months after the completion of work under the contract or till the continuation of defect liability period, whichever is more and for all other bidders, till the Contract has been awarded.

If any claim is made/lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pacts as specified above, unless it is discharged/determined by the Competent Authority, IIIT Sri City.

Article 7: Other Provisions

1) This Pact is subject to Indian Law, place of performance and jurisdiction is the Headquarters of the Division of the Institute, who has floated the Tender.
2) Changes and supplements need to be made in writing. Side agreements have not been made.
3) If the Contractor is a partnership or a consortium, this Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a Company, the Pact must be signed by a representative duly authorized by board resolution.
4) Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intensions.
5) It is agreed term and condition that any dispute or difference arising between the parties with regard to the terms of this Integrity Agreement / Pact, any action taken by the Institute in accordance with this Integrity Agreement/ Pact or interpretation thereof shall not be subject to arbitration.

Article 8: Legal & Prior Rights

All rights and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid. For the sake of brevity, both the Parties agree that this Integrity Pact will have precedence over the Tender/Contact documents with regard any of the provisions covered under this Integrity Pact.

IN WITNESS WHEREOF the parties have signed and executed this Integrity Pact at the place and date first above mentioned in the presence of following witnesses:

....
(For and on behalf of the Institute) (For and on behalf of Bidder/Contractor)

WITNESSES:

1. .....
(Signature, name and address)

2. .....
(Signature, name and address)

Place:

Date:

Annexure – I

DETAILS TO BE FURNISHED BY THE BIDDERS

1. Name of the Firm/Company:
   (Attach copy of the Registration Certificate)

2. Address for Communication:

3. Contact Person Telephone/ Mobile No.:

4. Work order copies of previous similar works

5. E-mail:

6. Details of Proprietor/partner/Director

7. GST Registration No.:
   (Attach copy of the GST Registration Certificate)

8. PAN Number:
   (Attach copy of the PAN Card)

This is to certify that the above facts are true complete and correct to the best of my knowledge and belief. Further, it is certified that I/We have read and understood the terms and conditions of the Tender Notice.

I/We give an undertaking and give our unconditional and unequivocal acceptance of all terms and conditions of the Tender and agree to abide by these terms and conditions.

Name and Signature of the Firm/Company
Seal of the Firm/Company

Annexure – II

DECLARATION REGARDING BLACK-LISTING AND/ OR LITIGATIONS

I/we hereby declare that our firm/agency is not black-listed by any Ministry or Department of Central Government/State Government or PSU or other bodies under the Central Government/State Government. I/we further declare that no criminal case is registered or pending against the firm/company or its owner/partners/directors anywhere in India.

Date the ..... day of 2024

Signature of Bidder …….

Name & Address of Bidder ……..

……

……

Annexure – III

PROFORMA OF EXPERIENCE
DETAILS OF SIMILAR WORKS CARRIED OUT BY THE FIRM

(SEPARATE SHEETS TO BE ATTACHED)

S. No.	NAME OF ORGANISATION	NAME OF WORK	CONTRACT VALUE	SCHEDULED DATE AND ACTUAL DATE OF COMPLETION (EXTN. OF TIME, IF ANY)	ACTUAL REASON FOR DELAY IN COMPLETION, IF ANY

Annexure – IV

FORMAT OF PERFORMANCE BANK GUARANTEE

To

The Registrar,

Indian Institute of Information Technology Sri City, Chittoor

No. 630, Gnan Marg, Sri City,

Tirupathi District – 517 646

Andhra Pradesh.

WHEREAS… ..... (name and address of contractor) thereinafter called "the contractor" has undertaken, in pursuance of Contract No. ……. Dated ……..…… to execute …….

(Name of Contract and brief description of Works) (Herein after called "the contract").

AND WHEREAS it has been stipulated by you in the said contract that the Contractor shall furnish you with a Bank Guarantee by a Nationalized/Scheduled bank of India for the sum specified therein as performance guarantee for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREOF we hereby affirm that we are the guarantor and responsible to you on behalf of the Contractor, up to a total of Rs…… (Amount of guarantee) Rupees. (in words), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of ……..

(amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract or of the works to be performed there under or of any of the contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 28 days from the date of issue of the Defects Liability Certificate.

Signature and seal of the Guarantor……
Name of the Bank ……
Address……

Date……
In the presence of ……
1……
(Name of Occupation)

2……
(Name of Occupation)

An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in Indian Rupees.

Annexure – V

FORMAT FOR CONTRACT AGREEMENT

(TO BE SUBMITTED ON RS.100/- NON-JUDICIAL STAMP PAPER)

CONTRACT AGREEMENT FOR THE WORK OF

……..…....

Made this …… Day of……

Between…….….. M/s …….……..

Hereinafter called the "Contractor" (which terms shall unless excluded by or repugnant to the context include its successors and permitted assigns) of the one part; and Indian Institute of Information Technology Sri City, Chittoor, 630, Gnan Marg, Sri City, Tirupati District – 517 646 (A.P.) hereinafter called the "OWNER" (which terms shall unless excluded by or repugnant to the context include its successors and permitted assigns) ofthe other part.

WHEREAS

a) OWNER being desirous of getting executed the WORK mentioned, enumerated or referred to in the Bid Document including Notice Inviting Tender, Instruction to Bidders, General Condition of Contract, Special Conditions of Contract, Specifications, Time Schedule, Letter of Acceptance of Bid and other documents has invited Bids.

b) CONTRACTOR has inspected SITE and surroundings of WORK specified in the Bid Documents and satisfied himself by careful examination before submitting his Bid as to the nature of the quantities, nature and magnitude of WORK, availability of equipment etc. necessary for the execution of WORK, the means of access to SITE, the position of supply of power and water thereto and the accommodation he may require and has made local and independent enquiries and obtained complete information as to the matters and things referred to, or implied in the Bid Document or having any connection there with, and has considered the nature and extent of all probable and possible situation, delays, hindrances or interferences to or with the execution and completion of WORK, to be carried out under this CONTRACT, and has examined and considered all other matters condition and things and probably and possibly contingencies, and generally all matters incidental thereto and ancillary thereof effecting the execution and completion of WORK and which might have influenced him in making his Bid.

c) The Invitation to Bid, instructions to Bidders, General Conditions of Contract, Description of Works and specifications, Plans, Time Schedule, Letter of Acceptance of Bid any and any other documents and enclosures, copies of which are hereto annexed are included in the expression "CONTRACT':

AND WHEREAS

OWNER accepted the Bid of CONTRACTOR for the provision and the execution of WORK at the CONTRACT PRICE as indicated in the letter of award of work upon the terms and subject to the conditions of Contract.

Now this CONTRACT AGREEMENT witnessed, 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 him, CONTRACTOR hereby covenants with OWNER that CONTRACTOR shall and will duly provide, execute and complete the work and things in CONTRACT, mentioned or described or which are to be implied therefrom or may be reasonably necessary for completion or stipulations mentioned in CONTRACT.

2. In consideration of the due provision, execution and completion of WORK by the CONTRACTOR in accordance with the terms of the CONTRACT, the Owner does hereby agree with CONTRACTOR that OWNER will pay to Contactor the respective amount for the work actually done by him and approved by Owner as per Payment Terms accepted in CONTRACT and payable to CONTRACTOR under provision of Contract; such payment to be made at such time and such manner as provided for in the CONTRACT.

AND

3. In consideration of the due provision, execution and completion of WORK, CONTRACTOR does hereby agree to pay such sums as may be due to OWNER for the services rendered by Owner to Contractor as set forth in CONTRACT and such other sums as may become payable to Owner towards loss, damage to the OWNER's equipment, materials etc. and such payments to be made at such time and in such manner as in provided in the CONTRACT.

IN WITNESS WHEREOF Parties executed these presents on the day and the year above written.

Signed and delivered for and on behalf of CONTRACTOR	Signed and delivered for and on behalf of OWNER (IIIT Sri City)
…….	…….
…….	…….
Date: ……..……	Date: …….
Place: ……..…….	Place: …….....

In presence of Witness (Signature with Name & Address)

1. …….	1. …….
2. …….....	2. …….....

VOLUME 1

TECHNICAL SPECIFIACTIONS FOR CIVIL AND FINISHING WORKS

TABLE OF CONTENTS

1. General Technical Specifications

These technical specifications shall be read in conjunction with the various other documents forming the contract, namely Notice Inviting Tender & Instructions to Tenderers, Conditions of Contract, Special Conditions of Contract, Bill of Quantities and other related documents, together with any addendum issued thereto.

Absence of terms such as providing, supplying, laying, installing, fixing etc. in the description does not even remotely suggest that the contractor is absolved of such providing, supplying etc. unless an explicit stipulation is made in this contract. The owner shall bear no costs of materials, equipment's duties, taxes, royalties etc.

In addition to the general obligation of the Contractor during defect liability period, the Contractor shall guarantee successful performance of waterproofing treatments for a period of ten years from the certified date of completion of the work. The Engineer shall prescribe the form and the manner of executing such guarantees. The Contractor hereby conforms that there is nothing in the items/specifications (or a shortcoming therein) as will prevent such successful performance. The work shall be executed through approved specialists experienced in the respective trades.

The classification of various items of work for purpose of measurements and payments shall be as per bills of quantities (BOQ). Except where distinguished by the BOQ, the rates apply to all heights, depths, sizes, shapes and locations. They also cater for all cuts and wastes.

The specifications may have been divided in different sections/sub-head for convenience

only. They do not restrict any cross-reference. The Contractor shall take in to account inter-relations between various parts of works/trades. No claim shall be entertained on basis of compartment interpretations.

The Contractor shall be required to submit and take approval from the Engineer-in-Charge/Consultant of shop drawings of the items of work specified in the specifications, Drawings or as directed from time to time. No extra payment shall be made for the same. Shop drawings shall be in metric units and shall be prepared in a format approved by the engineer.

The Contractor shall prepare and submit as-built drawings by way of making modifications/changes carried out with respect to the construction drawings issued prior to the construction of respective elements. These will be then incorporated by the respective Consultant/agency in to their drawings for maintaining necessary records for the owner.

No walls, terraces shall be cut for making any opening after waterproofing has been done without approval of the Engineer. Cutting of waterproofing when authorized by the Engineer in writing shall be done very carefully so that no other portion of the waterproofing is damaged. On completion of the work at such places, the waterproofing membrane shall be made good and ensured that the opening/cutting is made fully waterproof as per specifications and details of waterproofing approved by the Engineer at no extra cost. No structural member shall be cut or chased without the written permission of the Engineer.

All materials intended to be used at site shall be tested prior to its use in an approved manner. A list of tests including frequency of tests on construction materials is included in the special specifications. Cost of all such tests and any other tests felt necessary by the Engineer shall be deemed to be included in the price of respective materials quoted by the Contractor. Any defective materials brought to site shall be returned without any extra cost for the same.

Performance tests shall be carried out as the discretion of the Engineer on all/any items, of work as directed by the Engineer. Should any item shall fail to pass the tests, the Contractor shall be given opportunity to take corrective measures and have the same retested to the satisfaction of the Engineer, he may at his sole discretion order dismantling of the whole or part of the works done and order the Contractor to reconstruct the same. The cost of all these operations and materials shall be borne by the Contractor without any extra claim.

The Contractor may make a special note of the strictness of the concrete mix to be adopted in items of maximum water-cement ratio, minimum slump, control of total chloride and sulphate contents, use of admixtures etc.

Minimum cement contents are given purely from durability point of view. Larger contents shall have to be provided if demanded by mix design. Provision of cement slurry to create bond between plain/reinforced concrete surface and subsequent applied finishes (floor, plaster, dado, skirting etc.) shall not be paid extra. Mix design using smaller aggregate of 10mm down shall also be done in advance for the use in junction having congested reinforcement.

All full-fledged laboratories shall be established at site to start of construction and shall also stock all relevant codes as per the requirements of the special specifications. Procedure of mixing the admixtures shall be strictly as per manufactures recommendations if not otherwise

directed by the Engineer.

The batching plant for all concrete shall be used. Alternatively, use of ready mix concrete from an approved source shall be permitted. Concrete shall be transported using concrete pumps of adequate capacity including necessary stand by.

All the water tanks and other liquid retaining concrete structures shall undergo hydro- testing as per special specifications. Special benches shall be provided at site for stacking reinforcement bars of different sizes as per the specifications.

Form work for beams of RCC areas shall be designed in such a way that the form work of the adjacent slabs can be removed without disturbing the props/supports of the beams.

Wherever there are tension/suspended concrete members, which are suspended from upper level structure members, the shuttering/scaffolding of such members at lower level shall have to be kept in place till upper level supporting members gain minimum required strength. Cost of such larger durations of keeping in place the shuttering/scaffolding shall be deemed to be included in the price quoted for respective structural members.
In the mobilization period, the contractor shall carry out expeditiously and without delaying the following works

- Material testing and mix design of concrete as contemplated in the specifications.
- Setting up of full-fledged site laboratory as per the requirement of these specifications.
- Any other pre-requisite items required for final execution.

Items, which are not covered under the specifications, shall be executed; as per Engineer-in-charge / PMC / Consultant specification and relevant IS codes or with specifications under the direction of Engineer in Charge
Scope of Work
The work to be carried out this contract shall consist of various items as per description of works contained in the bill of quantities. Any discrepancy between the details given in bill of quantities and that provided in technical specifications of the corresponding items, the provisions of the bill of the quantities shall take precedence.

The item rates quoted by the contractor shall, unless otherwise specified also include compliance with/supply of the following:

- General work such as setting out, clearance of site before setting out and clearance after completion
- A detailed program for the construction and completion of works (using CPM/PERT techniques) including updating of all such activities on the basis of decisions taken at the periodic site review meetings as directed by the engineer in charge.
- Samples of various materials proposed to be used on the work for conducting tests there on is required as per the provisions of the contract.
- Design of mixes as per relevant clauses of the specifications given proportions of ingredients, source of aggregates and binder along with accompanying trial mixes to be submitted to the Engineer-in-Charge for his approval before use on the works.
- Setting of field-testing laboratory with all required apparatus and staffs for conducting day-to-day quality control tests.
- Any other item of work which is not specifically provided in the Bill of Quantities but which is necessary for complying with the provisions of the contract.

Obligation of the contractor

- In order to ensure that the contract work is executed strictly in accordance with this Agreement and in time, the Contractor shall have the following obligations at no extra cost to the Engineer-in-Charge in addition to such other obligations and responsibilities as have been specified elsewhere in this Contract.
- Provision of adequate number of constructional Plant and machinery for mechanized system of construction, handling and transportation.

Fulfill all the Contractor's labour regulations i.e. fair wages, display of notices regarding wages, payment of wages, labour records, attendance cards-cum-wage slips, labour welfare etc. as per standard practices and norms applicable at site.

All fossils, gold, silver, oil and other minerals, precious stones, coins, articles of value, of antiquity and structures and other remains/things of geological or archaeological interest discovered on the site of the works shall be notified by the Contractor immediately to the Engineer-in-Charge for onward information to the concerned authorities.

The Contractor shall take all reasonable precaution to prevent his workmen or any other person from removing or damaging any such article(s) or thing(s) and protect the same till the removal as per the instructions of the Engineer-in-Charge.

Clearance of the site of all rubbish, debris, vats, tanks, materials, temporary structures, plant and machinery, scaffolding and filling of all pits, excavation and hand over the site in a tidy and cleaned condition.

Opening up of covered work if instructed by the Engineer, if such covering was done before inspection by the Engineer or without permission/approval from the Engineer-in-Charge.

General

- The works will be executed as indicated in the nomenclature of each item and technical specifications as given hereunder as made applicable to this contract.

- In the absence of any definite provision in the technical specifications contained herein, reference may be made to the latest Engineer-in-charge/PMC/Consultant specification, MOSRT&H, IRC, ICAO Specifications and IS codes, in that order. Wherever these are silent, the construction and completion of the works shall conform to sound engineering practice and in case of any dispute arising out of the interpretation of the above, the decision of the Engineer-in-Charge shall be final and binding on the Contractor.

- The abbreviations, IRC, MOSRT& H, BIS, BS, ICAO ASTM shall be considered to have the following meaning:

IRC	:	Indian Road Congress
MOSRT& H	:	Ministry of Shipping & Transport (Road Wing) Govt. of India
BIS	:	Bureau of Indian Standards
BS	:	British Standard of the British Standard
ICAO	:	International Civil Aviation Organization
ASTM	:	American Society for Testing and Materials.

- All the codes of practice, standards and specifications applicable shall be the latest editions with up to date correction slips etc. or as directed by the Engineer-in-Charges.

Testing

It is made clear that cost of testing, cost of material for testing, all field apparatus required for sampling and testing as per Engineer-in-charge/PMC/Consultant specification /IS codes and manpower incident to such testing will be provided along with necessary transport arrangement to and fro to the approved testing agency or laboratory by the Contractor during the construction phase of the work and defect liability period. The expenditure in this regard shall be borne by the Contractor and nothing extra shall be payable by IIITS on this account. Field laboratory with all the required apparatus and staffs shall be established by the Contractor at site of work at his cost for carrying out field tests at stipulated frequencies.

Sampling and Testing

The Contractor or his accredited representative shall be present during sampling/testing and signify his concurrence for sampling / testing carried out by signing the test records. The Contractor shall be liable of all actions consequent to the test and their results as if he himself attended to the tests. The Contractor is duly advised to be present himself for sampling and testing or in the alternative, have fully qualified duly authorized Engineer for this purpose.

General list of codes, standards and specifications adopted in the tender documents

The following IS codes, ASTM, British Standards, Codes and Engineer-in-charge / PMC / Consultant Specifications have generally been adopted in the tender documents. This list however does not limit the use of any other relevant code or standards by the Engineer-in-Charge solely at his discretion either referred to in the tender documents or not, to achieve the desired quality of work. All the codes practice, standards and specifications applicable shall be the latest edition with all correction slips, etc. or as directed by the Engineer-in-Charge.

Sl.	Indian Standard	Subject
1	**Carriage of materials**	
	4082-1977	Recommendations on stacking & storage of construction materials at site.
2	**Demolition and Dismantling:**	
	1200(pt.XVIII)-1974	Method of measurements of demolition and dismantling
3	**Earth Work:**	
	1200 (Pt. I) -1992 4081-1986	Method of measurement of Earth work safety code for Blasting and related drilling Operations.
	6313 (pt. II)-1981	Anti-termite measures in buildings (Part II - Pre-constructional chemical treatment).

4	**Mortar:**	
	196-1966	Atmospheric conditions for testing

	269-1989	Ordinary, rapid hardening and low heat Portland cement
	383-1970	Coarse and fine aggregates from natural sources for Concrete
	455-1989	Portland blast furnace slag cement
	650-1991	Standard sand for testing of cement
	712-1984	Building Lines
	1489-1991	Portland Pozzolana cement
	1514-1990	Methods of sampling & Test for quick lime and Hydrated lime
	1542-1992	Sand for plastering
	1727-1967	Methods of tests for Pozzolanic materials
	2250-1981	Code of practice for preparation and use of masonry Mortar
	2386 pt. I-1977	Particle size and shape
	2386 Pt.II_1977	Estimation of deleterious materials and organic impurities
	2386 pt. III-1977	Specific gravity, density, voids, absorption and bulking
	2686-1977	Cinder as fine aggregate for use of lime concrete
	3025-1987	Methods of sampling and test (physical and chemical) water used in industry
	3068-1986	Broken brick (burnt clay) coarse aggregate for use in lime concrete (II-R)
	3182-1986	Broken brick(burnt clay) fine aggregate for use in lime mortar
	3812-1981	Fly ash
	3812pt.I	Fly ash for use as Pozzolana
	3812pt.II	Fly ash for use as admixture for concrete
	3812pt III	Fly ash for use as fine aggregate for mortar and concrete
	4031-1988	Methods of physical tests for hydraulic cement
	4032-1985	Method of chemical analysis of hydraulic cement
	4098-1983	Lime Pozzolana mixture
	6932(pt.I to X)	Methods of test for building lime
	6932 (pt.I)-1973	Determination of insoluble residue, loss of ignition, insoluble matter, silicon-dioxide, ferric and aluminum oxide, calcium oxide and magnesium oxide.
	6932 (pt.II)-1973	Determination of carbon dioxide content
	6932(pt.III)-1973	Determination of residue on slaking of quick lime
	6932 (pt.IV) -1973	Determination of fineness of hydrated lime
	6932 (ptV)-1973	Determination of unhydrated oxide
	6932(pt.VI)-1973	Determination of volume yield of quick lime
	6932 (ptVII)-1973	Determination of compressive and transverse strength
	6932(pt.VIII)-1973	Determination of workability
	6932 (pt.IX)-1973	Determination of soundness
	6932(pt.X)-1973	Determination of popping and pitting of hydrated lime

5	**Concrete work:**	
	383-1970	Coarse and fine aggregates from natural sources for Concrete
	456-2000	Code of practice for plain and reinforced concrete
	515-1959	Specifications for natural and manufactured aggregate for use in mass concrete
	516-1959	Method of test for strength of concrete
	1198-1959	Method of sampling and analysis of concrete
	1200(pt.II)-1974	Methods of measurements of cement concrete work
	1322-1982	Bitumen felts for water proofing and damp proofing
	1661-1987(pt.III)	Code of practice for application of cement lime plaster finishes
	2386-1977	Methods of test for aggregate for concrete
	2386(pt.I)-1977	Test for particle size and shape
	2386(pt.II)-1977	Test for estimation of deleterious materials and organic impurities.
	2386(pt.III)-1977	Test for specific gravity, density, voids, absorption and bulking
	238686(pt.IV)-1977	Mechanical properties
	2645-1975	Specification for integral water proofing compounds
	2686-1977	Specification for cinder aggregate for use in lime concrete
	3812-1981	Fly ash
	3812(pt.I)	Fly ash for use as pozzolana for concrete
	3812(pt.II)	Fly ash for use as admixture for concrete
	3812(pt.III)	Fly ash for use as fine aggregate for mortar and concrete
	7861-1975(pt.I)	Hot weather concreting
	7861-1981(pt.II)	Cold weather concreting
	9103-1979	Admixture for concrete

6	**RCC Work:**	
	432-1982	Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
	432(pt.I)-1982	Mild steel and medium tensile steel bars
	456-1978	Code of practice for plain and reinforced concrete
	457-1957	Code of practice for general construction of plain and reinforced concrete for dams and other massive structure
	516-1959	Methods of test for strength of concrete
	1139-1966	Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement
	1199-1959	Methods of sampling ad analysis of concrete
	1200(pt.II)-1974	Methods of measurement of cement concrete work
	1200(pt.V)-1982	Method of measurement of form work
	1343-1980	Code of practice for priestesses concrete
	1566-1985	Hard drawn steel wire fabric for concrete reinforcements

	1780-1961	Specifications for cold twisted steel bars for concrete Reinforcement
	1785-1983	Specifications for plain hard draw steel wire for pre-stressed concrete
	1786-1985	Cold twisted steel bars for concrete reinforcement
	2080-1980	Specifications for high tensile steel bars used in pre-stressed Concrete
	2204-1962	Code of practice for construction of reinforced concrete shell roof.V- Page 6 of 197
	2210-1962	Criteria for the design of steel structure and folded plates.
	2502-1963	Code of practice for bending and fixing of bars for concrete Reinforcement
	2751-1979	Code of practice for welding of mild steel bars used for reinforced concrete construction
	2911-1979	Code of practice for design and construction of pile Foundations
	2911(pt.I)-1979	Load bearing concrete piles
	2911(pt.III)-1980	Under reamed pile foundations
	3201-1988	Criteria for design and construction of precise concrete trusses
	3370(pt I to IV)-1965	Code of practice for concrete structures for storage of liquids
	3385-1986	Code of practice for measurement for Civil Engineering works.
	3414-1968	Code of practice for design and installation of joints in Buildings
	3588-1987	Code of practice for use of immersion vibrators for consolidating concrete
	3935-1966	Code of practice for composite construction
	4014-1967(pt.I & II)	Code of practice for steel tubular scaffolding (I: Definition / Material: II: Safety Regulations)
	4990-1981	Specifications for plywood for concrete shuttering work
	10262	Code of practice for design mix

7	**Equipment:**	
	460-1985	Specification for test sieves
	1791-1985	Specification for batch type concrete missed
	2430-1986	Specification for roller pan mixer
	2585-1968	Specification for concrete vibrators, immersion type
	2806-1964	Specification for screen board concrete vibrators
	2514-1963	Specification for concrete vibrating tables
	3366-1965	Specification for pan vibrators
	4656-1968	Specification for form vibrators for concrete
	2722-1964	Specification for portable swing weight batchers for concrete
	2750-1964	Specification for steel scaffolding.

8	**Brick work:**	
	1200(pt.III)-1976	Method of measurements of brick work
	2116-1980	Sand for masonry mortars
	2212-1962	Code of practice for brick work
	2250-1981	Code of practice for preparation & use of masonry Mortar
	IS 2572-2005	Construction of hollow and Solid Concrete Block Masonry

11	**Wood work:**	
	204-1991/92	Tower bolts (Part 1-1991:ferrous metals : part –II-1992: non ferrous metals)
	205-1992	Non-ferrous metal butt hinges
	206-1992	Tee and strap hinges
	207-1964	Gate and shutter hooks and eyes
	208-1987	Door handles
	281-1991	Mild steel sliding door bolts for use with padlocks
	287-1973	Recommendation for maximum permissible moisture contents of timer used for different purposes.
	303-1989	Plywood for general purpose
	362-1991	Parliament hinges
	363-1993	Hasps and staples
	364-1993	Fanlight catch
	401-1982	Code of practice for preservation of timber
	451-1973	Technical supply condition for wood screws
	452-1973	Door springs, rail-tail type
	453-1993	Double acting spring hinges
	723-1972	Steel counter sunk head wire nails
	729-1979	Drawer locks, cup board locks and box locks
	848-1974	Synthetic resin adhesive for plywood (phenolic and amino plastic)
	851-1978	Synthetic resin adhesive for construction work
	852-1994	Specifications for animal glue for general wood working Purposes
	1003	Timer paneled and glazed shutters
	1003(pt.I)-1991	Door shutters
	1003(pt.-II)-1994	Window and ventilator shutters
	1019-1974	Rim latches
	1141-1993	Code of practice for seasoning of timer
	1200	Method of measurement and Building of Civil Engineering Works
	1200(pt.XIV)-1984	Glazing
	1200(pt.XXI)-1973	Wood work and joinery
	1322-1993	Bitumen felts for water proofing and damp proofing

	1328-1982	Veneered decorative plywood
	13+41-1992	Steel Butt hinges
	1378-1987	Oxidized copper finished
	1568-1970	Wire cloth for general purposes
	1629-1960	Rules for grading of out size of timer
	1658-1977	Fiber hard board
	1659-1990	Block boards
	1823-1980	Floor door stoppers
	1868-1982	Anodic coating on Aluminum
	1911-1967	Schedule of unit weights of building materials
	2191-1983	Wooden flush door shutter (cellular and hollow core type)
	2191(pt.I)-1983	Plywood face panels
	2191(pt.II)-1983	Particle board face panels for wooden flush door shutters
	2202	Wooden flush door shutters (solid core type)
	2202(pt.I)-1991	Plywood face panels for wooden flush door shutters
	2202(pt.II)-1983	Particle board face panels for wooden flush door shutters
	2209-1976	Mortise locks (vertical type)
	2380-1981	Method of test for wood particle board and boards from lignocelluloses materials
	2681-1993	Non-ferrous metal sliding door bolts for use with pad locks
	2835-1987	Flat transparent sheet glass (3rd revision)
	3087-1985	Wood particle boards (medium density) for general purpose
	3097-1980	Veneered particle boards (1st Revision)
	3400	Method of test for vulcanized rubbers
	3400(pt.II)-1980	Hardness
	3400(pt.IV)-1987	Accelerated aging
	3400(pt.IX)-1978	Relative density and density
	3564-1986	Door closers (hydraulically regulated)
	3618-1966	Phosphate treatment of iron and steel of protection against corrosion
	3813-1987	“C” hooks for use with swivels
	3818-1992	Continuous (piano) hinges
	3847-1992	Mortise night latches
	4020-1967	Methods of tests for wooden flush doors (type tests)
	4021-1983	Timber door, windows and ventilator frames
	4827-1983	Electroplated coating of nickel and chromium on copper and copper alloys.
	4948-1974	Welded steel wire fabric for general use
	4992-1975	Door handles for mortise locks (vertical type)
	5187-1972	Flush bolts
	5523-1983	Method of testing anodic coating on aluminum and its alloys
	5930-1970	Mortise latch (vertical types)

	6318-1971	Plastic window stays and fasteners
	6607-1972	Rebated mortise locks (vertical type)
	6760-1972	Slotted countersunk head wood screws
	7196-1974	Hold fasts
	7197-1974	Double action floor springs (without oil check for heavy doors)
	7534-1985	Mild steel bolts with holders for padlocks

12	**Steel Work:**	
	63-1978	Whiting for paints
	198-1978	Varnish, gold size
	226-1975	Structural steel (standard quality)
	277-1985	Specification for galvanized steel sheets (plain and corrugated)
	278-1978	Galvanized steel barbed wire for fencing
	800-1984	Code of practice for use of structural steel in General building construction.
	806-1968	Code of practice for use of steel tube in general building construction
	813-1986	Scheme of symbols for welding
	814-1991	Covered electrodes for metal are welding of structural steel.
	814(pt.I)-1974	For welding products other than sheets
	814(pt.II)-1974	For welding sheets
	815-1974	Classification and coding of covered electrodes for metal are welding of mild steel and low alloy high tensile steel.
	817-1966	Code of practice for training and testing of metal are welders
	818-1968	Code of practice for safety and healthy requirements in electric and gas welding and cutting operation.
	1038-1983	Steel doors, windows and ventilators
	1081-1960	Code of practice for fixing and glazing of metal (steel and aluminum) door, windows and ventilators)
	1148-1982	Hot rolled steel river bars (up to 40mm diameters) for structural purposes
	1161-1979	Steel tubes for structural purposes
	1182-1983	Recommended practice for radiographic examination of fusion welded joints in steel plates
	1200-1974	Method of measurements of steel work and iron works
	1363-1984	Hexagon bolts, nuts and lock nuts (dia 6 to 39mm) and black hexagon screws (dia 6 to 24 mm)
	1599-1985	Method for bend test for steel products other than sheet, strip, wire and tube
	1608-1972	Method for tensile testing of steel products
	1821-1987	Dimensions for clearance holes for metric bolts

	1852-1985	Rolling and cutting tolerance for hot rolled steel products
	1894-1972	Method for tensile testing of steel tunes
	1977-1975	Structural steel (ordinary quality)
	2062-1984	Structural steel (fusion welding quality)
	4351-1976	Steel door frames
	4736-1986	Hot-dip zinc coatings on steel tubes
	6248-1979	Metal rolling shutters and rolling grills
	7452-1990	Hot rolled steel sections for doors, windows & ventilators

13	**Flooring:**	
	210-1978	Grey iron casting
	653-1992	Sheet linoleum
	777-1988	Glazed earthen-ware tiles
	809-1992	Rubber flooring materials for general purpose
	1122-1974	Methods for determination of specific gravity and porosity of natural building stones
	1124-1974	Method of test for water absorption of natural building stones
	1130-1969	Marble (blocks, slabs and tiles)
	1197-1970	Code of practice for laying of rubber floors
	1198-1982	Code of practice for laying and maintenance of linoleum floors
	1200(pt.XI)-1977	Method of measurements of paving and floor finished
	1237-1980	Cement concrete flooring tiles
	1443-1972	Code of practice for laying and finishing of Cement concrete flooring tiles
	1661-1972	Code of practice for application of cement and cement lime plaster finishes
	2078-1979	Method of tensile testing of gray cast iron
	2114-1984	Code of practice for laying in situ terrazzo floor finish
	2571-1970	Code of practice for laying in situ cement concrete flooring
	3400	Method of test of vulcanized rubbers
	3400(pt.II)-1980	Hardness
	3400(pt.X)-1977	Compression set at constant strain
	3462-1986	Flexible PVC flooring
	8318-1969	Code of practice for laying of flexible PVC sheet & tiles flooring
	5389-1969	Code of practice for laying hardwood parquet and wood block floors

14	**Roofing :**	
	73-1992	Paving Bitumen
	277-1992	Galvanized Steel sheets (plain and corrugated)
	458-1988	Concrete pipes (with and without reinforcement)

	459-1992	Un reinforced corrugated and semi corrugated
	651-1992	Asbestos cement sheets
	702-1988	Salt glazed stone ware pipes and fittings
	1199-1959	Industrial Bitumen
	1200(pt.IX)-1973	Method of sampling & analysis of concrete
	1200(pt.X)-1973	Method of measurements of roof covering (including cladding)
	1202-1978	Method of measurements of ceiling and lining
	1203-1978	Determination of specific gravity for testing Tar and Bitumen
	1205-1978	Determination of penetration for testing Tar and Bitumen
	1208-1978	Determination of Ductility for testing Tar and Bitumen
	1209-1978	Determination of flash point and fire point for Testing tar and bitumen
	1211-1978	Determination of water content for testing Tar and bitumen
	1212-1978	Determination of loss on heating for testing Tar and bitumen
	1216-1978	Determination of solubility in carbon disulphide for testing Tar and bitumen
	1322-1993	Bitumen felts for water proofing and damp proofing
	1346-1976	Code of practice for waterproofing of roof with Bitumen felts
	1609-1991	Code of proactive for laying damp proof treatment using bitumen felts
	1626-1994	Asbestos cement building pipes, gutters and fittings (spigot and socket types)
	1834-1984	Specification for hot applied sealing compounds for joints in concrete
	1838-(pt.I)-1983	Preformed filler for expansion joints in concrete non-extruding and resilient type (bitumen impregnated fiber)
	2115-1980	Code of practice for flat roof finish mud phuska
	2633-1986	Method of testing uniformity of coating on zinc coated articles
	3007-(pt.I-1964	Code of practice for laying of corrugated asbestos cement sheet
	3348-1965	Fiber insulation boards
	3607-1979	Magnetite for chemical industry
	7193-1994	Specifications for glass fiber base coal tar pitch & Bitumen felts
	8183-1993	Bonded mineral wool

15	**Finishing :**	
	75-1973	Linseed oil, raw and refinery
	77-1976	Linseed oil, boiled, for paints
	102-1962	Ready mixed paint, brushing, red, lead for priming and general purposes
	103-1962	Ready mixed paint, brushing, white lead for priming and general purposes

	104-1979	Specification for ready mixed paint, brushing, Zinc chrome priming
	133-1993	Enamel, interior (a) under coating (b) finished colour as required
	137-1965	Ready mixed paint, brushing, matt or egg-shell flat, finishing,
		interior, to Indian Standard colour, as required
	158-1981	Ready mixed paint, brushing, bituminous, black lead free acid alkali, water and heat resting for general purposes
	168-1993	Read mixed paint, air drying for general purpose
	217-1988	Cut back bitumen
	218-1983	Creosole and anthracene oil for use as wood preservatives
	290-1961	Coal tar black paint
	337-1975	Varnish, finishing interior
	338-1952	Varnish, under coating exterior, natural resin
	339-1952	Varnish under coating, exterior, synthetic resin
	340-1978	Varnish mixing
	341-1973	Black Japan, type A, B and C.
	345-1952	Wood filler, Transparent, liquid
	347-1975	Varnish shellac for general purpose
	348-1968	French polish
	419-1967	Putty for use of window frames
	427-1965	Distemper, dry, colour as required
	428-1969	Distemper., oil emulation, colour as required
	524-1983	Varnish, finishing exterior, synthetic
	525-1968	Varnish, finishing exterior and general purposes
	533-1973	Gum spirit of turpentine (oil of turpentine)
	712-1984	Specification for building limes
	1200(pt.XII)-1976	Method of measurements of plastering and pointing
	1200(pt.XIII)-1987	Method of measurements of white washing
	1200(pt.XV)-1987	Method of measurements of painting, polishing & varnishing
	2095-1982	Gypsum plaster boards
	2096-1992	Asbestos cement flat sheets
	2339-1963	Aluminum paint for general purposes, in dual container
	2547-1976	Gypsum building plaster
	2932-1994	Enamel synthetic, exterior (a) Under coating (b) Finishing
	2933-1975	Enamel, Exterior (a) Under coating (b) Finishing
	5410-1992	Cement paint, colour as required
	5411(pt.I)-1974	Plastic emulsion paint for interior use
	6278-1971	Code of practice for white washing & colour washing

16	**Safety Codes:**	
	818-1968	Safety and healthy requirements in Electric and gas welding and cutting operations
	3698-(pt.I)-1987	Safety code for scaffolds
	3696(pt.II)-1966	Safety code for ladders
	3764-1966	Safety code for Excavation works
	4081-1986	Safety code for blasting and related drilling operation
	4130-1976	Safety code for demolition of building
	5916-1970	Safety code for construction involving use of hot bituminous materials
	6922-1973	Structure subject to underground blasts code of practice for safety and design for
	7293-1974	Working with construction machinery safety code

SPECIALIZED ITEMS SPECIFICATIONS

Item No. 6.10 DRY STONE CLADDING

Providing and fixing dry cladding up to 10 metre heights with gang saw cut stone with (machine cut edges) of uniform colour and size up to lm x lm (as per Architectural drawing, and as per direction of Engineer in-charge), fixed to structural steel frame work and/ or with the help of cramps, pins etc. and sealing the joints with approved weather sealant etc complete (The steel frame work, stainless steel cramps and pins etc. shall be paid for separately.)

White sand stone/ Dholpur pink stone - 30 mm thick gang saw cut stone

Stone shall be of the type as specified in the item. It shall be hard, sound durable and tough free from cracks, decay and weathering and defects like cavities cracks, flaws, holes, veins, patches of soft or loose materials etc. Thickness of stone shall be as specified

Stone shall be cut with the gang saw to the required size and shape on all beds and joints so as to free from any waviness and to give truly vertical horizontal surface as required. The exposed face and sides of stones forming joints shall be such that the straight edge laid along the face of the stone is in contact with every point on it. All the visible angle and edges shall be square and free from chipping. The dressed stone shall be of the thickness specified with permissible tolerance of ± 2 mm. Before starting the work, the contractor shall get the samples of stone approved by Engineer-In charge.

Approved sample shall be kept in custody of Engineer-in-Charge and stones supplied and used on the work shall conform to sample with regard to soundness, colour, veining and general texture. The stone shall be cut by gang saw into slabs of required thickness along the places parallel to the natural bed.

When necessary double scaffolding for fixing the stone at greater heights, jib crane or other

mechanical appliances shall be used to hoist the heavy pieces of stone and placed them into correct positions. Care shall have to be taken that corners of the stone are not damaged. Stone shall be covered with gunny bags before tying chain or rope is passed over and it shall be handled carefully. No pieces which has been damaged shall be used that work

Stacking and Storing

Stone slabs are thin and brittle and should never be stacked flat across timber supports. They should therefore, be stacked on edge on timber or like runners. Packing pieces inserted between the slabs may be rope or timber. Slabs shall be well covered with plastic sheeting to protect them from any possible staining.

Scaffolding

Double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. Nothing shall be paid extra upto height of 10 Meter.

Fixing

The size & shape of the cramps shall be as per drawing and as per directions of Engineer-in-charge. The samples of steel cramps should be approved in advance before starting the stone cladding work.

The cramp shall be attached to top and bottom of the stone. The cramps shall have inbuilt adjustment for vertical and horizontal alignment. The cramps used to hold support and transfer the load of stone unit to the supporting structured steel shall be designed by the manufacturer and approval of the same shall be obtained from the Engineer-in-Charge.

The minimum number of clamps required shall be as per requirement of design to carry the load of individual stone slabs. The cramps shall be spaced not more than 60 cm horizontally and vertically along the stone side for insertion of pins / bolt attached with the steel cramps. Adequate cutting in stone shall be made with precision instrument to hold the cramps pins at the joints.

Stone shall be secured with clamps with high quality workmanship. The walls shall be carried up truly plumb. All the courses shall be laid truly horizontal and all the vertical joints truly vertical. The sequence of execution for cladding work shall be approved by the Engineer-in-Charge.

Jointing:

Joints horizontal and vertical shall be filled with weather sealant of make as approved by Engineer-in-charge with the help of pouring gun for filling the sealant. Before filling the joint with sealant, masking tape are required to be fixed on stones surface on both edges of joints of the stones, so that sealant may not spoil the surface of the stone. When all the joints are filled and sealant has dried, the masking tape may be removed.

Protection:
Work shall be protected from rain by suitable covering. The work shall also be suitably protected from damage and rain during construction.

Measurement:
The length and breadth shall be measured correct to a cm. The area shall be calculated in square meter correct to two places of decimal. Any opening of area 0.01 sqm. or less shall not be deducted.

ITEM No. 11.0 SIGNAGE:

The sign letters shall be made of standard stainless-steel alloy of no 304, to offer corrosion free and weather resistant characters. The edges of all faces on letters and logos shall have thin lines of exposed stainless steel that will be buffed smooth on polished letters to maintain consistency in appearance. The material should be 22 gauges and height of letter as specified in BOQ. The letter returns are to be produced from narrow band material or cut to size based on the desired letter depth and bent to the contour of the laser cut faces to produce a hollow backed letter with 90 deg. angle edges that have clean, crisp corners and hand soldered using lead -free silver solder. The letters are to be polished after buffing and stroking. It should be of single directional polish. While 3D box is made of stainless steel, the front plate shall be acrylic of 1/4" thickness, translucent for transmitting light from rear; the characters are to be laser cut and polished edges. The light source is to be fitted inside the box. Brackets are to be soldered on the inside of the metal sign letters to receive threaded studs. The letters shall be LED lit to create internally illuminated signage.

WARRANTY/GUARANTEE:

1) A copy of three years outdoor exposure report for the product offered shall be submitted. The report shall Warranty of Seven years (in Original) from the retro reflective sheet & VHB Tape Manufacturer be attested by the retro reflective sheeting manufacturer, the performance reading after three years, must be at least 80% of the minimum values mentioned in ASTM D 4956-07 type-IX sheeting performance table.

2) Self attested copy of laboratory test report from reputed and independent laboratory like CRRI Delhi /CALCOAST California or equivalent must be submitted. The proposed sheeting should have been tested for various peeling, blistering adhesive etc. as per test method prescribed by ASTM D-4956-07 and ASTM E-810. The report should be clearly mentioned the sheeting to have passed all the above tests.

Signages will be provided & installed as per below reference images: -
Reference Image for item No. 11.1 & 11.2: -

Reference image for item No. 11.3: -

Signage made in Lit Acrylic letters 450mm height mentioning “I ♥ IIIT SRI CITY CHITTOOR” with suitable pedestal.

Reference image for item no. 11.4: -

LIST OF APPROVED MAKES (CIVIL & INTERIOR WORKS)

S No.	MATERIAL	APPROVED MAKES
	Civil Works	
1	Anti-Termite Chemical	Vam Organic / NOCIL / Bayer / Fosroc Chemicals (India) Ltd / Lupin
2	Cement	ACC/ Birla / Ultratech / JK / Ambuja / Shree
3	TMT Steel	TATA TISCO / SAIL / JSW Steel / Vizag Steel
4	Bitumen Impregnated Expansion Board	Bengal Chemical Ltd./ STP
5	Construction Chemicals & Plasticisers	Fosroc / Roff / Pidilite / Sika
6	Bitumen	Aggarwal/ Tiki Tar/ Bitumen India/ Bitcol
7	Non Shink Grout	Fosroc / Sika / BASF / Soprema/ Pidilite
8	Water Proofing Chemicals & Membranes	Fosroc / Sika / BASF / Soprema/ Pidilite
9	Geotextile fabric	Manas/ Suntek/ Ocean/ Parishudh/ Parry/ J.T. Fabric
10	UPVC Pipes	Astral/ Supreme/ Finolex
11	Autoclaved aerated concrete Block	Magicrete/ PrimeACC/ Biltech
12	Welded Mesh	Swish Weldmesh / IRC/ Multiweld Wire Co.
	Wall Finishing Work	
13	White Cement Based Putty	Birla/ JK/ British paint
14	Non pigmented Textured Paints	Ultratech/ Asian/ Berger/ SKK
15	Internal Texture Paint (wall & ceiling)	Oikos/ Asian/ Ultratech
16	Cement based Paint	Snowcem / ICI/ Berger
17	Acrylic Smooth exterior paint	Asian / Nerolac / Berger/ Dulux/ ICI
18	Acrylic interior paint	Asian / Nerolac / Berger/ Dulux/ ICI
19	Dry Distemper /OBD	Asian / Nerolac / Berger / Dulux / ICI
20	Ceramic glazed wall tiles	Nitco / Kajaria / Johnson / RAK / Somany
21	Acoustical Insulation	UP Twiga / Lloyd Insulation
22	Lacquered Glass	Saint Gobain Planique/ AIS /Modi
23	Anti-Fungal Paints	Asian / Dulux / ICI / Berger
24	Glass partitions & Doors profiles	Dorma/ Jeb/ Alloy
25	Frosting Film	3M/ Llumar/ LG
26	Epoxy Paint	Asian/ Sika/ Neo/
27	Plywood, Block Boards, Particle Boards	Green/ Century/ Archid/ Kitply/ Duro
28	Upholstery Foam	Sheela/ Allied/ Flexipol/ SKPI/ Jumex/ Suryaa
29	Calcium silicate board, tiles & panel	Ramco/ Aerolite/ Armstrong
30	MDF Board	Greenpanel/ Century/ Actiontesa
31	Mirror	Modiguard / Saint Gobain/ AIS
32	Plaster of Paris	Sakarni/ Shriram/ Superfine/ JK
33	Changing room lockers	Godrej / green lam / equivalent
34	PVC seating for halls	Innovative Seatings / KF systems /equivalent
35	Storage Rack	Godrej/ Silverlining/ Giraffe/ Spider/ Mex

	Steel Work & Roofing	
36	Structural Steel Section	Tisco/ SAIL/ Apollo/ Vizag/ JSW
37	Structural Steel tubular Section	Tata Structura/ Apollo Steel Pipes/ SAIL/ Kalinga/ JSW
38	Welding Rods	Advani/ Esab/ Nucor
39	Mild Steel Plates, Flat, Angles, Chequred Plate	Tisco/ SAIL/ Apollo/ Vizag/ JSW
40	Stainless Steel	Salem/ Jindal
41	Synthetic Enamel Paint	Asian / Nerolac / Berger / Dulux / ICI
42	Deck sheeting	Tata/ SAIL/ Lloyd/ Jindal/ Essar/ JBP
43	Fire rated Paint	Akzo Nobel Coatings Pvt. Ltd./ Asian Paints Ltd.
44	Roof Sheeting	Tata Bluescope/ Multicolor/ Jindal
45	Multiwall/ Plain Polycarbonate	Danpal/ DPI Daylight / Polygal / Coxiwell
	Flooring Works	
46	Vitrified Tiles	Nitco / Kajaria / Johnson / RAK / Somany / Restile
47	Tactile tile	Johnson / Somany / Restile
48	Tile Adhesive	Laticrete / Ardex Endura / Weber
49	Epoxy Filler Grout	Laticrete / Ardex Endura / Weber / Fosroc/ Sika/
50	Floor Surface Hardners	Fosroc/ BASF /Sika
51	Glass Fiber reinforcement	Recron/ UP Twiga/ Owenscorning
52	Acrylic emulsion cement modified and water based concrete bonding agent	Sika/ Fosroc/ Pidilite/ Soprema
53	Epoxy urethane joint Sealer	Fosroc/ Sika/ Laticrete / Ardex Endura / Weber /
54	Road marking Paint	Asian PPG/ ITS coating/ Kataline
55	Self Levelling screed	Fosroc/ Dubond/ Neocrete
56	Bamboo plank Flooring & Cladding work	Epitome / equivalent
57	Heavy Duty Door Mats made with flexible vinyl (Virgin PVC)	3M or equivalent
	Ceiling Works	
1	Gypsum board/Tiles ceiling	Saint Gobain Gyproc/ Lafarge Boral Gypsum/ USG Knauf/
2	Calcium silicate board/Tiles Ceiling	Ramco/ Aerolite/ Approved equivalent
3	Mineral fibre tiles Ceiling	Armstrong/ Saint Gobain/ USG Knauf/ Anutone
4	Open cell ceiling	Durlum/ Lindner /Hunter Douglas/ Armstorng
5	Acoustical Glass wool ceiling	Ecophone/ Armstrong/ USG Knauf/
6	Acoustical Baffle	Ecophone/ USG/ Knauf/ Armstrong
7	Acoustical Spray Plaster	Ecophone/ Asona/ Approved equivalent
	Door, Windows & Coverings	
8	Flush Doors	Duro/ Century/ Green/ Merino/ Mayur/ Kitply
9	Laminates	Greenlam / Merino/ Formica/ Century

10	Veneer	Decowood Green/ Duro/ Century
11	Stainless Steel hardware	Ozone/ Geze/ Dorma/ haffele/ Hettich
12	Fire rated Door hardware	Hormann/ Geze/ Dorma/ Assa Abloy
13	Aluminium Extrusion	Jindal/ Hindalco/ SAPA/ Bourka/ Century/ Global/
14	Aluminium Hardware	Alualpha/ Lavaal/ Giesse/ Kinlong
15	Aluminium Louvers	Technal/ Fasado/ Vitrocsa/ Sapa/ VS1/ Wicona
16	Microwave Cured EPDM Gasket	Avigiri/ Kotwan/ Osaka
17	Aluminium Skirting, Corner, Groove, covering, transit profiles	Alucraft/ Baux/ Dural trims
18	Fire Rated Steel Door	Shaktihormann/ Navair/ Sukri/
19	General Steel Door	Shaktihormann/ Navair/ Sukri/
20	Acoustical Steel Door	Shaktihormann/ Navair/ Sukri/
21	Fire rated Glazed Door	Shaktihormann/ Navair/ Sukri/
22	Toilet Partitions/ Cubicles	Greenlam/ Merino
23	Window Blinds	Hunter Douglas/ Vista/ De Décor/ MAC
24	Wood Adhesive	Fevicol / Jivanjor / Vamicol
	Façade Work	
25	Aluminium Extrusions	Jindal / Bhoruka / Sapa /Hindalco
26	Reflective Glass	Saint Gobain /Guardian / Sisecam/ Asahi
27	Clear Float Glass	Saint Gobain /Guardian / Sisecam/ Asahi
28	Fire Rated Glass	Saint Gobain / Pilkington / Schott
29	Glass Processing	Saint Gobain / GlassTech / Sejal / FG / Fuso / Asahi / Impact Safety
30	PVB Lamination	Kuraray
31	SGP Lamination	Kuraray
32	Weather Sealant	Sika / DowCorning / Momentive
33	Structural Sealant	Sika / DowCorning / Momentive
34	ACP	Alpolic / Alucobond / Reynobond / Alstone / Virgo
35	Solid Aluminium Sheet	Novelis / DWALL Metallic
36	Anchor Fastners	Hilti / Fischer / Mungo
37	Anchor Channels (Cast in Channel)	Halfen / Hilti / Jordhal
38	EPDM & Silicon Gasket	Amee Rubber / Osaka / Eltech
39	Powder Coating	Jotun / Akzonoble
40	PVDF Coating	Valspar / PPG / Akzonoble
41	Powder & PVDF Processer	SP Coating / MJ Coaters / Aura International
42	Spacer Tape (Open PU	
43	Cell)	Norton / BOW
44	Glass wool (Insulation)	UP Twiga / Rockwool
45	Rock wool (Fire Stop)	Siderise / Hilti
46	Smoke Seal Intumescent	Siderise / Hilti
47	Baker Rod	Supreme Industries
48	SS Spider Fittings	Dorma / Kin Long

49	SS Patch Fitting	Dorma / Kin long/ Kaba
50	Automatic Sliding doors	Dorma / Geze / Kaba
51	Revolving Doors	Dorma / Boonedam / Kaba
52	SS Clamps (Stone cladding)	Hilti / Blick
53	Mild steel	Jindal / Sail / Tata
54	Stainless Steel	Salem Steel
55	Façade Systems	Technal / Schueco / Aluk/ Fasado
56	Anodizing	Dow Chemicals
57	Accessories	
57.01	SS Friction Hinges	Giesse / Cotswold / Securistyle / system based
57.02	Multipoint Locking sets	Giesse / Cotswold / Securistyle / system based
57.03	Handle	Giesse / Cotswold / Securistyle / system based
57.04	Rollers for Slidings	Giesse / Alualpha / Savio / Alutech / Lavaal
57.05	Flush lock for Slidings	Giesse / Alualpha / Savio / Alutech / Lavaal
58	Stainless Steel Cramps	Hilti / Fischer/ Canon
59	GRC Jali	Unistone/ Birla/ Everest/ Shenisha
60	Alumnium Expanded Metal Jali System	Citadel/ PEMPL /
61	Aluminium Louvered System	Hunter Douglas/ Durlum/ Lindner
62	Aluminium composite panel	Alucobond/ Eurobond/ Aludecor/ Reynobond/ Alstone/ Alstrong
63	SS wire grill system	Nitin Wire/ Satyam Impex/ Chirag Enterprises
	Road Work	
64	Bitumen	Aggarwal/ Tiki Tar/ Bitumen India/ Bitcol
65	Interlocking concrete Paver Block	As per approved sample
	Lifts (Elevators)	
66	Passenger Lift	Otis/ Kone/ Schindler/ Mitsubishi
67	Good Lift	Johnson/ TKE/ Otis

PREAMBLE TO SCHEDULE OF QUANTITIES

The conditions of contract and the drawings shall be read in conjunction with the specifications and matters referred to, shown or described in one are not necessarily repeated in the other. These specifications are comprehensive but may exceed the requirements of this project. Any ambiguity between the General Specifications, the Bill of quantities and contract drawings, shall be referred to the Engineer-In-Charge through PMC for clarification not later than 10 days before the date fixed for delivery of Tenders. Any ambiguity may be referred to the Engineer-In-Charge through PMC after signing of the contract and Engineer-In-Charge shall give a ruling which shall prevail. No claim for additional cost due to above, however, will be entertained.
Notwithstanding the sub-division of the specification into various headings, every part of it is to be deemed supplementary to every other part and is to be read with it, so far as it may be practicable so to do, or when the context so admits.

In this contract, reference is made to the Indian Standards or Engineer-in-charge / PMC / Consultant specification as approved by Engineer-In-Charge and these references shall be deemed to include the latest editions or issue of standards, specifications or By-Law including all revisions upto the date of invitation of Tenders. The contractor shall ensure that all materials and workmanship in so far as they apply to this contract shall comply in every specifications or any other equivalent or specification approved by the Engineer-In-Charge.
The Contractor shall keep at site copies of all relevant standards and codes of practice referred in these specifications throughout the period of contract. These shall be the latest editions and shall include all revisions/ addendums thereof.

Approved Manufacturers: Names of approved manufacturers are given in the specifications.
Reference in the specifications to approved manufacturers shall be construed as establishing a standard of quality and not as limiting competition.

The Contractor shall include in his prices for supplying the item or materials from the approved manufacturers listed or equal and approved.

All items or materials shall be delivered to the site in the manufacturers original unopened containers with the manufacturers brand and name clearly marked on.

All items or materials shall be assembled, mixed, fixed, applied or otherwise incorporated in the works in accordance with the printed instructions of the manufacturer of the item or materials.
Date of construction to be written on all respective items for monitoring curing.

Contractor shall follow the pour card/check list for all the concrete / finishing items on prescribed formats.

SITE DEVELOPMENT AND EARTH WORK

- **The rate of items in this section also to include:**

1. Measurement of excavation for payment shall be recorded only for the plan dimensions of the +500mm from RCC edge under foundation provided in the structure drawings. Excavation for working space and slopes for soil stability shall not be measured and paid.
2. During the excavation if required Contractor has to arrange & run Dewatering Bore to maintain site water table below 1 mtr from deepest foundation level including casing, perforated pipes, soil filter, Submersible pumps, connecting wire, including all tools and tackles, connecting the discharge pipe to nearest drain from site premises. Contractor must ensure all safety and ensure backup pumps in case of any breakdown. The complete system is to be installed as per the engineer's satisfaction. Cost is inclusive of Providing and running Diesel Generator (1 Running/ 1 Standby) with required fuel. Contractor has to arrange & maintain temporary drainage system till completion of Dewatering. No extra amount shall be claimed by the contractor on this account and his quoted rates shall be deemed to include dewatering if required. The Contractor to make his assessment for the same.
3. Stacking of excavated earth within the site including handling.
4. Site clearance such as clearing of shrubs, brushwood, undergrowth, roots and small trees not exceeding 30cm in girth measured at 1m above ground.
5. Setting out the work, profiles, bench marks etc.
6. Excavation either straight or curved in plan or to any desired shape or slope.
7. Provision of adequate barriers, Signage's, lighting, and gangways across excavated area open trenches etc. for protection of workmen and public.
8. Getting out and throwing spoil clear of area being excavated or disposing clear of edge of excavation to avoid falling in, as directed by the Engineer-In-Charge.
9. Trimming all sides, plumb and square, levelling all bottoms, clearing out loose earth, slips and falls from excavations before concreting. Work at all depths and locations, unless otherwise specified.
10. Bailing, pumping out or removing all water which may accumulate in the excavation from all causes. Necessary shoring, strutting, battening, benching. Contractor to submit methodology & design.
11. Signing guarantee Performa for anti-termite treatment i.e. satisfactory performance for minimum of 10 years from the date of final completion of project on an approved proforma. The guarantee shall be executed and extended by the Contractor and not by the anti-termite agency.
12. Conducting laboratory or field test for soil compaction. Compacted volume of earth shall be measured for payment at true location of filling.
13. All excavated material shall be the property of the owner or otherwise as specified in the Items. Excavation and disposal for basement shall be done by mechanical means and equipment. Dismantling & disposal of any structure / construction in excavation area.
14. Manual dressing to achieve the final level as directed by structural engineer.

15. Royalty & other taxes payable. Compliance with all stipulation of technical specification.

CONCRETE WORKS (PLAIN AND RCC)

- **The rates for all items under this section also to include:**

1. Generally, all concrete work shall be as per IS-456 (latest edition) characteristic strength (28 days) shall be 20 N/sq. mm, 25 N/Sq mm, 30 N/Sq mm and 35N/sqmm as may be specified on drawings. The rate of all items to include for mix designs for various strengths and workability and routine cube testing at various stages for strength as required. Cost of concrete admixtures is included in the quoted rates, the use of which shall be approved by the Engineer-In-Charge. The rates shall include for providing all materials, mixing, placing, compacting, cutting, finishing, placing inserts, holding down bolts and flanges, sleeves, puddle flanges, embedding all services pipes, boxes, hooks etc. as shown in drawings at correct location level with required changes in form work, reinforcement etc., complete. All RCC works and all concrete shall be machine vibrated. Formwork and reinforcement are measured separately. All concrete shall be with 20mm and downgraded nominal size stone aggregates except specified otherwise. Curing of the concrete shall be as per IS-456 (Latest Edition). All RCC work will be measured and paid as laid, quantity for both the case by using RMC or by using cast in situ concrete with batching plant. No payment will be made according to the supply quantity.
2. The rate of reinforcement work shall include for handling/ storing clearing of rust, straightening, bending and placing, binding, fixing in proper position at any height/level with 18 gauge annealed binding wires, necessary chairs, spacer bars, wastage and cement mortar cover blocks at proper positions to maintain proper cover as per IS-456 (Latest Edition). Reinforcement shall be bent in accordance with IS-2502.
3. Inverted cantilever, Circular / Curved, offsets, Projection, fins, bands, nibs and sloping members on slab, beams, columns, staircase including drilling, cutting, bonding agent complete to the satisfaction of Engineer-In-Charge etc.
4. Holes and openings in RCC slab/walls, parapet, masonry works, pockets in machine foundation, beam, parapets, for rainwater pipe or spouts and plumbing pipes shall be left at the time of concrete casting or raising masonry and making good after fixing fixtures.
5. If in the opinion of the Engineer-In-Charge, any surface other than specified for obtaining patterns in exposed surface in concrete under specific items, is asked to be left unrendered and painted, then the item will not be measured as item concerning exposed surface and no extra for any reason will be allowed.
6. Jointing new work with the existing concrete/brickwork including shuttering and approved bonding agent for construction joints.
7. Reinforcement shall be paid separately by weight actually placed in position as per the bar bending schedule, to be prepared by the contractor and approved by the Engineer-in-charge. The weight shall be taken as per IS Code for the particular diameter. Rates quoted for reinforcement shall include for cutting, bending, binding the reinforcement bars in any shape, hoisting to all leads and lifts and placing in any position as per detailed drawings, including providing precast cement concrete cover blocks of required thickness for keeping bars in position. 18 gauge annealed binding wire for tying for reinforcement shall be provided by the contractor. The contractor should cover for this in his overall rate for the reinforcement rates including removing rust, Mill scales, oil, grease, paint etc. from reinforcing bars.
8. Generally, in items for form work rate to include for form work, centring, shuttering, boxing propping including special nuts, bolts etc. in perfect line, level, plumb and if

required to provide camber, slope and removal thereof. Colourless shuttering oil or grease of approved quality shall be applied to forms before placing steel. Rate to include for any shapes including offsets/ chamfering in columns, residues, grooves, drip moulds, irregular shapes etc. Mode of measurement shall be in sqm regardless of shape, size and thickness of members. Stripping time for the formwork, centring and dropping shall be as per IS-456 (Latest Edition).

9. Work at all heights, depths & levels irrespective of individual storey.
10. Work in narrow widths, Piece meal/ small work, screeding under floor etc.
11. All staging upto any height and scaffolding work shall comprise of MS Pipes/ Structural steel sections with necessary coupling arrangement. (NO WOODEN BALLIES / PROPS WILL BE PERMITTED). Adequate size foundation blocks / base plates shall be provide below staging members to disperse the loads as per the founding strata.
12. Contractor shall set up on site concrete pump, hoists, tower cranes, passenger elevator, automatic microchips controlled Batching plant of capacity 10 cum per hour or more complete with silos/ stock piles for cement and aggregates, and also a D.G. set to be provided for uninterrupted supply of concrete. Use of batching plants for all concrete work is mandatory.
13. Providing grooves, drip molds, molds, chamfers, curved surfaces, and ornamental works in RCC members as per drawing and finishing to specified shape.
14. Forming all expansion and / or construction joints as directed.
15. Contractor to consider in his quoted rates the necessary arrangement e.g. providing and fixing of required quantity of woven mesh at the junction of Beam and Column or any other RCC members to separate two different grades of concrete mixes. No payment shall be made for over flowed richer mix of one RCC member into the other.
16. Use of greater than minimum specified quantities of cement to achieve specified or required mix design.
17. Use of plasticizer / super plasticizer (approved by Engineer-In-Charge) and / or additional cement for pumpable concrete.
18. Non-destructive test for defective concrete as directed by Engineer-In-Charge, and their remedial measures thereof.
19. Leaving dowels for anchorage of brickwork and other RCC members.
20. Mix designing and testing of all the ingredients of concrete from approved laboratory for each grade, pumpable & non-pumpable concrete.
21. Compliance with all requirements of technical specification.

MASONRY WORKS:

- **The rates for all items under this section also to include:**

1. All scaffolding, platforms, ladders, staging and plant required in the execution of work to any height or depth and lift.
2. Hacking and roughening of concrete or other surfaces in contact with masonry for bondage.
3. Leaving out dowels from concrete members for anchorage.
4. Labour providing in beam bed blocks of concrete.
5. Rough cutting and waste.
6. Levelling up and preparing tops of walls for damp proof courses, plinth beams, precast units etc.
7. Raking out joints to specified depths either for plaster or pointing or finishing the joints flush as the work proceeds, as directed.
8. Bedding and pointing wall planes, cills, lintels etc. in or on walls, bedding and pointing drops, window and like structures in cement mortar.
9. Forming chases for edges of concrete floors or other units, for sealing in or other waterproofing layers etc.
10. Holes (cut and formed or left), for fixing pipes, bolts and other inserts and making good including grouting if necessary.
11. Building in holdfasts and such other inserts.
12. Work in steps, pillars (round and squared) and also in circular work.
13. Keeping the work well wetted for ten days.
14. Work at all heights, depths and locations, unless otherwise mentioned.
15. Work in parts / joining old / new work including, toothing applying cement slurry etc complete.
16. Washing and cleaning of brick surface with such chemical as are deemed necessary by the Engineer-In-Charge for any efflorescence observed in the brick work.
17. Opening for exhaust fan/ rain water pipes/ spouts etc as shown in drawing and/ or as directed at site. No deduction for such opening shall be made.
18. Layout and layout course with flat brick/brick on edge / string coarse wherever required.
19. Any efflorescence observed in Brick Work should be watched on with clean water and treated with such chemicals as are deemed necessary by Engineer-In-Charge. The Brick Work shall be dismantled if deemed necessary by Engineer-In-Charge and rebuilt with new bricks including making good all disturbed and damaged work.
20. Providing & laying of Hoop Iron as per specifications.

21 Rate to include for any shapes, fins, projections, shafts, Work in narrow widths, Piece meal/ small work etc. Peace meal work necessitated by coordination & requiring of work of other agencies.

22 Compliance with requirements of technical specification

WATER PROOFING:

- Waterproofing work shall be carried out by the specialize agency as approved by Architect/ Engineer-In-Charge.
- The rate of all relevant items of water-proofing covered under this section to include:

1. Cleaning, smooth rendering and preparation of surface for lying waterproofing, insulation and other treatments.
2. All cutting, trimming, dressing and waste.
3. Treatment of down take pipes, and other obstructions as shown.
4. Providing 50x50, size chase in wall, parapets etc. at 300mm height from floor finish level for tucking ends of vertical layers of the treatment, filling up the chase with cement mortar 1:4 and preparing a drip mold as per detailed drawing just above the chase.
5. Sealing all joints, corners, junctions of pipes and masonry/ concrete with epoxy putty.
6. Curing/ wetting the surface at least for 10days and gunny bags to be spread wherever required before applicant of subsequent coat.
7. Work in narrow widths, junctions and at all locations as shown.
8. Work at all heights and depths.
9. 72 hours Pond testing of treated areas to the satisfaction of Engineer-In-Charge.
10. Signing guarantee as per approved Performa for waterproofing treatment for 10 years from the date of final completion on non-judicial stamp paper. The guarantee shall be executed & extended by the contractor and not by the water proofing agency.
11. Hydro testing for underground and overhead water tanks. The contractor shall get water tanks tested against any leakage by filling the tanks with water and maintaining it for seven days up to free board including cost of water, all necessary arrangements required for filling and emptying the tank after testing.
12. Compliance with requirements of technical specification.
13. Mode of Measurements.

a) Terrace

All measurements will be for roof area only as measured on plan and no additional area for vertical tucking/embedding upto 300mm right from top of finish, providing and making gola, khurrah where ever required shall not be paid extra. The contractors rate will be inclusive of all these to make the work complete.

b) Toilet Areas

Floor: Area of the toilet area shall be measured by length x breadth between wall.

Vertical side. The actual area treated shall be measured by length x height.

c) Injection Treatment

Floor: The total area of raft/ floor including the area below walls and projections and projections of treatment, if any shall be measured.

d) Walls:

Actual area treated shall be measured.

FLOORING WORKS:

(The rates for all items under this section also to include):

1. Use and waste of all temporary fillets, side forms, templates, moulds, straight edges etc.
2. Final preparation of the base, sub-grade or sub-floor including trimming of the base to remove all undulations including chipping or filling with concrete/ cement mortar, if necessary.
3. Cleaning and watering the surface immediately before laying the floor.
4. Providing bedding layer of mortar as specified, in the case of slabs, tiles etc. to correct levels and slopes as called for.
5. Curing, protecting and cleaning all surfaces as specified.
6. Leaving or chasing recess for skirting to match with plaster surface, bends, steps etc. on walls/ concrete and making them good after finishing of the wall.
7. Payment shall be made only for the finished dimension actually measured at site of work.
8. No work shall be started until the concealed piping drains etc, are laid by other agencies. Prior to commencing any finishing surfaces, levels and the slopes to drains shall be got approved, in writing by the Engineer-in-charge. Further to do so may result in demolishing the finished surface and redoing the work, all at contractors expenses.
9. Laying floors to required slope in any size and shape of panels, pattern & design of panels. The strips shall not be paid for separately.
10. Work shall be carried out at all heights, levels, leads and lifts.
11. Use of all scaffolding and cradles, dust seats and other coverings for fittings, furniture, floors etc. (for all heights and locations).
12. Compliance with requirements of technical specification.

FINISHING WORKS:

- **The rates for all items under this section also to include:**

1. Making all construction and expansion joints, curving, curing.
2. Making grooves of any pattern as per drawings or as directed by the Engineer-in-charge in plaster and dados including rounding of junctions with floors.
3. In case of wall plaster, dado and skirting, raking out joints, cleaning the surfaces, application of cement slurry, applying plaster, skirting and dado treatment unless otherwise specified.
4. Work on patches, narrow widths, small quantities, curved surfaces, projected/ resets bands, setbacks, offsets, corbels, architraves etc.
5. Extra thickness of plaster over indentations etc.
6. Repairing and finishing the junctions of skirting and dado, with relevant mortar/finish.
7. Finishing the chases, edges of electrical fittings and boxes etc.
8. Use of all scaffolding and cradles, dustsheets and other coverings for the protection of fixtures, fittings, furniture, floors etc. (for all heights and locations).
9. Grooves, bands in plaster, on RCC bands, drip coarse etc. in plaster works as per directions.
10. Cleaning of paint splashes, drops or dirt, glasses, joinery, electric fittings etc., including washing the floor and leaving the premises neat and clean.
11. Work shall be carried out at any elevations all heights, levels, leads, lifts.
12. Cutting line of two different finishes should be in straight line or as shown in drawing, bands wherever required.
13. Providing and fixing 300mm wide chicken wire mesh with GI screw and washers at the junctions of two different materials and on all chasing for electrical & plumbing conduits, pipes etc.
14. Cost of waterproofing compound wherever mentioned in Bill of Quantities.
15. Compliance with requirements of technical specification.

MISCELLANEOUS WORKS:

- **The rates for all items under this section also to include:**

1. Steel forging, reducing to required shape, size and figure, drilling, tapping, counter sinking for screws, filling etc. and satisfactory workmanship required to fabricate, finish, erect and fix in position, all structural steel and iron in a good and perfect manner.
2. Providing all bolts and nuts including holding down and anchor bolts, round, squared or tapered washers, anchor plates, rivets, packing pieces, gusset plates, cleats, wedges, brackets, separators etc. (net weight to be computed and paid).
3. All wastage's and cut pieces.
4. Welding as per specifications and drawings but weight of welds not to be paid.
5. Weight of various members to be taken as standard ISI weights. No allowances being made for rolling margins in steelwork.
6. Providing all spikes, nails, service bolts, clamps, jigs etc.
7. Making all necessary templates, patterns, moulds and platforms for layout etc.
8. All smithy work, unloading, getting in, hoisting, erecting and fixing in position at all heights, levels and locations, curve portion.
9. Rigidly inserting and setting in lead or other specified material and fixing into concrete and / or building into brick work while the work proceeds and for all fixing, anchoring, plugging, screwing, bolting etc. including non-shrink grout and sealants as may be required or directed.
10. Painting two top coat of Red oxide primer before hoisting and erecting in position.
11. The priming coat is required to be of high grade loosing approved quality of Red Oxide primer to provide a coating having a good rust preventive properties and shall adhere well to the metal surfaces, affording a good foundation for subsequent coats.
12. Bending to required shape of square bars, pipes, angles, plates etc as per drawing.
13. Compliance with requirements of technical specification.

<END OF VOLUME 1>

VOLUME 2

TECHNICAL SPECIFIACTIONS FOR PLUMBING WORKS

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BRIEFING:

1.0 The item mentioned in BOQ shall be installed as per manufacturer's direction approved by the Engineer-in-Charge-in-charge.

2.0 Specification/brands names of fixtures to be used as per the scope of work are listed in the bid documents. The efforts should be made by the Contractor to use indigenous products. The Contractor should also consider the availability of spares parts/ components for maintenance purposes while proposing any brand/ manufacturer. The materials of any other brand/manufacturer may be proposed for use by the Contractor in case the brands specified below are not available in the market and/or Contractor intends to use some other brand better than the brands mentioned in this list. The alternate brand can be used only after the approval of Engineer-in-Charge-in-Charge. The list of approved makes is appended to this document.

TECHNICAL SPECIFICATIONS PLUMBING WORKS

1. **BASIS OF DESIGN**

The Plumbing, Sanitary, Drainage System for the project is designed keeping in view the following:

1.1 Requirement of adequate and equal pressure availability of hot and cold-water lines in Public Toilets, Kitchen and other identified areas.

1.2 Adequate storage of water in underground + overhead domestic water tanks.

1.3 Levels of roads / pavements and other services in the area.

1.4 Landscape layout.

The execution of works and materials used shall be as per the latest relevant I.S. specifications.

Wherever reference has been made to Indian Standard or any other specifications, the same shall mean to refer to the latest specification irrespective of any particular edition of such specification being mentioned in the specifications below or Schedule of Quantities

2. CONCEPT OF THE SYSTEM

The following services are envisaged for the complex:

2.1 Domestic water supply through gravity system.

2.2 Sewage and Sullage collection system based on IS: 1742 and applicable standards for domestic drainage and connected to outfall into master sewer system.

2.3 Storm / Rain water drainage system from various levels of the building and disposal to Rain Water harvesting and over flow to into master system.

3. WATER STORAGE & DISTRIBUTION SYSTEM

3.1 Water Requirement

The water requirement for this project is proposed to be as per the provisions in IS: 1172 / NBC and prevalent practices.

3.2 Source of Water

It is expected that part of the daily domestic water requirement for the Complex shall be through master water supply.

4. SEWAGE, SULLAGE AND STORM WATER

The soil and waste shall be carried down through one pipe/ 2 pipe drainage system. Venting of system shall be carried out by using separate anti syphonage pipe.

5. WORKMANSHIP

The workmanship shall be best of its kind and shall confirm to the specifications, as below or Indian Standard Specifications in every respect or latest trade practices and shall be subject to approval of the Owner's Site Representative. All materials and/or Workmanship which in the opinion of the Owner's Site Representative / Architect / Consultant is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith.

6. MATERIALS

All materials shall be best of their kind and shall confirm to the latest Indian Standards. All materials shall be of approved quality as per samples and origins approved by the Owner's Site Representative / Architect / Consultants.

As and when required by the Owner's Site Representative / Consultant, the contractor shall arrange to test the materials and/or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials, work or portions or work are found defective or unsound by the Owner's Site Representative / Consultant, the contractor shall remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the Owner's Site Representative / Consultant. To prove that the materials used are as specified the contractor shall furnish the Owner's Site Representative with original vouchers on demand.

SECTION I: GENERAL INSTRUCTIONS

1.0 GENERAL REQUIREMENTS

1.1 Scope of Work

1.1.1 The form of Contract shall be according to the "Conditions of Contract". The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor.

1.1.2 Work under this contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the Plumbing and other specialized services as described hereinafter and as specified in the Schedule of Quantities and/or shown on the Plumbing Drawings.

1.1.3 Without restricting to the generally of the foregoing, the sanitary installations shall include the following: -

A. Plumbing Works

i) Sanitary Fixtures
ii) Soil, Waste & Vent and Rain Water Pipes and fittings.
iii) Water Supply System (Cold & Hot).
iv) Sewerage & Storm water drainage system

1.1.4 Services rendered under this section shall be done without any extra charge.

1.2 Specifications

1.2.1 Work under this contract shall be carried out strictly in accordance with Specifications attached with the tender.

1.2.2 Items not covered under these Specifications due to any ambiguity or misprints, or additional works, the work shall be carried out as per Specifications of the latest Central Public Works Department with upto date amendments as applicable in the contract and or as per the requirement of the client or its representative.

1.2.3 Works not covered above in para 1.2.1 and 1.2.2 shall be carried out as per relevant Indian Standards and in case of its absence as per British Standard Code of Practice.

1.3. Execution of Work

1.3.1 The Contractor should visit and examine the site of work and satisfy himself as to the nature of the existing roads and other means of communication and other details pertaining to the work and local conditions and facilities for obtaining his own information on all matters affecting the execution of work. No extra charge made in consequence of any misunderstanding, incorrect information on any of these points or on ground of insufficient description will be allowed.

1.3.2 The work shall be carried out in conformity with the Plumbing drawings and within the requirements of Architectural, HVAC, Electrical, Structural and Other specialized services drawings.

1.3.3 The Contractor shall cooperate with all trades and agencies working on the site. He

shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule.

1.3.4 On award of the work, Contractor shall submit a schedule of construction in the form of a PERT Chart or BAR Chart for approval of the Project Manager / Architect / Consultant. All dates and time schedule agreed upon should be strictly adhered to, within the stipulated time of completion/commissioning along with the specified phasing, if any.

1.4 **Drawings**

1.4.1 Plumbing drawings are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the Architectural and other services drawings.

1.4.2 Architectural drawings shall take precedence over Plumbing or other services drawings as to all dimensions.

1.4.3 Contractor shall verify all dimensions at site and bring to the notice of the Project Manager all discrepancies or deviations noticed. Decision of the Project Manager shall be final.

1.4.4 Large size details and manufacturers dimensions for materials to be incorporated shall take precedence over small scale drawings.

1.4.5 All drawings issued by the Architects/Consultant for the work are the property of the Architects/Consultant and shall not be lent, reproduced or used on any works other than intended without the written permission of the Architects/Consultant

1.5 **Inspection and Testing of Materials**

1.5.1 Contractor shall be required, if requested, to produce manufacturers Test Certificate for the particular batch of materials supplied to him. The tests carried out shall be as per the relevant Indian Standards.

1.5.2 For examination and testing of materials and works at the site Contractor shall provide all Testing and Gauging Equipment necessary but not limited to the followings:-

a) Theodolite, Steel tapes
b) Dumpy level
c) Weighing machine
d) Plumb bobs, Spirit levels, Hammers
e) Micrometers, Tachometers
f) Thermometers, Stoves
g) Hydraulic test machine
h) Smoke test machine

1.5.3 All such equipment shall be tested for calibration at any approved laboratory, if required by the Project Manager.

1.5.4 All Testing Equipment shall be preferably located in a special room meant for the purpose.

1.5.5 Samples of all materials shall be got approved before placing order and the approved samples shall be deposited with the Architects or kept at site in a sample room as prepared by the owners. Any materials declared defective by Project Manager/Architect/Consultant shall be removed from the site within 48 hours.

1.6 Metric Conversion

1.6.1 All dimensions and sizes of materials and equipment given in the tender document are commercial metric sizes.

1.6.2 Any weights, or sizes given in the tender having changed due to metric conversion, the nearest equivalent sizes accepted by Indian Standards shall be acceptable without any additional cost.

1.7 Reference Points

1.7.1 Contractor shall provide permanent Bench Marks, Flag Tops and other reference points for the proper execution of work and these shall be preserved till the end of the work.

1.7.2 All such reference points shall be in relation to the levels and locations given in the Architectural and Plumbing drawings.

1.8 Reference Drawings

1.8.1 The Contractor shall maintain one set of all drawings issued to him as reference drawings. These shall not be used on site. All important drawings shall be mounted on boards and placed in racks indexed. No drawings shall be rolled.

1.8.2 All corrections, deviations and changes made on the site shall be shown on these reference drawings for final incorporation in the completion drawings. All changes to be made shall be initialed by the Project Manager or Architects.

1.9 Shop Drawings

1.9.1 The Contractor shall submit to the Project Manager three copies of the shop drawings.

1.9.2 Shop drawings shall be submitted under following conditions:-

(a) Showing any changes in layout in the plumbing drawings.
(b) Equipment layout, piping and wiring diagram.
(c) Manufacturer’s or Contractor’s fabrication drawings for any materials or equipment supplied by him.

1.9.3 The Contractor shall submit two copies of catalogues, manufacturer’s drawings,

equipment characteristics data or performance charts as required by the Project Manager.

1.10 **Completion Drawings**

1.10.1 On completion of work, Contractor shall submit one complete set of original tracings and two prints of "as built" drawings to the Project Manager. These drawings shall have the following information.

a) Run of all piping, diameters on all floors, vertical stacks and location of external services.

b) Ground and invert levels of all drainage pipes together with location of all manholes and connections upto outfall.

c) Run of all water supply lines with diameters, locations of control valves, access panels.

d) Location of all mechanical equipment with layout and piping connections.

No completion certificate shall be issued unless the above drawings are submitted.

1.10.2 Contractor shall provide two sets of catalogues, service manuals manufacturer's drawings, performance data and list of spare parts together with the name and address of the manufacturer for all electrical and mechanical equipment provided by him.

1.10.3 All "Warranty Cards" given by the manufacturers shall be handed over to the Project Manager.

1.11. **Contractors Rates**

1.11.1 Rates quoted in this tender shall be inclusive of cost of materials, labour, supervision, erection, tools, plant, scaffolding, service connections, transport to site, taxes, octroi and levies, breakage, wastage and all such expenses as may be necessary and required to completely do all the items of work and put them in a working condition.

1.11.2 Rates quoted are for all heights and depths and in all positions as may be required for this work.

1.11.3 All rates quoted must be for complete items inclusive of all such accessories, Fixtures and fixing arrangements, nuts, bolts, hangers as are a standard part of the particular item except where specially mentioned otherwise.

1.11.4 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar/concrete/water proofing of appropriate mix and strength as directed by Project Manager. Contractor shall provide holes, sleeves and recesses in the concrete and masonry work as the work proceeds.

1.11.5 The Contractor shall furnish the Architects with vouchers and test certificates, on request, to prove that the materials as specified and to indicate that the rates at which

the materials are purchased in order to work out the rate analysis of non-tendered items which he may be called upon to be carried out.

1.12 **Testing**

1.12.1 Piping and drainage works shall be tested as specified under the relevant clause(s) of the specifications.

1.12.2 Tests shall be performed in the presence of the Project Manager/ Consultant.

1.12.3 All materials and equipment found defective shall be replaced and whole work tested to meet the requirements of the specifications.

1.12.4 Contractor shall perform all such tests as may be necessary and required by the local authorities to meet Municipal or other bye-laws in force.

1.12.5 Contractor shall provide all labour, equipment and materials for the performance of the tests.

1.13 **Site Clearance and Cleanup**

1.13.1 The Contractor shall, from time to time clear away all debris and excess materials accumulated at the site.

1.13.2 After the Fixtures, equipment and appliances have been installed and commissioned, Contractor shall clean-up the same and remove all plaster, paints stains, stickers and other foreign matter of discoloration leaving the same in a ready to use condition.

1.13.3 On completion of all works, Contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition, failing which the same shall be done at Contractors risk and cost.

1.14 **License Permits and Authorities**

1.14.1 Contractor must keep constant liaison with the Municipal/statutory authority and obtain all approval of all drainage, water supply and other works carried out by him.

1.14.2 Contractor shall obtain, from the Municipal and other authority's necessary completion certificate(s) with respect to his work as required for occupation of the building. Contractor shall obtain permanent water supply and drainage connections from authorities concerned. Employer shall pay all fees/deposits as required to be paid to the authorities towards connection charges.

1.15 **Recovery of Cost for Materials issued to Contractors Free of Cost**

1.15.1 If any materials issued to the Contractor free of cost, are damaged or pilfered, the cost of the same shall be recovered from the Contractor on the basis of actual cost to owner which shall include all freight and transportation, excise duty, sales tax, octroi, import duty etc. plus 100%. The decision on the actual cost given by the Employer shall be final and binding on the Contractor.

1.16 **Cutting of Water Proofing Membrane**

No walls, terraces shall be cut for making and opening after water proofing has been done without written approval of Project Manager/Architects. Cutting of water proofing membrane shall be done very carefully to ensure that other portion(s) of water proofing is (are) not damaged. On completion of work at such place the water proofing membrane shall be made good and ensured that the opening/cutting is made fully water proof as per specifications and details of water proofing approved by Architects.

1.17 **Cutting of Structural Members**

No structural member shall be chased or cut without the written permission of the Project Manager.

1.18. **Materials Supplied by Owner**

1.18.1 The Contractor shall verify that all materials supplied by the Employer confirm to the specifications of the relevant item in the tender. Any discrepancy found shall be brought to the notice of the Project Manager.

1.19 **Materials**

1.19.1 Unless otherwise specified and expressly approved in writing by the Project Manager, only materials of makes and specifications mentioned in the list of approved makes attached with the specifications shall be used.

1.19.2 If required, the Contractor shall submit samples of materials proposed to be used in the works. Approved samples shall be kept in the office of the Project Manager and returned to the Contractor at the appropriate time.

END OF SECTION I

SECTION II: SANITARY FIXTURES

2.0 SANITARY FIXTURES

Following Types of Sanitary Fixture needs to be mentioned

Fittings & Fixtures		
Sl.	**Description**	**Model/Shade**
	Fittings and Fixtures	
1	Single piece floor mounted WC (360x640x680)	Jaquar SLSWHT6851S22OPP or Equivalent
2	Orissa Pan (450x585x255)	Jaquar ECSWHT451LE or Equivalent
3	Orissa Pan wall hung cistern	Jaquar WHT184NT or Equivalent
4	Undercounter wash basin (595x420x200)	Jaquar CNSWHT705 or Equivalent
5	Urinal (345x320x610)	Jaquar URSWHT13257 or Equivalent
6	Shower Head 105 Dia	Jaquar OHSCHR1709 or Equivalent
7	Wash basin tap (Push type)	Jaquar PRS031GD or Equivalent
8	SS Towel Rail 600mm Long	Jaquar AHS1507 or Equivalent
9	Toilet roll holder with SS flap	Jaquar AKP35753PS or Equivalent
10	Health Faucet	Jaquar ALD579 or Equivalent
11	Shower area long body bib cock	Jaquar CONCHR107KN or Equivalent

2.1 **Liquid Soap Container**

2.1.1 Liquid Soap Container shall be of approved quality.

2.2 **Towel Ring**

2.2.1 CP Brass towel ring trapezoidal shape 215 mm long, 200 mm wide with minimum distances of 37 mm from wall face with concealed fittings arrangement of approved quality and colour

2.3 **Coat Hook**

2.3.1 Coat hook shall be of brass material and chrome color double hook type of approved make & quality.

2.4 **WC Pan Connector**

2.4.1 straight / offset type flexible single body push fit type WC pan connector of with integral single mould sealing fins made of flexible EVA body to be fixed with manufacture supplied grease, including rubber bush / adaptor for use with uPVC pipe

2.5 **Sink Mixer**

2.5.1 CP Brass Single lever mixer for sink approved make & quality.

2.6 **Water cooler**

2.6.1 water cooler with Inbuilt Aquagaurd RO purification + UV(50LPH). Cooling capacity shall be 100 liter & 150 liter shall be storage capacity. It should have 7 stages purification process, fully automatic, rectangular tank with Forced fin and tube condenser, Non-corrosive SS-304 outer body, Food-grade SS-304 stainless steel inner tank (18/8 or 18/10), PUF insulation, Reciprocating compressor with R22 Refrigerant. Water outlet temp is approx.. 17 deg c, Operating power supply 230 + 10% V AC,50 Hz,1 PH

2.7 **Two-way bib cock**

2.7.1 C.P. brass Two-way bib cock of approved quality conforming to IS:8931 approved make & quality.

2.8 **Health faucet**

2.8.1 CP Health faucet to European type W.C. Of approved quality & make.

2.9 **Towel rail**

2.9.1 CP Brass towel rail complete with brackets with CP brass screws with concealed fittings arrangement of approved quality and colour.

2.10 **Soap Dish Holder**

2.10.1 CP Brass Soap Dish Holder complete with brackets with CP brass screws with concealed fittings arrangement of approved quality and colour.

2.11 **Measurement**

2.11.1 Sanitary fixtures and accessories shall be measured by numbers in the unit given in the Schedule of Quantities.

2.11.2 Rates for all items shall be inclusive of cutting holes and chases and making good the same, C.P brass screws, nuts, bolts and any fixing arrangements required and recommended by manufacturers, testing and commissioning.

END OF SECTION II

SECTION III: WATER SUPPLY SYSTEM

3. WATER SUPPLY SYSTEM

3.1 Scope of Work

3.1.1 Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the Schedule of Quantities.

3.1.2 Without restricting to the generality of the foregoing, the water supply system shall include the following:-

a) Distribution system from main supply headers to all fixtures and appliances for cold/hot water.
b) Cold water supply lines from main line to overhead water tanks.
c) Excavation and refilling of pipes trenches.
d) Insulation to hot & cold water pipes.
e) All the concealed by should be insulated by rubber nitrile insulation and all the exposed to wall pipe in the terrace
f) Pipe protection and painting.
g) Control valves, masonry chambers and other appurtenances.
h) Connections to all plumbing fixtures, tanks, appliances and Municipal mains

3.2 General Requirements

3.2.1 All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Project Manager.

3.2.2 Pipes and Fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

3.2.3 Short or Long bends shall be used on all main pipe lines as far as possible. Use of Elbows shall be restricted for short connections.

3.2.4 Pipes shall be fixed in a manner so as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

3.2.5 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.

3.2.6 Clamps, hangers and supports on RCC walls, columns and slabs shall be fixed only by means of approved made of expandable metal fasteners inserted by use of power drills.

3.2.7 All pipe clamps, supports, nuts, bolts, washers shall be galvanized MS steel

throughout the building. Painted MS clamps & MS nuts, bolts and washers shall not be accepted.

3.2.8 Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

3.3 Water Supply System

3.3.1 Contractor should study the site plan and water supply system diagram for an overview of the system.

3.3.2 Source

Water supply will be acquired from master line and collected in overhead water storage tanks.

3.4.1 Pipe Supports

3.4.1.1 All pipes clamps, supports, hangers, rods, pipe supports, nuts and washers shall be factory made galvanized MS steel or alternatively galvanized after fabrication to suit site requirements.

3.4.1.2 SS pipes in shafts and other locations shall be supported by galvanized M.S clamps of design approved by pipes in wall chases shall be anchored by G.I hooks, pipes at ceiling level shall be supported on structural clamps fabricated from M.S structural steel. Pipes in typical shafts shall be supported on Galvanized slotted angles/channels as specified elsewhere.

3.4.1.3 **Clamps**

G.I. pipes in shafts and other locations shall be supported by M.S. clamps of design approved by Project Manager. Pipes in wall chases shall be anchored by iron hooks, Pipes at ceiling level shall be supported on structural clamps fabricated from M.S. structural steel as described above. Pipes in typical shafts shall be supported on slotted angles/channels as specified.

3.5 Anchor Fasteners

3.5.1 All pipes support, hangers and clamps to be fixed on RCC walls, beams, columns, slabs and masonry walls 230mm thick and above by means of galvanized expandable anchor fasteners in drilled holes of correct size and model to carry the weight of pipes. Drilling shall be made only by approved type of power drill as recommend and approved by manufacturer of the anchor fasteners. Failure of any fastening devices shall be the entire responsibility and contractor shall redo or provide additional supports at his own cost. He shall also compensate the owner for any damage that may be caused by such failures.

4.5 Unions

Contractor shall provide adequate number of unions on all pipes to enable easy

dismantling later when required. Unions shall be provided near each gunmetal valve, stop cock, or check valve and on straight runs as necessary at appropriate locations as required and/or directed by Project Manager.

3.7 Flanges

Flanged connections shall be provided on pipes as required or where shown on the drawings, all equipment connections as necessary and required or as directed by connections shall be made by the correct number and size of GI nuts, bolts & washers with 3 mm thick gasket. Where hot water or steam connections are made insertion gasket shall be of suitable high temperature grade and quality approved by Bolt hole dia for flanges shall conform to match the specification for C.I. sluice valve to I.S.780. and C.I. butterfly valve to IS: 3095.

3.8 Valves

3.8.1 Ball Valves

Valves upto 50 mm dia. shall be screwed type Ball Valves with stainless steel balls spindle teflon seating and gland packing tested to a hydraulic pressure of 16 kg , sq.cm., and accompanying couplings and steel handles.(to BS 5351) protected with thermal insulation.

3.9 Butterfly Valves – Slim Seal Type

3.9.1 Valves 65 mm dia. and above shall be cast iron butterfly valve to be used for isolation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both directions with accompanying flanges and steel handle.

3.9.2 Butterfly valve shall be of best quality conforming to IS: 13095.

3.10 Non Return Valve (Dual Slim Type)

Where specified, non-return valve shall be provided through which flow shall occur in one direction only.
Each Butterfly and Slim Type Swing Check (NRV) Valve shall be provided with a pair of flanges screwed or welded to the main line and having the required number of nuts, bolts and washers of correct length.

END OF SECTION III

SECTION IV: SOILS, WASTE, VENT PIPES & FITTINGS

4 Scope of work

Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent and rain water pipes and fittings as required by the drawings and as given in the Schedule of Quantities.

4.1 Without restricting to the generality of the foregoing, the work shall include the following:-

a) Vertical and horizontal soil, waste, vent, and fittings, joints, clamps and connections to fixtures.
b) Soil & waste pipes to external sewers line.
c) Connection of all pipes to sewer lines as shown on the drawings at the ground floor.
d) Floor and urinal traps, cleanout plugs, inlet fittings.
e) Testing of all pipe lines.

4.2 General requirements

4.2.1 All materials shall be new and best quality conforming to Latest IS Code and specifications and subject to the approval of the Project Manager /Architect.

4.2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

4.2.3 Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

4.2.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps an interval specified.

4.2.5 Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.

4.3 Piping System

4.3.1 Soil, Waste & Vent Pipes

a) The Soil & Waste pipe system above ground has been planned as a "two pipe system" as defined in IS: 5329, having separate pipes for waste from kitchen sinks, bath tubs, showers, washbasins, AHU's condensate drains and floor drains and is approved by the local authority. Waste stacks have been provided with a “P” trap at basement ceiling.

b) Vertical soil & waste stacks shall be connected to a common horizontal drain pipe at basement floor ceiling as shown on the drawings.

c) All Floors of toilets, kitchens and other service areas located on structural slab are SUNK by 300 mm to accommodate all soil & waste pipes.

d) All soil and waste from areas below general ground level will be collected in sumps and pumped into sewer lines.

e) Anti-siphonage pipe (ASP) shall be provided for soil fittings on vertical stacks. It may also be provided for waste lines where shown on the drawings.

4.5 Fixing

4.5.1 All vertical pipes shall be fixed truly vertical to walls with approved type of GI clamp. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard). However shaft where more vertical pipes run, the pipes may be fixed to the slotted angle/channel supports fixed to walls at intervals specified here under:-

4.5.2 Horizontal pipes running on the floor shall be covered with cement concrete grade M-10, 75mm thick in bed and 75mm thick all around soil and waste pipes under floor

4.5.3 Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the Project Manager/Building Contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces at no extra cost.

4.6 Clamps

4.6.1 Holder bat clamps shall be of standard design and fabricated from **galvanized MS standard flats** 40x3 mm thick and 12 mm dia MS rod and 6 mm nuts and bolts. Holder bat clamps shall be fixed in cement concrete 1: 2 : 4 mix blocks 10x10x10 cms deep.

4.6.2 Where holder bat clamps are to be fixed in RCC column or slotted angles, walls or beam they shall be fixed with **galvanized** 40x3 mm flat iron "U" type clamps with anchor fasteners of approved design or 6 mm nuts and bolts.

4.6.3 For SWR pipes conforming to IS: 13592 shall be clamped to wall with approved type of uPVC saddle clamp/U-clamp or as given in the Bill of quantities.

4.6.4 Structural clamps shall be fabricated by electro-welding from MS structural members e.g. rods, angles, channels flats as per detailed drawing. Contractor shall provide all nuts & bolts, welding material. All fabricated clamps, nuts, bolts and washers shall be not dipped galvanized.

4.6.5 Galvanized slotted angle/channel supports on walls shall be provided wherever shown on drawings. Angles/channels shall be of sizes shown on drawings or specified in schedule of quantities. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with suitable anchor fasteners. The spacing of support bolts horizontally shall not exceed 1 m.

4.6.6 Wherever MS clamps are required to be anchored directly to brick walls, concrete slabs, beams or columns, nothing extra shall be payable for clamping arrangement and making good with cement concrete 1 : 2 : 4 mix (1 cement : 2 coarse sand : 4 mm stone aggregate 20 mm nominal size) as directed by the Project Manager.

4.6.7 For sleeves, anchor fasteners and clamp spacing chart shall be as follows:

MARKINGS:

All pipes shall carry the following markings: Time and date of manufacture; company name; dimension, application class, barcode and material details.

FITTINGS:

Single- Layered fitting in PP, a reinforced wall and factory fitted lip ring, hot water resistant upto 95 degree c in accordance to EN 1451-PART 1-6EN 12056 PART 1-5.

INSTALLATION: The piping system must be clamped properly as required, pipes passing through walls, beams, slabs, columns should pass through sleeves which are padded with insulation material internally (between pipe and sleeve) covering the pipe to avoid transfer of body and structural borne sounds (refer manufacturer's installation guide lines). The piping must not touch any wall, structure, paneling, false ceiling etc.

4.5 Traps

4.5.1 Floor traps

Floor traps shall be siphon type full bore P or S type cast iron having a minimum 50 mm deep seal. The trap and waste pipes in sunken area (where required) shall be set in cement concrete blocks firmly supported on the structural floor. The blocks shall be in 1 : 2 : 4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size) and extended to 40 mm below finished floor level. Contractor shall provide all necessary shuttering and centering for the blocks. Size of the block shall be 30x30 cms of the required depth.

4.5.2 Floor trap inlet

Bath room traps and connections shall ensure free and silent flow of discharging water. Where specified, Contractor shall provide a special type inlet fitting fabricated from uPVC pipe without, with one, two or three inlet sockets fixed on side to connect the waste pipe. Joint between waste and hopper inlet socket of the trap shall be joined with solvent cement recommended by the manufacturer. Inlet shall be connected to an uPVC. P or S trap. Floor trap inlet hoppers and the traps if set in cement concrete blocks as specified in para above without extra charge. UPVC multi-inlet trap can be used where ever possible to be decided by the project Engineer.

Trap & Seals

All traps shall be self-cleaning design and the seal depth shall be as specified below wherever the traps are not integral with the appliances:

Appliance or ware	Material	Trap Type	Seal depth(mm)
Lavatory /wash basin	C.P. cast brass	32 mm dia Bottle	75 mm
Sink	C.P. cast brass	40 mm dia Bottle	75 mm
Kitchen floor drain of fabricated drain boxes	uPVC/C.I.	75/100 mm dia 'P' or 'S'	50 mm
Urinals	uPVC/C.I.	100 mm dia 'P' or 'S'	50 mm

4.5.3 Floor Gratings

Floor and urinal traps shall be provided with 100-150mm square or round CP/stainless steel grating, with rim of approved design and shape. Minimum thickness shall be 4 mm or as specified in the Schedule of Quantities

4.5.4 Jointing

Pipe to pipe and pipe to fitting (SWR) joint shall be with 'O' rubber ring as recommended by the manufacturer. Jointing with solvent cement shall be applied to uPVC waste pipes (confirming to I.S. 4985) and fittings or as recommended by the manufacturer's.

4.6 Cleanout Plugs

4.6.1 PP Clean out pipe for Soil, Waste pipes laid under floors shall be provided near pipe junctions bends, tees, "Ys" and on straight runs at such intervals as required as per site conditions. Cleanout pipe shall terminate flush with the floor levels.

4.6.2 Cleanout on Drainage Pipes

a) Cleanout pipe shall be provided on starting point of each drain and in between at locations indicated on plans or directed by the Project Manager. Cleanout pipe shall be of size matching the full bore of the pipe but not exceeding 160 mm OD.

b) Cleanouts at ceiling level pipe shall be provided with a bend terminating at floor level above. The cap of the cleanout pipe shall have a cap flush with floor.

4.7 Waste pipe from appliances

4.7.1 General

a) Waste pipe from appliances e.g. wash basins, sinks and urinals shall be of noise insulated Polypropylene piping system as per DIN EN 12056 and DIN1986-100 with 3 layer pipe made of External layer -PP, middle layer-Mineral reinforced PP, Internal layer-PP. push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 10 dBA as per DIN 4109 at a flow rate of 2 l/s and having pipe ring stiffness as per 1S0/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, density of pipe = 1.9 g/cm3, elongation break 50% and tensile strength 20 N/mm2,Coefficient of linear expansion 0.09 mm/mK PP pipe 40, 50 mm OD as given in the Schedule of Quantities.

b) All pipes shall be fixed in gradient towards the outfalls of drains. Pipes inside a toilet room shall be in chase unless otherwise shown on drawings. Where required pipes

may be run at ceiling level in suitable gradient and supported on galvanized structural clamps. Spacing for clamps for such pipes shall be as per the pipe spacing chart given in section 1.

4.8 Encasing pipe in Cement Concrete

uPVC soil and waste pipes and drainage under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1 : 2 : 4 mix (1 cement : 2 coarse sand : 4 stone aggregate 12 mm size) 75 mm in bed and all-round. When pipes are running well above the structural slab, the encased pipes shall be supported with suitable cement concrete pillars of required height at intervals of one meter. Rate for concreted round pipes shall be inclusive of pillars, supports, shuttering and centring.

4.9 Cutting and making good

4.9.1 Contractor's rate shall include for providing all necessary holes, sleeves, cut outs and chases in structural members as building work proceeds. Wherever holes are cut or left originally, they shall be made good with cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size) or cement mortar 1 : 2 (1 cement : 2 coarse sand) and the surface restored as in original condition.

4.10 Testing

4.10.1 Testing procedure specified below apply to all soil, waste and vent pipes above ground including pipes laid along basement ceiling.

4.10.2 Entire drainage system shall be tested for water tightness during and after completion of the installation. No portion of the system shall remain untested. Contractor must have adequate number of expandable rubber/bellow plugs, manometers, smoke testing machines, pipe and fitting work test benches and any other equipment necessary and required to conduct the tests. All testing equipment/motors etc. shall be certified for its calibration by an approved laboratory.

4.10.3 All materials obtained and used on site must have manufacturer's hydraulic test certificate for each batch of materials used on the site.

4.10.4 Testing soil, waste and rainwater pipes

a) Apart from factory test all pipes and fittings shall be hydraulically tested for a head of 3 m preferably on a specially set up work bench. After applying pressure, strike the pipe with a wooden pallet and inspect for blow holes and cracks. Pressure may be applied for about 2 minutes. Reject and remove all defective pipes.

b) After installation all connections from fixtures, vertical stacks and horizontal drains including pipes along ceiling shall be tested to a hydraulic pressure not exceeding 3 m. Such tests shall be conducted for each floor separately by suitable plugs.

c) After the installation is fully complete, it should be tested by flushing the toilets, running at least 20% of all taps simultaneously and ensuring that the entire system is self-draining, has no leakages, blockages etc. Rectify and replace where required.

4.10.5 Contractor shall maintain a test register identifying date and time of each area. All tests shall be conducted in presence of Project Manager and signed by both.

4.11 Measurements

4.11.1 General

a) Rates for all items quoted shall be inclusive of all work and items given in the specifications and Schedule of Quantities.

b) Rates are applicable for the work in basements, under floors, in shafts at ceiling level area for all heights and depths.

c) Rates are inclusive of cutting holes and chase in RCC and masonry work and making good the same.

d) Rates are inclusive of pre testing, on site testing, of the installations, materials and commissioning of the works.

e) Pipes (unit of measurement. Linear meter to the nearest centimeter)

4.11.2 Pipes shall measure per running meter correct to a centimeter for the finished work which shall include fittings e.g. bends, tees, crosses, etc. The length shall be taken along centre line of the pipes and fittings. All pipes and fittings shall be classified according to their diameter, method of jointing and fixing substance, quality, and finish. The diameters shall be nominal outer diameter.

4.11.3 Cement concrete around pipes shall be measured along the center of the pipe line measured per linear meter and include any masonry supports, shuttering and centring cutting complete as described in the relevant specifications.

4.11.4 Slotted angles/channels shall be measured per linear meter of finished length and shall include support bolts, nuts and clamps embedded in masonry walls with cement concrete blocks and nothing extra will be paid for making good the same.

4.11.5 Fittings

Unit of measurement shall be the number of pieces. Pipe fittings are included in the rate for pipes. Urinal traps, trap gratings, hoppers, cleanout plugs shall be measured by number per piece and shall include all items described in the relevant specifications and Schedule of Quantities.

4.11.6 Excavation for soil pipes

No payment shall be admissible with respect to excavation, refilling and disposal of surplus earth for soil and waste pipes laid below ground, in sunken slabs or over basement rafts.

4.11.7 Project Manager’s decision with respect to the correct interpretation regarding mode of measurement shall be final and binding on the contractor.

END OF SECTION IV

SECTION V: SEWAGE EXTERNAL SEWERAGE WORK

5. Sewer work

5.1 Scope of work

5.1.1 Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install all the drainage system as required by the drawings and specified hereinafter or given in the Schedule of Quantities.

5.1.2 Without restricting to the generality of the foregoing, the drainage system shall include:

a) Sewer lines including excavations, pipelines, manholes, drop connections and connections to the existing sewer.

b) Storm water drainage, excavation, pipelines, manholes, catch basins, drain channels and connections to the existing storm water drain.

5.2 General requirements

5.2.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of the Project Manager.

5.2.2 Drainage lines and open drains shall be laid to the required gradients and profiles.

5.2.3 All drainage work shall be done in accordance with the local municipal bye-laws.

5.2.4 Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competent authority.

5.2.5 Location of all manholes, etc. shall be got confirmed by the Contractor from the Architect / Landscape Architect. As far as possible, no drains or sewers shall be laid in the middle of road unless otherwise specifically shown on the drawings or directed by the Project Manager.

5.2.6 In sewer line pipe DWC HDPE SN8 confirming to 16098 Part II pipe will be used.

5.3 DWC HDPE Pipes (SN 8): IS 16098 Part II

5.3.1 DWC pipes shall be of first class quality and free from rough texture inside or outside and straight. All pipes shall have the manufacturers name marked on it and shall comply with IS-16098 Part II and shall be of approved makes.

5.3.2 **Laying and Jointing of DWC HDPE Pipes**

a) Pipes are liable to be damaged in transit and notwithstanding tests that may have been made before dispatch each pipe shall be examined carefully on arrival at site. Each pipe shall be rung with a wooden hammer or mallet and those that do not ring true and clear shall be rejected. Sound pipes shall be carefully stacked to

prevent damage. All defective pipes should be segregated, marked in a conspicuous manner and their use in the works prevented.

b) The pipes shall be laid with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipe jointer room to work right round the pipe and as short as practicable to admit the socket and allow the joint to be made.

c) Where pipes are not bedded on concrete the trench bottom shall be left slightly high and carefully bottomed up as pipe laying proceeds so that the pipe barrels rest on firm ground. If excavation has been carried too low it shall be made up with cement concrete 1:5:10 mix at the Contractor's cost and charges.

d) If the bottom of the trench consists of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on cement concrete bed of 1:5:10 mix to ensure even bearing.

5.3.5 **Jointing of Pipes**

a) Tarred gaskin shall first be wrapped round the spigot of each pipe and the spigot shall then be placed into the socket of the pipe previously laid, the pipe shall then be adjusted and fixed in its correct position and the gaskin caulked tightly home so as to fill not more than one quarter of the total length of the socket.

b) The remainder of the socket shall be filled with stiff mix of cement mortar (1 cement: 1 clear sharp washed sand). When the socket is filled, a fillet should be formed round the joint with a trowel forming an angle of 45 degrees with the barrel of the pipe. The mortar shall be beaten up and used after it has begun to set.

c) After the joint has been made any extraneous materials shall be removed from inside of the joint with a suitable scraper or "Badger". The newly made joints shall be protected until set from the sun, drying winds, rain or dust. Sacking or other materials, which can be kept damp, shall be used. The joints shall be exposed and space left all rounds the pipes for inspection by the Project Manager. The inside of the sewer must be left absolutely clear in bore and free from cement mortar or other obstructions throughout its entire length, and shall efficiently drain and discharge.

5.4 Testing

- All lengths of the sewer and drain shall be fully tested for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be carried out from manhole to manhole. All pipes shall be subjected to a test pressure of at least 1.5 meter head of water. The test pressure shall, however, not exceed 6 meter head at any point. The pipes shall be plugged preferably with standard design plugs with rubber plugs on both ends. The upper end shall, however, be connected to a pipe for filling with water and getting the required head.

- Sewer lines shall be tested for straightness by: (i) inserting a smooth ball 12 mm less than the internal diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end. (ii) means of a mirror at one and a lamp at the other end. If the pipeline is straight the full circle of light will be seen otherwise obstruction of deviation will be apparent.

- The Contractor shall give a smoke test to the drains and sewer at his own expense and charges, if directed by the Project Manager.

  A test register shall be maintained which shall be signed and dated by Contractor.

END OF SECTION V

LIST OF MAKES

S No	Item / Material	Make		
		1st Preference	2nd Preference	3rd Preference
1	GI Pipes as per IS:1239	Surya Prakash	Jindal	Tata
2	GI Fittings (Malleable Cast Iron) as per IS:1879	Zoloto	Sant	Lehry
3	Butterfly Valve / Check Valve	Zoloto	Sant	Lehry
4	Ball Valves	Zoloto	Sant	Lehry
5	Cables	Polycab	Finolex	Havells
6	Water Meter	Kranti	Kent	
7	PVC Copper Wire	Sky tone	Finolex	
8	uPVC Pipes & Fittings	Supreme	Finolex	Astral
9	CPVC Pipes & Fittings	Supreme	Finolex	Astral
10	Sanitary Fixture & CP Fittings	Jaquar	Hindware	Parryware
11	Stainless Steel Grating	Camry	Chilly	Jayna
12	Air Release Valve	Zoloto	Sant	Lehry
13	RCC Pipe	Jain Spun Pipe	Om Spun Pipe	Indian Hume Pipe
14	Ferrule connection	Zoloto	Sant	Lehry
15	Stoneware Pipe	As per ISI Marked		
16	Fire Extinguisher	Kalpex	Exflmae	Omex

VOLUME 3

TECHNICAL SPECIFIACTIONS FOR ELECTRICAL WORKS

TABLE OF CONTENTS

A. SCOPE OF WORK:

1. **This specification covers general principles to be followed for the selection of electrical equipment and their installation, testing & commissioning. The electrical system consists of the following sub-systems,**
    - LV Switchgears
    - Lighting system
    - Earthing system
    - Lightning protection system
    - Cabling system
    - Low voltage systems like, DATA, Voice, TV and CCTV
2. The supply, erection, testing and commissioning of the entire electrical works shall be in line with local electrical norms, Indian standards and also basic concepts developed and laid down in this technical specification.

B. STANDARDS AND CODES:

1. All electrical equipment and installations shall confirm to the NBC 2016, latest publication of Bureau of Indian Standards and codes of practice for installation and maintenance.
2. In case where Indian Standards are not available, the equipment and accessories shall confirm to the latest publications of International Electro Technical Commission (IEC) or latest standards and codes of practice published by any other recognized National Standards Institutions.
3. All electrical equipment and installations shall also conform to the latest Indian Electricity Rules as regards safety, earthing and other essential provisions specified therein for installation and operation.
4. All installations shall comply with the statutory requirements of Government of India and CEIG.

C. EXECUTION:

1. The electrical installation shall be complete in all respects, in line with the specifications/drawings.
2. The contractor to appoint minimum three site engineers,
    - Site engineer-in-charge shall have minimum 15 years experience with Under graduation in Electrical and Electronics engineering.
    - Site supervisors shall have minimum 5 years experience with Diploma in Electrical and Electronics engineering
    - Before appointing the engineers, the CV shall be submitted for Client's approval.
3. The contractor to obtain all required permits/ licenses required for satisfactory execution and operation of the installation.
4. All receipted amounts shall be reimbursed by Client on production of proof of payment

by the contractor.

5. The executed work shall strictly confirm to applicable laws, regulations and Indian Standards which become applicable.
6. Any conflict between DBR, drawings and specifications shall be brought to the notice of Client. The final decision will be taken by Client and contractor to follow Client's instructions.
7. The contractor shall co-ordinate with all other services like Civil, Structural, Plumbing and other agencies at site.
8. All required openings on wall/floor/ceiling shall be properly planned, the cut-out openings shall be made, properly finished and related all debris shall be removed by the contractor.
9. If any discrepancy on dimensions against drawings shall be brought to the notice of the engineer in charge.
10. All required shop floor drawings shall be prepared by the contractor and the same shall be submitted for approval of Client/Consultant.
11. On approval of shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement. This statement must be submitted prior to completing ordering of equipment and should identify imported/local materials in this contract as well as proposed spares/tools. The Consultant shall provide recommendation to Client representative for acceptance of anticipated variation in contract amounts and also advise Client to initiate action for procurement of spare parts and tools at the completion of project.
12. Contractor shall produce all equipment / system vendor drawings in three sets for Client/Consultants approval.
13. The manufacturing clearance shall be issued to the contractor by Client / Consultant for all the system/Equipments.
14. The contractor is responsible to update time to time changes in the hard copy of all the drawings for preparation of As-built documentation and it shall be approved by the Engineer in charge.
15. Obtain approval from Local Authorities prior & post installation for operation of system.
16. Handing over document comprising of list of recommended spares, catalogues and service schedule for each equipment/material, test reports of equipment's, testing & commissioning reports of systems.
17. **Contractor to train the Client's staff.**
18. **DEFECTS LIABILITY PERIOD:**

- ***The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.***
- ***All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Client.***

D. LIGHTING SYSTEM

1. The intent of this clause is to define the requirements for the supply, erection, testing and commissioning of the lighting system. The work shall be carried out in conformity with this specification, relevant codes of practice of the Indian Standards, approved drawings and the instructions of the Engineer-in-charge.
2. The light fixtures in the common areas are fed from lighting panel and group controlled. The wring shall be done as specified in the DBR / Drawings, all joints of conductors in Switch boards/JBS/Fitting shall be made only by means of approved Mechanical connectors (nylon/PVC connectors). Bare or twist joints are not permitted anywhere in the wiring system.
3. The lighting layouts furnished by Client/Consultant shall indicate approximate location of lighting fixtures. The electrical contractor shall determine, with approval of the Engineer-in-Charge, the exact location of each fixture in order to avoid interference with piping or other mechanical equipment and also with a view to obtain as uniform illumination as practicable, and to avoid objectionable shadow. The circuit numbering shall be provided in the drawings for the light fixtures, conduit run shall be laid out by the contractor to suit field conditions as per directions of the Engineer-in Charge.
4. Fixtures shall be firmly supported in concrete structures, where metal inserts are not available; fixtures will be fixed to or supported from concrete surfaces with the help of anchor fastener. In such cases special care shall be taken to see that anchoring is firm. For smaller weight equipment, nylon (or metallic) sleeve anchors shall be used.
5. All hardware shall be galvanized or zinc passivated.
6. Main runs of wiring from LDB and tapings to individual fixtures/sockets shall be in sizes specified on the DBR / drawings.
7. Fixtures shall be firmly supported in concrete structures where metal inserts are not available; fixtures having a weight up to 2.5 kg shall be supported by minimum two numbers nylon sleeve anchors. Flameproof or other heavier fixtures shall be supported by using metallic anchor fasteners of approved size. All supports shall be thoroughly cleaned and painted in an appropriate color to suit the fixture.
8. In case of false ceilings fixtures shall be supported from true ceiling. Exact location of fixtures shall be finalized in consultation with air-conditioning contractor and as indicated on electrical drawings. Wiring above false ceilings shall not be left loose and shall be supported along the structures/ceiling. Wiring above false ceiling shall be on surface and below false ceiling it shall be concealed. To facilitate easy maintenance looping back system of wiring shall be followed throughout. Accordingly supply

tapings and other interconnections are made only at fixture connector blocks or at switch boards. Intermediate junction boxes shall be used for wire pulling as inspection boxes.

9. All wires in conduit shall be color coded. Each circuit shall have independent phase and neutral wire. Unless otherwise specified, insulated conductors of AC supply and DC supply shall be bunched in separate conduits.
10. In case of group control of light points, point to point distance shall be measured and classified for subsequent points.
11. Street lighting poles shall be installed at a distance of 300mm from the edge of the walkway of the road. Fixture wire from marshalling box up to fixture shall be 2.5mm^2, copper conductor PVC insulated. Main feeder up to the marshalling box shall be as per the respective drawings.
12. Each pole shall be grounded by connecting it to ground with 8 swg GI wire spring rope.
13. Street lighting shall be mounted on steel tubular poles as per standard drawings. Street lighting poles shall be supplied with a base plate and grouted. The street lighting poles shall be painted with one coat of primer and 2 coats of aluminum paint. The second coat of aluminum paint shall be given just before handing over the installation to the Engineer-in-Charge. The poles shall be numbered as per the drawings.

Light Fixtures (Luminaries) – General Requirements

14. LED luminaries shall be complete with accessories like lamps, drivers, connectors, connecting wires etc. Outdoor type fixtures shall be provided with outdoor type weatherproof box.

Lamps

15. The light fixtures and lamps shall confirm to relevant standards
16. The entire lighting system will be achieved by using LED type luminaries.
17. Supply voltage 120 - 270 V AC
18. P.F > 0.95
19. High power LED's having System efficacy > 110 lm/W and junction temp. < 70°C
20. Luminaire performance complies with IS 10322 (Part 5 / Sec-3)
21. Driver surge protection 4KV, external Surge protection 10 KV with optics distribution
22. THD<10% at 110 Volts AC
23. Driver efficiency >90%
24. CCT: 3000K - 5700K, minimum CRI>70
25. The lumen output of the lamps shall be more than more than 105lumens per Watt
26. The fixtures shall be with required mounting arrangements, if required to facilitate proper aiming of the luminaire at desired angle.
27. The outdoor luminaire shall be protection class IP68 for LED Module and IP67 for LED driver.
28. The light fixtures shall have complete accessories like lamps, drivers, wires between drivers and fixtures etc.

Light Control Switches

29. The switches shall be suitable for use on 240V, 1 phase, 50Hz supply; the switches shall be of flush type for mounting on an insulated plate with suitable enclosure. The switch box / enclosure may be recessed into or mounted on wall as per requirements of

project layouts. The size of enclosure boxes shall be chosen to accommodate the number of switches to be installed at the particular location. The enclosures shall be made of 1.2 mm thick MS-CRCA sheet steel, stove enameled / galvanized. The enclosure box shall be with insulating cover. An enclosure intended for surface mounting shall not have holes or gaps in its sides other than those expressly provided for cable entry. The switches shall conform to the relevant standards. For common areas like corridors, car park, staircases the lighting control shall be from MCB control from DB, they need not be controlled from switches.

Receptacle Units

30. Receptacle units shall consist of socket outlet with associated switch. The socket outlet and switch or MCB shall be flush mounted within a stove enameled / galvanized 1.2 mm thick MS-CRCA sheet steel enclosure with insulating cover, the box may be recessed into or mounted on a wall as per requirements of project layouts.
31. The outdoor type receptacles shall be housed in a 2 mm thick GI enclosure with gasket, hinged door having locking arrangement. The enclosure shall be with rain canopy and removable gland plate entry for bottom, composite receptacle with switch modules housed in a box shall be with degree of protection IP 66. The receptacle units shall be suitable for 240V, 1 Phase, 50Hz/415V, 3 Phase, 50 Hz supply as indicated in project layouts.
32. Wiring for exhaust fans shall be terminated in ceiling roses/receptacles and the connection from ceiling rose/receptacle to the exhaust fan shall be by means of a flexible cord equivalent in size to the main run of wires. The switch for control of the exhaust fan shall be mounted at an operable height and the receptacle shall be mounted near to the fan.

Lighting Wires

33. The wires of wiring in lighting system shall be 1100V, 1 core, FRLS insulated, unarmoured with stranded copper conductors. The wires shall conform to the applicable standards.

    The size and no of Cu wires shall be as follows,

34. LIGHTING:
    - DB to Switch board/First fixture - 3#2.5sqmm
    - Switch board/First fixtures to Lighting point - 3#1.5sqmm
35. POWER SOCKET:
    - 6A (group of 6A away) - 3#1.2sqmm
    - 6/16A Power sockets - 3#2.5sqmm
    - Geyser sockets - 3#4sqmm
    - Split-Air conditioners - 3#4sqmm
36. COLOUR CODING OR WIRES
    - R – Phase - Red
    - Y - Phase - Yellow
    - B – Phase - Blue

- Neutral - Black
- Earthing - Green or Yellow green

Conduits

37. Conduits and their associated fittings shall conform to applicable standards. The conduit shall be surface / concealed installation. Supply of conduits shall include all associated fittings like couplers, bends, tees, JBs, pillboxes, GI wires to pull the Cu wires etc.,

    The following conduit sizes shall be used for surface/concealed,

    - PVC conduit 20mm dia, 2mm wall thickness
    - PVC conduit 25mm dia, 2mm wall thickness
    - PVC conduit 32mm dia, 2mm wall thickness
    - MS conduit 20mm dia, 1.6mm wall thickness
    - MS conduit 25mm dia, 1.6mm wall thickness
    - MS conduit 32mm dia, 1.6mm wall thickness

38. For entire project for building concealed wiring PVC concealed conduit shall be used
39. MS conduits to be used for any surface conduit.
40. For MS Conduits only threaded type conduit fittings shall be used. Pin Grip type or clamp type fittings are not acceptable. Conduit ends shall be free from sharp edges or burrs. The ends of all conduits shall be reamed and neatly bushed with Bakelite bushings.
41. In order to minimize condensation of sweating inside the conduit system, all outlets shall be properly drained and ventilated in such a manner so as to prevent entry of insects.
42. The outer surface of the conduit pipes, including all accessories forming part of the conduit system, shall be adequately protected against rust, particularly when such system is exposed to weather. In all cases, bare threaded portion of the conduit shall not be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.
43. Conduit connection to outlet boxes shall be by means of screwed hubs or check nuts on either side.
44. Conduit pipes shall be fixed by 16 gauge GI saddles on 25 x 6 mm GI Saddle bars in an approved manner at intervals of not more than 25 cms. Saddles shall be fixed on either side of couplers, bends or similar fittings, at a distance of 30 mm from the center of such fittings.
45. Where concealed wiring is to be adopted, conduits shall be laid in time before concreting of the slab. The contractor shall coordinate his work with other agencies involved in the civil works in such a way, that the work of these other agencies is not hampered or delayed because of any section on his part.
46. Vertical conduit runs shall be made either through columns or chases prepared in the walls. Contractor shall fill these chases or any other openings made by him after completing the work and neatly finish the surface. During installation, care shall be taken to see that adequate covers are provided to prevent rusting of conduits. If required, conduit runs may be concealed in the floor for low level receptacles.

47. After erection, the entire conduit system shall be tested throughout, for mechanical and electrical continuity and shall be permanently connected to earth by means of earthing clamps, in accordance with Indian Electricity Rules.

Outdoor Junction Boxes

48. Junction boxes with terminals shall be supplied for branching and terminating lighting cables when required for outdoor areas, terminals shall be suitable for TP N E, rating shall be in line with requirement. The junction boxes shall be dust and vermin proof and shall be fabricated from 1.2 mm to 2 mm GI sheet steel depending on the size of the junction box and shall be complete with removable cover plate with gaskets two earthing terminals each with nut, bolt and washer. Boxes shall be additionally weather proof when specified.

MCB Distribution boards:

49. The distribution of light fixtures / receptacles shall be such that the loading on each phase of LDB is approximately equal. The loading on each circuit shall be restricted to 80% of the MCB rating and the voltage drop shall not exceed 5%.
50. Lighting Distribution Boards (LDB) shall be of sheet steel enclosed. For outdoor, canopy sloping towards rear side of the panel shall be provided to achieve a degree of protection IP-55. The lighting panels for road lighting and floodlighting of open areas shall be provided with an adjustable timer or photocell for automatically switching "ON" and "OFF" every day.

E. EARTHING SYSTEM:

1. The earthing system shall be designed as per IS 3043.
2. The work shall be carried out in the best workman like manner in conformity with this specification, and as per IS 3043, approved drawings and instructions of the Engineer-in-Charge.
3. The main grid conductor for electrical power distribution system shall be hot dip galvanized G.I. Flat and for other systems like networking, UPS etc shall be copper conductor. Sizes for main conductor shall be as marked on the drawings. Earth electrodes shall be as per the standard drawings. Thickness of hot dip galvanizing shall not be less than 75 microns.
4. The earthing installation shall be done in accordance with the earthing drawings, specification and the standard drawings. The entire earthing system shall fully comply with the Indian Electricity Act and Rules framed there under. The contractor shall carry out any changes desired by the Electrical Inspector or the owner, in order to make the installation conform to the Indian Electricity Rules at no extra cost. The exact location earth conductors, earth electrodes and earthing point on the equipment shall be determined in field, in consultation with the Engineer-in-Charge.
5. Excavation and refilling of earth, necessary for laying underground earth bus loops shall be the responsibility of the contractor.

6. The earth loop impedance to any point in the electrical system shall have value, which will ensure satisfactory operation of protective devices.
7. The main earth loop shall be laid at a depth of 600 mm below grade level. Wherever cable trenches are available, the earth lead shall be laid in the trenches and shall be welded to the cable tray support structural. The earthing strip shall be protected against mechanical damage.
8. Wherever specified, the earthing flat shall be run along cable trays. The earthing cable shall be suitably cleared to the cable tray at regular intervals.
9. Joints and tapping in the main earth loop shall be made in such a way that reliable and good electrical connections are permanently ensured. All joints below grade shall be welded and suitably protected by giving two coats of bitumen and covering with Hessian tape. All joints above ground shall be by means of connectors/lugs as far as practicable. Tee connectors / tee joints shall be used for tapping earth leads from the main loop wherever it is installed above ground.
10. Metal Conduits, in which cables have been installed, shall be effectively bonded and earthed. Cable armors shall be earthed at both ends.
11. Earth pipe electrodes shall be installed as shown in the earthing layout drawings and in accordance with the standard drawing of reference and IS: 3043. Their location shall be marked to enable accurate location by permanent markers.
12. All earth electrodes shall preferably be driven to a sufficient depth to reach permanently moist soil. Electrodes shall preferably be situated in a soil which has a fine texture and which is packed by watering and ramming as tightly as possible. Wherever practicable, the soil shall be dug up, all lumps broken and stones removed in the immediate vicinity of the electrodes.
13. All earth electrodes shall be tested for earth resistance by means of standard earth test meter. The tests shall take place in dry months, preferably after a protracted dry spell. If necessary, a number of electrodes shall be connected in parallel to reduce the earth resistance. The distance between two electrodes shall not be less than twice the length of electrode.
14. The electrodes shall have a clean surface, not covered by paint, enamel, grease or other materials of poor conductivity.
15. The exact location and number of earth electrodes required at each location shall be determined in the field in consultation with the Engineer-in-Charge, depending on the soil strata and resistivity, to meet the ohmic values prescribed in the relevant IS. Earth Electrode shall be located avoiding interference with road, building foundation, column etc.
16. Individual earth electrode shall be provided for each lightning Arrester. The electrodes shall be so placed that all lightning protective earths may be brought to earth electrode by a short and straight a path as possible to minimize surge impedance.
17. The isolating facility shall be provided for the individual earth pits to check their earth resistance periodically. All the earth electrodes shall be suitably numbered and this should be indicated in as built drawings.

18. All electrical equipment shall be doubly earthed by connecting two points on equipment to a main earthing ring. The earthing ring will be connected via link to several earth electrodes. The earth grid formed shall be a closed loop with earth electrodes connected to the grid with double strip connection. The cable armor will be earthed through the cable glands.
19. The following shall be earthed.
    - All switchgear and their earth bus and bus duct.
    - Motor Frames.
    - Non-current carrying metallic parts of electrical equipment such as switchgear racks, panel boards, motor control center, lighting, power and instrument panels, push button stations, cable trays, pipe, conduits, terminal boxes etc.
    - All fences, gates/enclosures housing electrical equipment.
    - All steel structures, rails, etc, including bonding between section.
    - Structural steel and columns.
20. The earthing connection shall be properly made. A small flexible aluminium cable loops to bridge the top cover of the transformer and the tank shall be provided to avoid earth fault current passing through fastening bolts when there is a lightning surge, high voltage surge or failure of the bushings. The neutral of all transformers shall be connected to the earth pit through a test link.
21. All paint, scale and enamel shall be removed from the contact surface before the earthing connections are made.
22. All hardware used for earthing installation shall be hot dip galvanized or zinc passivated. Spring washers shall be used for all earthing connections of equipment.
23. Light fixtures shall be earthed through the extra core provided in the lighting cable for this purpose.
24. Following sizes shall be used to carry out the earthing,
    - MDB / MCC - 25 mm X 5 mm GI Flat
    - MCB DB - 8 SWG Cu Wire
    - Push Button Station - 8 SWG Cu Wire
    - Motors <5kW - 8 SWG Cu Wire
    - Motors >5kW - 25mm X 5 mm G.I. Flat
    - Main Earth Grid - 25mm X 5 mm GI Flat
25. There shall be two types of earth pits GI / CU, the type, location, usage, shall be referred in the respective drawings.
26. General body earth pit: Earthing with G.I. earth pipe 4.5 m long x 40 mm dia. including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with Charcoal and salt as required.
27. LV/UPS earth pit: Earthing with copper plate 600 mm X 600 mm X 3 mm thick including accessories and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.

TESTING

28. Earthing systems / connection shall be tested as follows:

- Resistance of individual electrodes shall be measured after disconnecting it from the grid.
- Earthing resistance of the grid shall be measured after connecting all the electrodes to the grid. The resistance between any point on the metallic earth grid and the general mass of earth shall not exceed 1 ohm.

29. The resistance to earth shall be measured at the following:
    - At each electrical system earth or system neutral earth.
    - At one point on each earthing system used to earth electrical equipment enclosures
    - At one point on each earthing system used to earth wiring system enclosures such as metal conduits and cable sheaths or armor.
    - At one point on each fence enclosing electrical equipment.
    - Measurement shall be made before connection is made between the ground and the object to be grounded.

F. CABLING SYSTEM:

1. Cables shall be armoured / Unarmoured, according to the system requirement and the same is mentioned in the cable schedule.
2. All LT power cables shall be single/multi-core, 650/1100V grade, XLPE insulated. Minimum size of the power cable shall not be less than 2.5 sq. mm in case of copper and 6 sq. mm in case of aluminium.
3. Outer sheath of all cables shall be black in color. The outer sheath is to protect the cable against termite attack. Sequential marking of the length of the cable in meters shall be provided on the outer sheath at every one meter. The embossing shall be legible and indelible.
4. The overall diameter of the cables shall be strictly as per the standards. PVC/Rubber end caps shall be supplied for each drum.
5. Armoured cables shall be laid underground directly in buried trenches at depth of 750mm to 1500mm as specified in the respective drawings. The cable trenches shall be prepared by earth work in excavation in all types of soils and across roads.
6. The contractor shall carry out all the necessary shoring, strutting and bailing out water wherever required. The trenches shall be kept dry. The trench bottom shall be rammed, leveled and filled with a layer of fine 75mm thick dry cables shall be laid over it. Utmost care shall be exercised to prevent any damage to the cables while handling. The cables shall be single length without any joints in between wherever practicable.
7. The cables so laid and tested in the trench above the sand cushion shall be covered with a layer of 200mm thick fine dry river sand. The thickness of this layer of sand shall be from the bottom of the cables. The sand layer shall be lightly pressed for consolidation, but not causing any damage to the cables.
8. There after a protective layer of 75mm thick second class red brick laid on flat shall be placed to cover the trenches. The remainder of the trenches shall then be back filled

with the excavated soil and tamped, excess earth after back filling if any shall be disposed off as directed by the Engineer-in-charge.

9. Bottom of trenches shall be free of large stones and foreign materials which could damage cables. A minimum total cover (sand, bricks and back fill) of 600mm shall be provided between the top of the top most cable and grade level.
10. A separation layer of brick shall be placed between high voltage and medium voltage cables where ever they are running in the same trench. If more than one layer of cables are laid, each layer must be separated by fine dry river sand of 200mm depth (between axis of the two layers)
11. A minimum clearance of 300mm shall be maintained between cable trench and parallel runs of underground piping of foundation. If it is not possible the cables shall be protected in rigid steel galvanized conduits for that particular length.
12. Cable trenches shall be identified by means of markers. These markers shall be placed at locations of changes of directions of cables and at intervals of not more than 2 meters. Such markers shall have the directional arrow for the cable from feeding plant towards connected load.
13. Cables shall be identified with cable tag attached to each cable. The tags shall be stamped with the cable number as per cable schedule marking. Tags shall be attached to cables at minimum intervals shall be 10 meters at every straight run, starting and ends points. A minimum of 2nos of tags shall be attached to the cables inside the Distribution boards/MCC's electrical rooms.
14. Ample stock and if necessary a loop shall be left at every straight through joint to permit re jointing at the same place.
15. Where cables rise from trench to motors, push buttons / junction boxes, etc. they shall be taken in rigid steel galvanized conduits for mechanical protection up to a minimum of 300mm above grade.
16. Minimum distance between the different types of cables viz. High voltage power cables, medium voltage power cables, copper control cables and LV cables while laying in the trenches shall be maintained as per the drawings.
17. Open cable trenches inside the buildings shall be provided with cast iron chequered plates.
18. LT cables on bottom tiers, Control and special signal cable any on the topmost tiers.
19. Cable network shall include power, control and lighting cables, which shall be laid in trenches, cable trays or pipes as detailed in the relevant drawings and cable schedules. Erection of cable trays as required shall be the responsibility of the contractor.
20. All tray levels shall be checked after erection and marked in as built drawing. Cable routing given on the layout drawings shall be checked in the fields to avoid interference with structures, heat sources, drains, piping, air-conditioning ducts, false ceiling support members etc. and minor adjustments shall be done to suit the field conditions wherever deemed necessary.
21. High voltage, medium voltage and other control cables shall be separated from each other by adequate spacing or running through independent pipes, trenches or cables trays, as applicable. All communication cables shall run on separate trays / ducts /

trenches / pipes. Wherever these are not available, cables shall be taken in the same trench as that of power cable, but in a separate tray.

22. All cable routes shall be carefully measured and cables cut to the required lengths, leaving sufficient length for the final connection of the cable to the terminal of the equipment. The various cable lengths cut from the cable reels shall be carefully selected to prevent undue wastage of cables.
23. The quantity that indicated in the cable schedule is only approximate. The contractor shall ascertain the exact requirement of cable for a particular feeder by measuring at site and avoiding interference with structure, foundation, pipelines or any other services. Before the start of cable laying, cable drum schedule shall be prepared by electrical contractor and get that approved by engineer-in-charge to minimize / avoid straight through joints. Contractor shall work out the actual number of straight through joints required.
24. Cables shall be neatly arranged in the trenches / trays in such a manner so that crises crossing is avoided and final take off to the motor / switchgear is facilitated. Arrangement of cables within the trenches / trays shall be the responsibility of the contractor.
25. Cable routing between lined cable trench and equipment / motors shall be taken through GI pipe sleeves of adequate size. Pipe sleeves shall be laid at an angle of maximum 45° the trench wall. In case of larger dia cables i.e. 50 mm and above, adequately sized pipe with larger bending radius shall be provided for ease of drawing of cable or for replacement. In places where it is not possible, a smaller trench / groove may be provided if approved by Engineer-in-Charge.
26. All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation. For this purpose, ends of all PVC insulated cables shall be taped with an approved PVC or rubber insulating tape. Use of friction type or other fabric type tape is not permitted.
27. The electrical contractor shall do removal of covers for purposes of cable laying and reinstalling them in their proper positions after the cables are laid. Cables shall be handled carefully during installation to prevent mechanical injury to the cables. Ends of cables leaving trenches shall be coiled and provided with a protective pipe or cover, until the final termination to the equipment is completed.
28. Cable ends shall be carefully pulled through the pipes, to prevent damage to the cable. Where required, approved cable lubricant shall be used for this purpose. Where cable enters pipe the cable should be bent in large radius. Radius shall not be less than the recommended bending radius of the cables specified by the manufacturer.
29. Following guidelines shall be adopted for sizing the pipe.
    - 1 cable in pipe - 53% fill maximum
    - 2 cables in pipe - 31% fill maximum
    - 3 cables in pipe - 43% fill maximum
    - 4 cables or more - 40% fill maximum
30. After the cables are installed and all testing is complete, pipe ends above grade shall be plugged with a suitable weatherproof plastic compound for sealing purpose. Alternatively G.I. Lids or PVC bushes shall be employed for sealing purposes.

31. Where cables pass through foundation, walls or other underground structures, the necessary ducts or openings will be provided in advance for the same. However, should it become necessary to cut holes in existing foundations or structures, the electrical contractor shall determine their location and obtain approval of the Engineer-in-Charge before cutting is done.
32. At road crossings and other places where cables enter pipe Sleeves adequate bed of sand shall be given so that the cables do not stack and get damaged by pipe ends. Spare pipes for future use shall also be provided.
33. Drum number of each cable from which it is taken shall be recorded against the cable number in the cable schedule.
34. Individual cables or small groups that run along structures/walls etc. will be clamped by means of 16 SWG GI saddles on 25x6mm saddle bars. Alternatively small group of cables can be taken through 100 mm slotted channel / ISMC 100. They shall be rightly supported on structural steel and masonry individual or in groups as required.
35. All G.I. Pipes shall be laid as per layout drawings and site requirements. Before fabrication of various profiles of pipe by hydraulically operated bending machine (which is to be arranged by the contractor), all the burrs from the pipes shall be removed. G.I. Pipes with bends shall be buried in soil/concrete in such a way that the bends shall be totally concealed. For G.I. Pipes buried in soil, bitumen coating shall be applied on the buried lengths. Installation of G.I. Pipes shall be undertaken well before paving is completed and necessary co-ordination with paving agency shall be the responsibility of Electrical Contractor. The open ends of pipes shall be suitably plugged with G.I. Plugs after they are laid in final position.
36. Cables laid on supporting angle in cable trenches, structures, column and vertical run of cable trays shall be suitably clamped by means G.I. Saddles / Clamps, where as cable in horizontal run of cable tray shall be tied by means of nylon straps.
37. Cables shall be uniformly spaced, properly supported and protected is an appraised manner. All bends in runs shall be with due consideration to avoid sharp bending and kings of the cables. The bending radius of value types of cables as per IS: 1255 shall not be less than those specified **
38. Type of cables and Minimum Bending radius
    - Voltage grade single core multi core
    - 1.1 kV PVC 15 D 12 D
39. Where cables are required to cross roads and surface drains they shall be taken through Hume pipes at a depth mentioned in the respective drawings.
40. Where cables are required to be laid inside the building they shall be taken through PVC pipes at a depth mentioned in the respective drawings.
41. Where cables are required to be laid inside the building on surface, they shall be taken through GI conduits.
42. For crossing water, sewage pipes etc. cable shall be taken through pipes shall be placed in such a manner that the distance between top or bottom of service pipes shall be 250 mm minimum.

CABLE TERMINATION:

43. All PVC cables upto 1.1 kV grade shall be terminated at the equipment by means of single compression type cable glands. They shall have a screwed nipple with conduit electrical threads and check nut.
44. Power cables wherever colour coding is not available shall be identified with red, yellow and blue PVC tapes. Where copper to aluminium connections are made, necessary bimetallic washer shall be used. For trip circuit identification additional red ferrules shall be used only in the particular cores of control cables at the termination points in the switchgear/Control panels and Control Switches.
45. In case of control cables their terminal numbers by means of PVC ferrules or self-sticking cable markers shall identify all cores at both ends. Wire numbers shall be as per schematic/wiring/ inter-connection diagram. All unused spare cores of control cable shall be neatly bunched and ferruled with cable tag at both ends.
46. Where threaded cable gland is screwed into threaded opening of different size, suitable galvanized threaded reducing bushing shall be used of approved type. Contractor shall drill holes for fixing glands wherever necessary. Gland plate shall be of non-magnetic material 3mm sheet steel.
47. The cable shall be taken through glands inside the panels or any other electrical equipment such as motors. The individual cores shall then be dressed and taken along the cableways (if provided) or shall be fixed to the panels with polyethylene straps. Only control cables of single strand and lighting cables may be directly terminated on to the terminals.
48. Cable leads shall be terminated at the equipment terminals, by means of crimped type soldieries connectors. Crimping shall be done by hand crimping / hydraulically operated tool and conducting jelly shall be applied on the conductor. Insulation of the leads should be removed immediately before the crimping. Conductor surface shall be cleaned and shall not be left open.

CABLE TESTING:

49. Before energizing, the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground.
50. Where splices or termination are required in circuits rated above 600 volts., measure insulation resistance of each length of cable before splicing/terminating.
51. Measure the insulation resistance of directly buried cable circuits before cable trenches are back-filled. Repeat measurement after back filling. For cables upto 1.1kV grade, 1000V megger and for HV cables 2.5 / 5kV megger shall be used.
52. D.C. High Voltage test shall be conducted after installation on the following and test results shall be recorded.
53. For record purposes test data shall include the measured values of leakage current verses time. The D.C. High Voltage test shall be performed as detailed below in the presence of the Engineer-in-Charge.
54. Cables shall be installed in final position with the entire straight through joints complete. Terminations shall be kept unfinished so that motors, switchgears, transformers etc. are not subject to test voltage.

55. Cable schedule and layout drawings must be marked for AS BUILT conditions during the installation work and shall be approved by Engineer-in-charge.

G. DATA/TELEPHONE/TV SYSTEM:

1. The Class room block is provided with adequate number of data/telephone/TV/CCTV points. The exact number of points shall be obtained from respective layouts.
2. The field cabling shall be done with CAT6A
3. The backbone shall be by 2core FOC
4. The camera shall employ complete solid-state circuitry, ensuring high operational reliability.
5. Network bullet camera, it shall be IR Indoor type 1by3 inch CMOS 1point 3 MP 2point8 mm Fixed 12 IR LEDs PoE Hpoint264
6. Network bullet camera, it shall be IR outdoor type 1by3 inch CMOS 1point 3 MP 2point8 mm Fixed 12 IR LEDs PoE Hpoint264
7. The NVR shall be 32 Chanel with all connected accessories.

H. SAFTY ITEMS SCHEDULE

Sl No	DESCRIPTION	UNIT	QTY
	Supply and installation of the following equipments per electrical room.		
1	12 mm thick 900mm width Non-skid rubber mat for 1.1KV grade	Mtr.	LOT
2	Sand bucket painted red & approved quality with MS stand to fix 4 buckets (1sets of 4 buckets).	Set	1
3	Danger plates 440 volts written in two languages.	No	2
4	Carbon dioxide fire extinguisher type 4.5 kg capacity.	No	2
5	Standard first aid box kit.	No	2
6	Shock treatment chart written in two languages.	No	2

I. LIST OF MAKES

S No	DESCRIPTION	MAKES		
		1st Preference	2nd Preference	3rd Preference
A	**DISTRIBUTION BOARD / ACCESSORIES**			
1	MCCB / MPCB / MCB / RCCBs & RCBOs	Lauritz Knudsen (formerly L&T E&A)	Legrand / Siemens	ABB / Schneider
2	MCB Distribution Boards	Lauritz Knudsen	Legrand / Siemens	ABB / Schneider
B	**UPS System**			
3	UPS	APC	Emerson	Legrand
4	Battery	Exide	Standard	Furakawa
5	Battery Charger	Voltstat	AE	BCH
C	**CABLES/ WIRES / CABLE ACCESSORIES**			
6	1100 V LT XLPE Power Cables	Polycab	KEI	RR Kable
7	1100 V LT PVC Control Cables	Polycab	KEI	RR Kable
8	PVC Insulated FRLS Cu. Wires	Polycab	KEI	RR Kable
9	Compression glands and Lugs	Dowells	Comet	
D	**LIGHT FIXTURES / FANS / CONDUITS / SWITCHES / CABLE TRAYS**			
10	Light Fixtures	Philips / Wipro	Bajaj	Havells
11	External and Landscaping Light Fixtures	Philips	KLITE	
12	Street Light/ Post Top lighting Poles	Jindal	Phillips	
13	Modular Switches & Socket Outlets	Legrand	Anchor	Panasonic
14	Industrial sockets	Lauritz Knudsen	Legrand	OBO
15	Ceiling / Wall / Exhaust Fans	Almonard / Havells	Crompton Greaves	Orient / Khaitan
16	PVC conduits	Aero Plast	Avan plast	
17	MS Conduits	Bharath	JK Tupe	Precision
18	Cable trays	Profab	OBO	
E	**RACEWAYS / NETWORKING**			
19	GI floor raceways / UPVC & Aluminum wall trunking / Floor box	Legrand	OBO	
20	Network racks	Legrand		
21	Wall mounted racks	Legrand		
22	CAT 6A Cables	Legrand		
23	Video door phones	Legrand		