<table>
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<th>Sl No.</th>
<th>Details</th>
<th>Page No.</th>
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<td>01</td>
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<td>B - Brief Details and Objectives of the Work</td>
<td>11-19</td>
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<td>C - Method of Evaluation</td>
<td>20-24</td>
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<td>60-208</td>
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<td>16</td>
<td>Ground floor &amp; First floor plan</td>
<td>209-210</td>
</tr>
</tbody>
</table>
OFFER NOTICE

Offer forms are invited from reputed firms for the work of “Architectural Design and Interior Services on Turnkey Basis (Design, Construction, Supply and erection) for Setting Up of New Indian Institute of Management Campus at Visakhapatnam”. All as per the scope of work. Approximate value of the Turnkey project is Rs.1,54,59,193/- (Rupees One crore forty lakh twenty-seven thousand seven hundred eighty-two only)

<table>
<thead>
<tr>
<th>E.M.D (Rs.) TO BE SUBMITTED ALONG WITH OFFER</th>
<th>PERIOD FOR COMPLETION</th>
<th>Sale of Tender Documents &amp; Cost (In Rs.)</th>
<th>Receipt of Technical Bid</th>
<th>DATE OF OPENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Rs.3,87,000/-</td>
<td>Sixty Days</td>
<td>21/04/2015 to 05/05/2015</td>
<td>11.05.2015 Upto 15:00hrs on</td>
<td>11.05.2015 at 15:30 hrs</td>
</tr>
<tr>
<td>a) From the Estate Office, IIMB between 10:00hrs to 15:30hrs OR</td>
<td></td>
<td></td>
<td></td>
<td>Commercial bids (Forms E &amp; F) will be issued only after being qualified in the technical bid and concept presentation.</td>
</tr>
<tr>
<td>b) Can also be downloaded (Refer clause-16b)</td>
<td></td>
<td></td>
<td></td>
<td>Commercial Bid opening date will be intimated.</td>
</tr>
<tr>
<td>(2) Cost of Tender Document Rs.2,500/-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pre-Bid Meeting 05/05/2015 at 16:00hrs

Concept Presentation Date will be intimated later
OFFER CONDITIONS:

1. The prescribed Offer Forms which are non-transferable, can be obtained during the period mentioned at Col.No.3, on any working days from 10.00 to 15.30 Hours from:

   - “Chief Manager (Infrastructure), Estate Office, Indian Institute of Management Bangalore”
   
   or

   - “Manager (Electrical), Estate Office, Indian Institute of Management Bangalore”

   on remittance of the non-refundable cost of Offer Forms indicated in Col.3.

2. To obtain the offer documents, the firm should get the requisition letter and the supporting documents verified and signed by the designated officer or staff engineer of Estate Office and pay the necessary offer document fees to Account Section by presenting the duly verified and signed requisition letter and get the receipt. Firm can collect the offer documents by submitting this receipt at Estate Office.

3. Offers will also be accepted by post. However, Indian Institute of Management Bangalore (IIMB) shall not be responsible for late receipt of offer by post.

4. The Offer shall be received up to 15:00 hrs on the dates mentioned above by the Chief Manager (Infrastructure), Indian Institute of Management Bangalore, Bannerghatta Road, BANGALORE-560 076, and will be opened on the same day in the presence of Firms or their authorized representatives. Please note, the authorized representatives should carry the letter of authorization for attending the offer opening. The authorization letter should be in their company letter head issued in the name of the authorized representative, duly signed by the authorized representative with his name in CAPITALS and attested by the owner of the company. (Format of the letter is given under Proforma A).

5. Offer documents duly completed in all respects shall be dropped in the Offer Box kept for the purpose in the Estate Office, IIMB before the date and time indicated above.

6. You are requested to return the offer documents in sealed covers addressed to the Chief Manager (Infrastructure), Indian Institute of Management Bangalore, Bannerghatta Road, Bangalore -560 076.

7. Late offer and conditional offers are liable for rejection.
8. IIMB does not bind itself to accept the lowest or any other offer.

9. The period allowed for execution of the work is **60 Days** from the date mentioned in the work order, to be placed on the successful firm.

10. Quotations other than this called for in the enclosed documents are liable for rejection.

11. The successful firm is requested to sign the work order prepared based on the quoted rates, placed on him by the accepting officer.

12. **The accepting officer reserves the right to place order as a whole or part of any item only as deemed fit.**

13. **EARNEST MONEY DEPOSIT.**

   You are requested to attach the Demand Draft/Bankers’ Cheque from any Nationalized Bank / Scheduled Bank for Rs.3,87,000/- (Rupees Three lakh eighty-seven thousand only) in favour of Indian Institute of Management Bangalore, payable at Bangalore, along with the offer towards Earnest Money Deposit. No interest will be paid on this deposit.

   All the vendors should remit the EMD along with the technical bid.

   **Mode of Deposit:**

   a) The Earnest Money may be accepted only in the following forms
   b) Banker’s Cheque / Pay order
   c) Demand Draft
   d) Bank Guarantees submitted, as Earnest Money shall be valid for **120 days beyond the validity of the bid.**
   e) EMD deposited by the tenderer shall not bear any interest to the Contractor.

   Any offer not accompanied by an acceptable earnest money deposit and not secured in the payment modes as indicated below shall be rejected by the IIMB as non-responsive.

   The Earnest Money Deposit shall be forfeited:

   a) If the firm withdraws the Offer after offer opening during the period of offer validity;

   b) In the case of a successful firm, if the firm fails within the specified time limit to
      I. Sign the Agreement; or
II. Furnish the required Security deposit

Permanent Earnest Money Deposit shall not be valid for this offer. **Offers without requisite Earnest Money will be summarily rejected. Earnest Money Deposit is compulsory for all the firms including State Government / Statutory Bodies / Enterprises / Undertakings etc.**

14. In case, the firm/firm after quoting withdraws from the offer or refuses/delays in commencing the work or stop the work abruptly, their EMD/SD, as the case may be, will be forfeited.

15. The Commercial Bid will be opened only if the firm/firm qualifies in the Technical Bid and Concept Presentation. Incomplete details of the Technical Bid will be rejected summarily. IIMB has its right to reject any bid without assigning any reason therefor.

16. Intending firm should submit their applications for offer along with the demand draft obtained from any nationalized bank in favour of Indian Institute of Management Bangalore payable at Bangalore **OR** cash of **Rs.2,500/- (Rupees Two thousand Five hundred only - Non Refundable)** towards cost of offer processing/document. **OR**

Tender document can be downloaded from the Institute’s website (www.iimb.ernet.in\opportunities \commercial). The bidders downloading the tender document from website should attach tender fee of Rs.2,500/- (Rupees Two thousand five hundred only – Non-refundable) in shape of DD in favour of “Indian institute of Management Bangalore” payable at Bangalore alongwith tender documents & to be enclosed in the technical bid.

17. **Non-compliance of any of the conditions set forth herein above will result in the offer being rejected.**

18. Any information / clarifications required by the Firm can be obtained from the Estate Office, IIMB during working hours on any working days till the date of opening of Technical Bid. **Any clarifications raised by the firm after the opening of the Technical Bid will not be entertained.**

19. If the Headquarters of the successful Firm are elsewhere other than the place of work, he shall have duly authorized Agent at the place of work from the commencement of the work until it is fully completed. Such Agent shall be authorized to act on behalf of the successful Firm to operate and execute terms of contract.

20. The successful firm is requested to enter into an agreement within 15 days on the stamp paper for the value of **Rs.1,600/-** as per the format enclosed in the document.
21. No cost of whatsoever will be paid towards site visits, concept presentation etc. by IIMB.

22. Firm should check any correction or Corrigendum related to this Offer Notice on Website before submitting their offer.

The Director, IIMB, reserves the right to reject any or all pre-qualification applications without assigning any reasons therefor & Director’s decision shall be final & binding on all the applicants.

**TERMS AND CONDITIONS FOR TECHNICAL QUALIFICATION**

1. TIME IS THE ESSENCE OF THE CONTRACT.

2. The language for submission of application should be English.

3. In the event of any firm wishing to withdraw from prequalification, the firm must return the document with an explanatory letter to the employer.

4. The enclosed schedules should be filled in completely and all questions should be answered. If any particular query is not relevant, it should be stated as ‘Not Applicable’.

5. All Technical bids must contain the following information:
   - A description of how the firm meets the qualifications listed under "firm qualifications".
   - A conceptual plan demonstrating how the firm will fulfil the items listed under "Scope of Work".
   - Timelines for completing the project, with comprehensive activity plan and breakdown of tasks and specific time required to complete each task at each stage of development.
   - Name and contact information of the lead person assigned by the firm to this project.
   - Information on three projects (Turnkey basis) similar to this one, including name, title and email address of the primary contact person at each client. Written testimonials from recent clients would add value.
   - Title page including the firm's name, address, phone number, principal contact and email address.
   - Resumes of all principals to be involved in the project and their roles and responsibilities in this project, including years of experience related to Interior works (Turnkey basis).
• A detailed work plan describing the firm’s approach to designing, managing and coordinating this project.

• A procedure for how the firm will go about collecting all the required information and assistance required from IIMB in order to complete the project.

• Financial status of the firm including, on the basis of annual turnover, working capital net worth work on hand, financial arrangements proposed, viz., own resource/bank credits etc.

• Earnest Money Deposit (EMD).

• The Firm/Consultant should furnish the brief description about the materials, workmanship, finished and specification.

• **Only the eligible consultants/firms will be invited to give the concept presentation provided they produce definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority for having satisfactorily completed similar turnkey services for at least three (3) similar works each project costing Rs.62.00 Lakhs each or two (2) similar works each project costing Rs.78.00 Lakhs or One (1) similar work project costing Rs.124.00 Lakhs during the last 7 (seven) years ending with 31.03.2015.**

7. The Indian Institute of Management proposes to avail the services of Firm for designing the interior works (Turnkey basis). Applications are invited along with Design Intent as detailed in the document.

8. In the event of a tender being submitted by a partnership firm, the tender must be signed separately and legibly by each partner or member of the firm, or, in their absence a person holding Power of Attorney on behalf of the firm concerned. In the later case, a copy of the power of attorney duly attested by a Gazetted Officer must accompany the tender and certified true copy (attested only by Gazetted Officer) of the partnership deed must be enclosed along with the tender submitted by the partnership firm.

9. If the application is made by a limited company or a limited Corporation, it shall be signed by duly authorized person holding the power of attorney which power of attorney shall accompany the application. Such limited company or corporation will be required to furnish satisfactory evidence of its existence before the contract is awarded.

10. If the application is made by a group of firms, it shall be accompanied by a legal document signed by all parties to the joint venture/consortium confirming therein a clear and definite manner the proposed administrative arrangements for the management and execution of contract, the delineation of duties, responsibilities and scope of work to be undertaken by each such party, the authorized representative of the joint venture and an undertaking that the several parties are jointly and severally liable to the employer for the performance of the contract together with details of experience and past performance of each of the parties to the joint venture on works of a
similar nature within the past Seven years, current works on hand and other contractual commitments.

11. To be eligible for award of contract, bidders shall provide evidence satisfactory to the Employer, notwithstanding any previously conducted pre-qualification of potential bidders, their capability and adequacy of resources effectively to carry out the subject contract. To this end, all bids submitted shall include the following information.

a) Copies of original documents defining the constitution, legal status, place of registration and principal place of business of the company or firm or partnership or if a joint venture, of each party thereto constituting the tender.

b) Wherever the tenderer is a joint venture of two or more firms, a statement signed by all parties to the joint venture, of the proposed administrative arrangements for the management and execution the contract, the duties, responsibilities and scope of work to be undertaken by each party, the authorized representative of the joint venture, and an undertaking that the several parties are jointly and severally liable to the Employer for the performance of the contract.

c) Details of the experience and past performance of the tenderer (or of each party to a joint venture) on works of similar nature within the past seven years and details of current works on hand and other contractual commitments Major items of construction equipment proposed for carrying out the contract.

d) Back up by specialized agencies for items of work like sanitary, water supply, electrical works etc. are permitted subject to specific approval of Employer/Engineer.

e) Firm shall not sublet any part of the work without prior written consent of the Employer/Engineer.

f) Reports on the financial standing of the tenderer (or of such party to a joint venture) including profit and loss statements, Balance sheets and auditors reports for the past three years.

g) Information regarding any current litigation in which the tenderer is involved.

12. The information furnished must be sufficient to show that the applicant (along with all parties to the consortium/joint venture) is capable in all respects to successfully complete the envisaged contract works strictly on the basis of the application (along withal parties to the consortium/joint venture) having already earlier carried out satisfactory work of similar size and complexity. The Applicant’s attention is explicitly drawn to the fact that
even after pre-qualification of potential bidders has already been carried out, all tenders shall include a statement of the changes that may have occurred since pre-qualification with particular reference to the various items listed above and that furthermore, contract work shall be awarded to the successful tenderer, only on the basis of a careful scrutiny of all the above information furnished by the Applicant.

13. The Applicant is expected to have visited the project site before submitting pre-qualification bid.

14. While submitting the schedule duly filled in, the Applicant shall enclose latest copies of brochures and technical documentation giving more information about the firm and all the members of the consortium/joint venture.

15. All recipients of a pre-qualification document (whether they submit pre-qualification bid or not) should treat the document as strictly confidential and document (pre-qualification) valid for six months.


17. The offer document comprises of the following:

A. TECHNICAL BID:
   a) Eligibility criteria.
   b) Brief details of the work
   c) Method of Evaluation
   d) General Rules & Instructions to the Applicant
   e) Conditions of Contract
   f) Application Format
   g) Proforma - A, B, C and D

B. FINANCIAL BID-FEE STRUCTURE:

Financial bid for the proposed consultancy services (Turnkey basis) should be furnished in Proforma - ‘E’ and ‘F’ and submitted in a separate envelope (THIS IS ONLY FOR QUALIFIED VENDORS).

18. The Interior Turnkey Consultants/Vendors should fix the interior design to the plan enclosed as per the requirements of the IIMB vide (B, ‘Brief Details and Objectives of the Work’), no structural modifications are allowed in the plan enclosed.

19. The Interior Turnkey Consultants/Vendors should furnish the Prequalification Document with detailed specifications including conditions of contract and relevant reference of Bureau of Indian Standards on materials and workmanship along with costing.

20. **No remuneration will be paid for the presentation and site visits etc.**
## A. ELIGIBILITY CRITERIA

### SUBJECT: Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Criteria</th>
<th>Documents Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>The Firm should be a registered member with Council of Architecture (COA) or Indian Institute of Firms (IIA)</td>
<td>Copy of valid registration certificate from COA or IIA</td>
</tr>
<tr>
<td>02</td>
<td>The Firm should have minimum of 7 years experience in architectural services.</td>
<td>Copy of registration certificate. PAN Card copy shall be enclosed.</td>
</tr>
<tr>
<td>03</td>
<td>The Firm should have provided consultancy services for at least three (3) similar works each project costing Rs.62 Lakhs each or two (2) similar works each project costing Rs.78 Lakhs or One (1) similar work project costing Rs.124 Lakhs during the last 7 (seven) years ending with 31.03.2015. <strong>Similar work means designing the interiors (Turnkey basis) of building for public sector undertaking or reputed organizations.</strong></td>
<td>Satisfactory completion certificates from the clients clearly indicating the cost &amp; nature of work and year of completion.</td>
</tr>
<tr>
<td>04</td>
<td>Organizational set up including staff strength, infrastructural facilities (Details to be attached) Consultant / Associates including in-house capabilities for various services (Details to be attached)</td>
<td>Details of organization chart with in-house facilities and external service consultants proposed for this project.</td>
</tr>
<tr>
<td>05</td>
<td>Registration with Government Organization</td>
<td>Registered with PWDs / CPWD / MES / Railways / Public Sector Undertakings and provide necessary documents in support of the same</td>
</tr>
<tr>
<td>06</td>
<td>Work Experience</td>
<td>Work Experience in Central Govt./Central Autonomous Body / Central PSUs / PWDs / CPWD / MES / Railways / Public Sector/ Tech parks</td>
</tr>
<tr>
<td>07</td>
<td>Client certificate</td>
<td>Client certificate &amp; recommendations</td>
</tr>
</tbody>
</table>
B. BRIEF DETAILS AND OBJECTIVES OF THE WORK

SUBJECT: Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

SCOPE OF WORK

The details of existing spaces with approximate areas at ground floor level are tabulated below for planning and designing as per the requirement and the ground floor plan enclosed:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Nomenclature as per drawing</th>
<th>Approximate area (Sft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conference Hall</td>
<td>2926.72</td>
</tr>
<tr>
<td>2</td>
<td>Classroom-1</td>
<td>744.161</td>
</tr>
<tr>
<td>3</td>
<td>Classroom-3</td>
<td>744.161</td>
</tr>
<tr>
<td>4</td>
<td>Classroom-2</td>
<td>744.161</td>
</tr>
<tr>
<td>5</td>
<td>Classroom-4</td>
<td>744.161</td>
</tr>
<tr>
<td>6</td>
<td>Office</td>
<td>818.836</td>
</tr>
<tr>
<td>7</td>
<td>Waiting</td>
<td>282.385</td>
</tr>
<tr>
<td>8</td>
<td>Ladies’ Toilet</td>
<td>483.963</td>
</tr>
<tr>
<td>9</td>
<td>Gents’ Toilet</td>
<td>122.954</td>
</tr>
<tr>
<td>10</td>
<td>Director</td>
<td>524.877</td>
</tr>
<tr>
<td>11</td>
<td>Pantry</td>
<td>93.140</td>
</tr>
<tr>
<td>12</td>
<td>Washroom</td>
<td>81.345</td>
</tr>
<tr>
<td>13</td>
<td>Lounge</td>
<td>934.72</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>77.041</td>
</tr>
<tr>
<td>15</td>
<td>2.45m wide Passage</td>
<td>200.351</td>
</tr>
<tr>
<td>16</td>
<td>2.45m wide Passage</td>
<td>200.351</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>263.62</td>
</tr>
<tr>
<td>18</td>
<td>1.50m wide Passage</td>
<td>223.82</td>
</tr>
<tr>
<td></td>
<td>Total Built-up Area (Approx)</td>
<td>10210.767</td>
</tr>
</tbody>
</table>

Preparation of detailed working drawings and specifications, Internet facilities, networking, telephones, wall panelling, false ceiling, acoustics, electrical / DG Power Supply set up, floor finish, colour scheme and other required interior features.
The detailed design shall include the following:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Unit</th>
<th>Approx. Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classroom</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Lighting</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Electrical wiring / Power point for individual table</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Stand alone Ups-10kVA</td>
<td>****</td>
<td></td>
</tr>
<tr>
<td>Inside Painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>False-ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic wall paneling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White ceramic writing Board</td>
<td>Sft</td>
<td>240</td>
</tr>
<tr>
<td>Lecturn</td>
<td>Nos</td>
<td>01</td>
</tr>
<tr>
<td>Classroom tables for 70 seaters</td>
<td>70 Seaters</td>
<td></td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos</td>
<td>70</td>
</tr>
<tr>
<td>Vertical blinds for windows</td>
<td>Sft</td>
<td>320</td>
</tr>
<tr>
<td>Pen stand</td>
<td>Nos</td>
<td>01</td>
</tr>
<tr>
<td>Bottle holders</td>
<td>Nos</td>
<td>02</td>
</tr>
<tr>
<td>Glass boards</td>
<td>Sft</td>
<td>48</td>
</tr>
<tr>
<td>Curved false flooring tiers (3 tiers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) I tier height – 100mm to 125mm from floor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) II tier height – 200mm to 250mm from floor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) III tier height – 300mm to 375mm from floor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinyl flooring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum angles for stages</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Faculty Office</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum / any other partition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside Painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting works</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Electrical wiring</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Tables for faculty</td>
<td>Nos</td>
<td>06</td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos</td>
<td>24</td>
</tr>
<tr>
<td>Storage units (975x450x1200mm)</td>
<td>Nos</td>
<td>08</td>
</tr>
<tr>
<td>UPS (1kVA)</td>
<td>****</td>
<td></td>
</tr>
<tr>
<td>Tables with cubicals</td>
<td>Nos</td>
<td>02</td>
</tr>
<tr>
<td>Pedestals with 3 drawers</td>
<td>Nos</td>
<td>08</td>
</tr>
<tr>
<td>Item</td>
<td>Unit</td>
<td>Quantity</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>Vertical blinds for windows</td>
<td>Sft</td>
<td>157</td>
</tr>
<tr>
<td><strong>Seminar room</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Lighting works</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>Electrical works</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Stone alone UPS (2kVA)</td>
<td></td>
<td>****</td>
</tr>
<tr>
<td>Inside Painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic wall paneling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables for 25 seaters</td>
<td></td>
<td>For 25 seaters</td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos</td>
<td>25</td>
</tr>
<tr>
<td>Storage unit (975x450x1200mm)</td>
<td>Nos</td>
<td>04</td>
</tr>
<tr>
<td>False-ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical blinds for windows</td>
<td>Sft</td>
<td>86</td>
</tr>
<tr>
<td><strong>Library</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Lighting works</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>Electrical works</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Stone alone UPS (2kVA)</td>
<td></td>
<td>****</td>
</tr>
<tr>
<td>Inside painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables for 26 seaters</td>
<td></td>
<td>For 26 seaters</td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos</td>
<td>26</td>
</tr>
<tr>
<td>Bookrack</td>
<td>Sft</td>
<td>495</td>
</tr>
<tr>
<td><strong>2 nos of officers cabins with storage &amp; furniture &amp; 6 nos of Staffroom with cubical section</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting works</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>Electrical wiring</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Stand alone UPS (1kVA)</td>
<td></td>
<td>****</td>
</tr>
<tr>
<td>Inside Painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables with cubical</td>
<td>Nos</td>
<td>06</td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos</td>
<td>12</td>
</tr>
<tr>
<td>Storage unit (975x450x1200mm)</td>
<td>Nos</td>
<td>10</td>
</tr>
<tr>
<td>Modular full height partition with wooden doors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manager table (1500 x 600mm)</td>
<td>Nos</td>
<td>02</td>
</tr>
<tr>
<td>Item</td>
<td>Quantity</td>
<td>Unit</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>Pedestal with 3 drawers</td>
<td>08</td>
<td></td>
</tr>
<tr>
<td>Vertical blinds for windows</td>
<td></td>
<td>Sft 145</td>
</tr>
<tr>
<td><strong>Director block</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Director's office, washroom, secretariat cabin &amp; pantry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Lighting works</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Electrical works</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Stand alone UPS (2kVA)</td>
<td>****</td>
<td></td>
</tr>
<tr>
<td>FAX machine</td>
<td>No 01</td>
<td></td>
</tr>
<tr>
<td>Inside Painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washroom for Director's office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pantry for Director's office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos 04</td>
<td></td>
</tr>
<tr>
<td>Table</td>
<td>Nos 01</td>
<td></td>
</tr>
<tr>
<td>Storage/filing cabinet</td>
<td>Sft 150</td>
<td></td>
</tr>
<tr>
<td>3 seaters sofa</td>
<td>No 01</td>
<td></td>
</tr>
<tr>
<td>Single seater sofa</td>
<td>Nos 03</td>
<td></td>
</tr>
<tr>
<td>Center table</td>
<td>No 01</td>
<td></td>
</tr>
<tr>
<td>Vertical blinds for windows</td>
<td>Sft 22</td>
<td></td>
</tr>
<tr>
<td>Tables with cubical for secretary</td>
<td>No 01</td>
<td></td>
</tr>
<tr>
<td>Chairs</td>
<td>Nos 03</td>
<td></td>
</tr>
<tr>
<td>Storage unit (975x450x1200mm)</td>
<td>No 01</td>
<td></td>
</tr>
<tr>
<td><strong>Reception area works</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical wiring / Telephone</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Other civil works</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common area furniture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAX machine</td>
<td>No 01</td>
<td></td>
</tr>
<tr>
<td><strong>Corridors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside Painting for walls &amp; ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UPS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPS equipments</td>
<td>****</td>
<td></td>
</tr>
<tr>
<td>Cabling work</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Panels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cafeteria for 30 seaters capacity (Proposed in first floor)**

<table>
<thead>
<tr>
<th>Tables for 30seaters</th>
<th>For 30seaters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairs</td>
<td>Nos 30</td>
</tr>
<tr>
<td>Counter table</td>
<td>Nos 04</td>
</tr>
<tr>
<td>AC</td>
<td>***</td>
</tr>
<tr>
<td>Electrical wiring</td>
<td>*</td>
</tr>
</tbody>
</table>

**Unisex washroom**

**Ladies/Gents washrooms**

**Washrooms close to classroom (Additional new building)**

**Security office inside the building and security cabin near the entrance gate with furniture**

- Refer Particular specification, Images, plan for details.
- Electrical requirements are given room-wise. However the vendor should design the wiring from the main panel as per the requirement of local distribution board shall be decided by the vendor at the time of detail design.
- Note:
  1. Electrical wiring: Based on the revised lighting design, power socket requirements, UPS wiring and DG power backup, power distribution has to be designed.
  2. Telephone wiring: At present there is no telephone wiring in the building. Telephone wiring has to be designed based on the layout proposed and the location of EPABX considered in the design.
** Proposing the additional lighting design after studying the existing lighting level as per requirements of IIM. Refer Section LIGHTING for complete lighting details.
*** The vendors should design area-wise air-conditioning requirements considering the heat load given below. The design calculation should be submitted along with the technical bid.

**** Area-wise UPS power requirements are given in the chart. The power socket outlets has to be designed as per the furniture layout plan proposed in the room. IIMB will give the approval for the above drawing before execution.

1. SEALING & SUBMISSION OF THE BIDS:
   i. The offer is "THREE ENVELOPE CONCEPT" and it has to be submitted as such.

   ii. The First Cover containing the Demand Draft/Bankers’ Cheque towards EMD and super-scribed as “Earnest Money Deposit” and the cover should be properly closed and sealed.

   iii. The Second Cover containing the Technical Bid, duly signed on every page with company seal, super-scribed as "Technical Bid" and the cover should be properly closed and sealed.

   iv. These two sealed covers (i.e. first cover containing EMD and second cover containing Technical Bid) should be placed in a bigger outer cover and should be closed and properly sealed. The outer cover should be super-scribed with the NAME OF THE WORK mentioned above. The covers with improper seal or without the name of the work will be summarily rejected.

   v. The Third cover containing the Financial Bid (which will be issued only to the qualified firms in Technical Bid and Concept Presentation), duly sealed and signed on every page, super-scribed as “Financial Bid” and the cover should be closed and sealed.

   vi. **NOTE:** The first two envelopes should be furnished at the date and time of submission of Technical Bid and the third envelope (only by qualified firms) should be furnished at the date and time of submission of Financial Bid.

   vii. The outer cover for the first two envelopes should bear the name and address of the firm.
viii. The outer cover of the offer should be addressed to:
Chief Manager (Infrastructure)
Estate Office
Indian Institute of Management Bangalore
Bannerghatta Road
BANGALORE – 560076.

ix. The second envelope should contain the Technical Details as per the details and all the components of Technical Bid as detailed in the NIO with all supportive documents duly signed on all the pages other than the financial / fees aspects.

x. Firm should note that financial aspects of the offer should not be disclosed in any way, in the technical bid/ second envelope and such technical bids consisting financial aspects are liable for rejection.

xi. The third envelope should contain the financial Bid as per Proforma ‘E’ and ‘F’, and should be sealed and submitted on the date and time intimated to the qualifying firms. Non-submission of the same (i.e Proforma E and F) in separate sealed cover along with Eligibility & Technical Bid shall automatically render the entire offer being rejected. This envelope should contain duly filled in Total Amount details (enclosed in the offer document) with values written in words and figures.

xii. The sealed offers should be submitted to Indian Institute of Management Bangalore, Bannerghatta Road, Bangalore - 560 076, on or before 11.05.2015, 15:00 Hrs. If last day of submission of bids is declared a holiday subsequent to issuance of NIO the next working day shall be deemed to be the last day for submission of the offer. No offer will be accepted by email or FAX.

xiii. The offers can also be submitted through post. However, Indian Institute of Management Bangalore will not be responsible for delay in receipt of the offers.

xiv. The first envelope (EMD) and second envelope (Technical bid) will be opened in the said office on 11.05.2015 at 15:30 Hrs.

3. Offer shall be submitted in the prescribed form only i.e. as per the documents issued / have to be duly filled and submitted and no other format shall be used, except for Proformas which shall be submitted in the letterhead. Wherever required, particulars can be submitted in annexure but such details shall be clearly mentioned in respective columns in the original document. All the documents, enclosures, and correspondence will form the part of contract. Offer in any other format other than the prescribed in this document shall be liable for rejection. The applicant shall submit an under
taking in **Proforma 'E' and 'F'** stating that no changes, alterations are made in the offer documents issued by the, IIMB, Bannerghatta Road, Bangalore-560 076.

4. **The fees quoted** shall be inclusive of all fees / charges payable to the associate consultants, Income Tax (TDS) & inclusive of Service Tax.

5. **IIMB, Bannerghatta Road, Bangalore- 560 076 reserves the right to restrict the scope of work and/or divide the assignment.**

6. Offers which are incomplete in any respect are liable to be rejected.

7. Canvassing in connection with offers is strictly prohibited and the offers submitted by the firms who resort to canvassing will be liable for rejection.

8. The offer shall remain open for acceptance for a **period of 120 days from the date of opening.** No offer can be modified or withdrawn by the Firm after submission of the Bid.

9. The Firms or their authorized representatives with an authorization letter as per **Proforma A** are requested to be present during the opening of the bids. Presence for the bid opening is optional. IIMB will proceed with opening of the technical bids on the stipulated date & time unless otherwise modified.

10. It will be obligatory on the part of the Firm to offer and sign the offer documents for all the component parts.

11. The successful Firm shall execute the agreement as per **Proforma C**, on a stamp paper of appropriate value within 15 days from the date of acceptance of the offer, and until a formal agreement on stamp paper is prepared and signed, this offer document as signed under **Proforma B** along with the subsequent correspondence shall constitute a binding contract between the Firm and the IIMB/ Employer.

12. On acceptance of the offer, the name of the accredited representative(s) of the Firm who would be responsible for taking instructions from the IIMB / Employer shall be communicated to the Employer.

13. The total period of work for the purpose of this contract is **60 Days** or till completion of work **as per mutual agreement between Firm and IIMB.**

14. The firm shall inspect the site to ascertain the site conditions, constraints and any other information required for making the offer. For any assistance for visiting the site intending applicants may contact **Chief Manager(Infrastructure), Estate Office, Indian Institute of Management, Bannerghatta Road, Bangalore-560 076.** The firm should visit the site at his own cost.
15. **During the course of technical evaluation if found necessary, IIMB may seek supplementary details and the same shall be submitted within the stipulated time. Non-submission of such details in time may render such applications for disqualification from further evaluations.**

16. Voluntary submission of the supplementary price bid by the firm shall not be accepted and supplementary details shall be limited to the details sought for by the IIMB only. Any other un-related price variations furnished in supplementary details/price bids shall not be recognized and might be liable for rejections if undue information is furnished.

17. **Conditional offers shall be rejected.**
C. METHOD OF EVALUATION

SUBJECT: Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

1. Firstly, the offers of the applicants will be evaluated against the stipulated eligibility criteria of IIMB. Compliance of all the stipulated criteria is mandatory. In case of large number of applications (10 or more) meeting the minimum eligibility criteria, further evaluation & short listing will be carried out on the basis of the details furnished by them to restrict the numbers and such of those will be taken up for evaluating their designs and other technical details.

**PART-A**

<table>
<thead>
<tr>
<th></th>
<th>NAME OF THE AGENCY</th>
<th>EMD ( Rs.3,87,000/- )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>Eligibility Criteria</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Financial strength</td>
<td>Required limit in Lakhs</td>
<td>Submitted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Annual turnover</td>
<td>47</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4</th>
<th>Experience in similar class of work</th>
<th>Works Particulars</th>
<th>Required limit in Lakhs</th>
<th>Worked in Lakhs</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Single work</td>
<td>124</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Two Works</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Three works</td>
<td>62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5</th>
<th>Work Experience</th>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td>Work Experience in any Government Institutions or Higher learning equivalent to IIMB</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
<td>Work Experience in Central Government / Central Autonomous Body / Central PSUs / PWDs / CPWD / MES / Railways / Public Sector / Tech park</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td></td>
<td>Work Experience in Reputed private Organization</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6 Registration with Government organization

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Registered with PWDs /CPWD/MES/Railways/Public Sector Undertakings and provide necessary documents in support of the same</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7 Company Experience

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Company Work Experience - above 7 years (5 Marks)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b Company Work Experience - 5 to 7 years (2 Marks)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 8 Organizational set up including staff strength, infrastructural facilities (Proof to be attached) Consultant / Associates including in-house capabilities for various services (Proof to be attached)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>a a) Office Space (3000 sq.ft.)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b b) No. of Engineers present (For details, refer F, Sl no.6)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c c) Other associated staff</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9 Client certificate

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Client Certificate &amp; Recommendations / Awards</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 10 Aggregate % achieved

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
</table>

### 11 Minimum aggregate % required

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Marks Break Up</th>
<th>Firms Scored</th>
<th>Total % Scored</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>70%</td>
</tr>
</tbody>
</table>

If necessary, the applicant shall coordinate for the site visit of their qualifying works with their clients.

The technical bids will be opened initially and the conditions stipulated would be examined and clarifications sought, if necessary, on such conditions.
stipulated in the tender documents. Each of these conditions shall be evaluated by the committee. Likewise, the tenderer’s design will be scrutinized as to its conformity with the basic design data supplied with tender documents. The Committee shall shortlist the agencies to be invited for presentation.

The agencies qualifying in **Technical Bid – Part A** shall have to give presentations before the committee exhibiting their Interior space planning, by way of animations and any other modern method of presentation based on the separate time slot awarded to each turnkey consultant/vendor. The competent committee shall select the agencies based on their presentation with best concept, design, track record in construction of similar buildings including aesthetic and space utilization.

2. **Such of those technically shortlisted applicants will be evaluated by the Evaluation committee to rank their designs based on the quality and type of presentation based on the below listed parameters.**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Overall understanding the concept, Main thematic vision, Originality of the concept, Aesthetics and innovation</td>
<td>15</td>
</tr>
<tr>
<td>b)</td>
<td>Quality and Efficiency of design and facilities planned</td>
<td>15</td>
</tr>
<tr>
<td>c)</td>
<td>Speed, ease of construction, sustainability, cost towards maintenance</td>
<td>15</td>
</tr>
<tr>
<td>d)</td>
<td>Disturbance to existing structure</td>
<td>15</td>
</tr>
<tr>
<td>e)</td>
<td>Proper utilization for all areas</td>
<td>10</td>
</tr>
<tr>
<td>f)</td>
<td>Ventilation for all areas</td>
<td>10</td>
</tr>
<tr>
<td>g)</td>
<td>Finishes matching with existing building</td>
<td>10</td>
</tr>
<tr>
<td>h)</td>
<td>Combination of materials used</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

3. **Design Presentation:** shall contain preliminary conceptual Plans, Architectural Designs with drawings giving details, highlights of the design (look & feel concept), specifications for various components, perspectives, to provide information in respect of magnitude of work and its components. Firm may submit a walk through during the presentation to highlight their concept/design, **for which no extra cost will be payable.**
The Applicants while preparing the above preliminary conceptual drawings for design presentation shall take note of the following points:

i. Develop Architectural / Interior Drawings/Plans to utilize the full area as per the local bye-laws and regulations. Copy of site plan and floor plans are available for inspection at our office.

ii. The drawings prepared shall have good ambience, in tune with current/futuristic trends, space efficiency, economy, incorporating features/ facilities for the persons with special needs, ease and speed of construction, care taking and maintenance, etc.

iii. The drawings should preferably contain the concept design of the respective main component appropriate to the purpose and use for which it is intended.

iv. It shall be open to firm to suggest any new feature to the building as a part of interior, which shall be within the overall scheme of MMRDA architectural guidelines. While furnishing such details, the cost factor should also be indicated.

4. In case a large number of Turnkey Consulting Firms/Vendors secure the minimum prescribed qualifying marks, the Committee may restrict the number of qualifying Turnkey Architects/Architectural Firms/Vendors.

5. The top three ranked bidders with respect to the above parameters will only be invited to participate in the commercial bid and considered for evaluating the lowest offer. No presentation material to be attached with the Technical/commercial Bids.

6. Based on the presentation and feedback of the Selection Committee, the designs will be awarded with marks, which will constitute 80% (Concept presentation) and fee quoted will be opened and will have 20% weightage marks (Financial Bid) as enumerated below:

7. The merit rank and the fees quoted will be taken into account for the final selection of the Applicant with weightage of 80 % for the merit (i.e. Design Details) and 20 % for the Fee quoted. The weightage will be applied as per the example given below:

   In case of assessing the quoted fee the following shall apply.

   a. The fee quoted for the scope of architectural design and execution in percentage terms will be converted into amount considering the project cost of Rs.15.00 Crores. Even in case of restricted/divided scope of work, for assessment purpose the project cost will be considered at Rs.15.00 Crores.
Let us assume 3 participating Firms scoring the marks for the design as per the table below and in case of fees the amount quoted is as under:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Marks Scored for design (Concept Presentation)</th>
<th>Fee quoted by the agency (Financial) (Rs. in crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Firm A</td>
<td>85</td>
<td>23.00</td>
</tr>
<tr>
<td>2</td>
<td>Firm B</td>
<td>80</td>
<td>13.00</td>
</tr>
<tr>
<td>3</td>
<td>Firm C</td>
<td>75</td>
<td>18.00</td>
</tr>
</tbody>
</table>

The maximum scoring points i.e 85 scoring points will be given 100 percentages and percentage of the other Firms will be worked out on proportionate basis and thereafter weightage of 80% will be applied on marks so obtained. Similarly the minimum fee i.e Rs.13.00 lakhs will be given 100 percentage and percentage of the other Firms will be worked out on proportionate basis and thereafter weightage of 20% will be applied on marks so obtained. The marks so obtained by all the Firms will be added and the Firms will be ranked 1, 2 & 3.

Marks obtained by Firm A \[-\frac{85}{85} \times 80 + \left(\frac{13}{23}\right) \times 20 = 91.304\text{ marks}\]

Marks obtained by Firm B \[-\frac{80}{85} \times 80 + \left(\frac{13}{13}\right) \times 20 = 95.294\text{ marks}\]

Marks obtained by Firm C \[-\frac{75}{85} \times 80 + \left(\frac{13}{18}\right) \times 20 = 85.033\text{ marks}\]

As per the weightage, the Firm B gets the maximum marks and will be ranked one on the basis of overall marks.

8. **The decision of the IIMB in selection of the Firm shall be final and binding on the participating applicants.**

9. IIMB decision in the selection process is final and IIMB will neither entertain any correspondence in this regard nor will be bound to furnish any explanation. The acceptance of an offer will rest with the IIMB which does not bind itself to accept the lowest offer and reserves to itself the authority to reject any or all of the offers received without assigning any reason.

11.0 **LATE TENDERS**

11.1 Any tender received by IIMB after the deadline prescribed for submission of tenders will be returned unopened to the Bidder.
D. GENERAL RULES & INSTRUCTIONS TO APPLICANTS

SUBJECT: Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

1. The documents consisting of Notice Inviting the Offer, Eligibility criteria, General rules and instructions to Firms, Method of selection, conditions of contract, Application Format, Proforma-A, B, C & D can be collected between the dates mentioned in the Notice Inviting Offer (NIO) during the working hours everyday except on Saturdays, Sundays and Public Holidays from Estate Office, Indian Institute of Management Bangalore (IIMB), Bannerghatta, Road, Bangalore 560 076. And Financial Bid will be issued only to vendors qualifying in the Technical Bid and Concept Presentation.

2. The scope of work includes the following items of works:

   Proposing layout with furniture as per IIM requirements which consist of the following:

   a) Classrooms
   b) Reception Areas
   c) Seminar room
   d) Library
   e) Officers cabin
   f) Staffroom
   g) Faculty Office
   h) Director’s Office
   i) Washroom at Director’s office
   j) Waiting lounge
   k) Secretary cabin
   l) Pantry
   m) Renovation of existing Washrooms
   n) Cafeteria
   o) Washrooms close to classroom
   p) Security office inside the building and security cabin near the entrance gate with furniture’s
   q) Proposing one Disable Friendly Washroom for men and women
r) Backup power DG as per capacity given by IIM
s) Cabling design for DG and UPS wiring
t) Installation of UPS – Capacity provided by IIM
u) Extension of UPS power supply to the areas suggested by IIM
v) Proposing the location for installing DG and UPS
w) Installation of EPABX
x) Proposing the location for installing EPABX
y) Telephone instruments for individual area
z) Telephone wiring
aa) Furnishing the different furniture designs
bb) Total layout preparation as per the functional area
cc) Proposing the additional lighting design after studying the existing lighting level as per requirements of IIM
dd) Designing the AC Unit for the required areas
ee) Furnishing the BOQ after approval of the design by IIM
ff) Networking
gg) Inside Painting
hh) Detailed working drawings based on the approved concept, which should be certified by IIMB.
i) All macro and micro level details to confirm to relevant Bureau of Indian Standards.
jj) To furnish Macro and Micro level activity for completion of work, with confirmed period of total completion of work.
kk) The approved Bill of Quantities will be certified for quality of materials and workmanship by IIMB.
ll) The Interior Turnkey Consultants/Vendors should post experienced site supervisory staff on works, which will be verified by IIMB.
i) After the completion of work, prepare and supply,
- Final drawing with plans, elevations, sections, structural details, structural designs etc, incorporating all the changes made during the execution of the work.
- No variation in cost is permitted. The work should be done as per approved concept only.
mm) Interior Design services will include preparation of drawings for plans, elevations, sections and specifications for integrating the Interior Design with the construction programs in place.

i) These will include the following:

- Schedules of Furniture, Fittings and Equipment including seating, tables, networking etc.
- Partitions, doors, wall panels, acoustic screens, wall and floor finishes, ceilings, electrical wiring drawings installations.
- Material selection and colour scheme for walls and ceiling finishes, blinds and upholstery.
- Interactive computer terminals, etc. coordinated and controlled as teaching-aids from the faculty rostrum.
- Fittings for general illumination.

nn) **Interior Designing and other related Consultancy Work/Schedule of Services:**

- Layout Designing
- Interior Designing – Designing and detailing for the interiors, such as wall paneling, lighting, all types of signages including indicators, acoustics, aesthetics and display systems, decorative features & fixtures, air-conditioning, renovation of restrooms, rearrangement of plumbing/sanitary work, sewerage system details
- Designing of ergonomically developed modular furniture, furnishing
- (a) Preparation of concept plan of renovation or remodeling including associated facilities / features as necessary
  (b) Approval of concept plan by IIMB
  (c) Providing and presenting the proposed scheme in any modern method of presentation.

3. Preparing and presenting to IIMB for their review and approval:

   a) Conceptual Designs,

   b) Schematic Designs and
c) Design Development in successive stages after IIMB approval of the preceding stage.

4. It must be clearly noted that IIMB will not permit offering of Consultancy Services as back-to-back and/or sublet them to serve other agency.

5. The following deductions will be made in the Works Bill after verification by the IIMB, as per prevailing norms or as amended in force.
   
   (a) S.D. @ 5%
   (b) I.T. @ 2%
   (c) Labour Cess @ 1%
   (d) Power & Water Charges as per actual consumption

6. Mobilization Advance will not be paid on works and safety norms on works to be implemented as per NBC 2000.

7. Material Advance (only on non-perishable items) will be paid to an extent of 70% of value of work order excluding taxes against Bank Guarantee.

8. The safety and security of the materials should be looked after by the vendors and Work Bills will be certified by Engineer-in-charge, IIMB based on the actual quantity executed at site, work bills to be furnished as per CPWD norms.

9. The firm should furnish the detailed schedule for completion of work as per PERT/CPM, furnish weekly progress reports and give presentation on the progress of works during Works Review Meetings.

10. All the firms are requested to visit the site and get clarified with design data before presenting the concept. No modifications / alterations will be allowed after the presentation is made.

11. No cost of whatsoever will be paid towards site visits, presentations etc, during pre-qualification.

12. Incomplete details are liable to be rejected.

13. If the application is made by a Firm in Partnership, it shall be signed by all the Partners of the Firm, above their full names and current addresses, or by a Partner holding the Power of Attorney for the Firm by signing the Application in which case a certified copy of the Power of Attorney shall accompany the Application. A certified copy of the Partnership Deed, current address of the Firm and the full names and current addresses of all the Partners of the Firm shall also accompany the Application.
14. If the Application is made by a limited Company or a limited Corporation, it shall be signed by duly authorized person holding the Power of Attorney which Power of Attorney shall accompany the Application. Such limited company or corporation will be required to furnish satisfactory evidence of its existence before the consultancy is awarded.

15. If the application is made by a Group of Firms, it shall be accompanied by a legal document signed by all parties to the Joint Venture/Consortium confirming therein a clear and definite manner, the proposed administrative arrangements for the management and execution of contract, the delineation of duties, responsibilities and scope of work to be undertaken by each such party, the authorized representative of the Joint Venture and an Undertaking that the several parties are jointly and severally liable to the Employer for the performance of the Contract together with details of experience and past performance of each of the parties to the Joint Venture on works of a similar nature within the past five years, current works on hand and other contractual commitments.

16. To be eligible for award of Interior Consultancy job, bidders shall provide evidence satisfactory to the Employer, notwithstanding any previously conducted pre-qualification of potential bidders, of their capability and adequacy of resources effectively to carry out the subject contract. To this end, all bids submitted shall include the following information:

   (a) Copies of original documents defining the constitution, legal status, place of registration and principal place of business of the company or firm or partnership or if a joint venture, of each party thereto constituting the tender.

   (b) Where the Interior Consultant is a joint venture of two or more firms, a statement signed by all parties to the joint venture of the proposed administrative arrangements for the management and execution of the contract, the duties, responsibilities and scope of work to be undertaken by each party, the authorized representative of the joint venture, and an undertaking that the several parties are jointly and severally liable to the Employer for the performance of the contract.

   (c) Details of the experience and past performance of the Interior Turnkey Consultants/Vendors (or of each party to a joint venture) on works of similar nature within the past Five years and details of current works on hand and other contractual commitments.

17. The pre-qualification document shall be considered to ascertain whether the Consultant/firm:

   i) meets the eligibility criteria
   ii) has been properly studied and signed
   iii) contain all the details called for and are in proper format
iv) Prequalification Document should be accompanied by required authorization

18. As per GO No.FD 300/LET/2006 dated 18-01-2007. 1% will be deducted from each and every bill as per Labour Welfare Tax Act.

19. All the works are to be carried out as per the standard specifications issued from time to time by BIS and as per relevant codes and practice.

20. In case of Discrepancy / Inconsistency between the Description in the Scope of Works, Specifications, Nomenclature of Items and / or the Drawings, Conditions of Contract, and if there are Varying or Conflicting Provisions made in any Document forming Part of the Contract, the Employer shall be the Deciding Authority with regard to the Intention / Interpretation of the Document and his Decision shall be final and binding on the Interior Turnkey Consultant/Vendor without any reservations.

21. Any Error in Description or any Omissions therefrom, shall not vitiate the Contract or release the Interior Turnkey Consultant/Vendor from the Execution whole or any part of the Works comprised therein according to Drawings and Specifications or from any of his Obligations under the Contract.

22. Foreign Exchange – It shall be clearly understood that no Foreign Exchange shall be made available for the Purpose of Equipment, Plants, Machinery or Materials of any kind or any other Items / Purposes required to be carried out in Execution of the Work. It shall be clearly understood that no Foreign Exchange required for importing Equipment, Materials for Tools, Plants and Machinery etc.

23. Night Work – For completing the Work well within the Intended Completion Period, the Interior Turnkey Consultant/Vendor might be required to work in two or more Shifts (including Night Work) and no Claim whatsoever shall be entertained on this account, notwithstanding, the Fact that the Interior Turnkey Consultant/Vendor will have to pay to the Labours and other Staff engaged directly or indirectly on the Work according to the Provisions of the Labour Regulations and the Agreement entered into and for Extra Amounts towards any other Reason. None of the Permanent Works shall be carried out during Night or on Authorized Public Holidays without the permission in writing of the Employer except when Work is unavoidable or absolutely necessary for the Safety of Life, Property or Work in which case the Interior Turnkey Consultant/Vendor shall immediately advise the Employer accordingly, provided that the Provisions of this Condition shall not be Applicable in the case of any Work which is customary to carry out by Rotation or in Double Shift.

Existing Drains, Pipes, Cables, OFC, Overhead Wires, Sewer Lines, Water Lines and similar Services encountered in the Course of the Execution of the
Work shall be protected / maintained against the Damage by the Interior Turnkey Consultant/Vendor. The Interior Turnkey Consultant/Vendor shall not store Materials or otherwise occupy any part of the Site in a manner likely to hinder the Operation of such Services. In case Temporary Shifting of such Services is required to facilitate the Work, the Interior Turnkey Consultant/Vendor at no Extra Cost shall do the same.

The Respective Departments in coordination with the Employer shall carry out Shifting of Major Services. The Decision as whether the Service in Question is Major or not, will be at the Discretion of the Employer. The Interior Turnkey Consultant/Vendor will, however, be required to provide all help to ensure that the Work is carried out smoothly.

24. **No Accommodation is available at the site of Work for Office, Residence, Labour, Store etc. and the Interior Turnkey Consultant/Vendor has to make his own Arrangement and no Claim whatsoever on this account shall be entertained.**

25. The Interior Turnkey Consultant/Vendor shall make his own arrangement for the Disposal of the Spoils from the Works to such Place where the same shall not cause Nuisance and shall be acceptable to the Authorities concerned.

26. It is to be understood that the Amount quoted by the Interior Turnkey Consultant/Vendor shall cover Incidental Work Charges also and nothing extra will be admitted.

27. **Construction Schedule** – The Construction Schedule and the Methodology of Construction shall be so planned that the entire Work can be completed in minimum possible time and the same must be got approved from the Employer before the Commencement of the Work.

28. Even though an applicant may satisfy the above requirements, he would be liable to disqualification if he has:

   i) Made misleading or false representation or deliberately suppressed the information in the forms, statements and enclosures required in the pre-qualification document.

   ii) Record of poor performance such as abandoning work, not properly completing the contract, or financial failures/weaknesses, etc.

29. Short listing will be subject to thorough verification of their credentials and inspection of similar works carried out/in progress by them through a Committee / Satisfactory Completion Report form the clients.

30. No correspondence will be replied during the tender process.
31. **The prequalified Turnkey Consultants/Vendors will be requested to give the presentation to the IIMB Committee on the informed date and time at their own cost. (Cost incurred on presentation will not be reimbursed).**

32. The presentation should comprise of all the design features, finishes, all micro level detailing and costing. No change in the costing will be permitted.

33. After completion of the work, Final Bill to be submitted along with all the As-Built Drawings, Inventory on works, Handing Over Report duly signed.

34. All the Design / Internal Space Planning should conform to the requirements of IIMB as per B – ‘Brief Details and Objectives of the Work’ and fit in the area as per drawing.

35. **WORKMEN’S COMPENSATION ACT AND OTHER LABOUR ACT:**

   The firm shall employ labour, in sufficient number to maintain the required rate of progress and of quality to ensure workmanship of the degree required by the specification and to the satisfaction of the EIC. The firm shall remain liable for the payment of all wages or other money to his work people or employees under the Payment of Wages Act, Employer liability Act, workmen’s compensation Act, ESI Act or any other Act or enactment relating thereto and rules framed there under from time to time. The Firm shall engage labour only on and during the hours of working day unless he obtains the prior written approval of the Engineer to do otherwise. If such approval is given no liability in respect of any excess cost arising there from shall be incurred by the IIMB.

36. **ESI & PF:**

   **PROVIDENT FUND BENEFITS:**

   a) Provident Fund Benefits to employees by or through Contractors under Employees Provident Fund Amendment 1963 (Act No. 28 of 1963). It is an express condition that the Contractor will comply with the provision of the Employees Provident Fund Act 1952 or as revised and the scheme framed there under in respect of every person employed by him or in connection with the work of the Company.

   b) It is also agreed to, that the Company shall be entitled to recover from him or in any other manner all such sums and charges paid / payable or incurred by IIMB in connection with the Provident Fund in respect of the said employees, such sums including employees contribution, cost of administering the act or scheme administrative expenses incurred by IIMB in connection with the extension of the Provident Fund Benefits of such employees.
For this purpose the Contractor shall furnish at the commencement of each financial year the particulars of persons employed by him, lengths of services of such employees and the details of Provident Fund Benefits extended to them to IIMB Accounts Department.

c) The Contractor shall, during the currency of the contract, when called upon by the Engineer-in-Charge, engage and also ensure engagement by subcontractors and other employed by the Contractors in connection with the works such numbers of apprentices in the designated trades as prescribed by the Central Government and for such period as may be required by the Engineer-in-Charge. The Contractor shall train them as required under the Apprentices Act 1961 and the rules made there and shall be responsible for all obligations of the employer under the said act including the liability to make payment(s) to apprentices as required under the said act.

**ESI PAYMENT:**
The Contractor shall maintain Register showing the names, addresses and other particulars of the insured persons and also obtain ESI / Medical Identity Cards and distribute them to his labourers as employed by him.

NOTE: The above are current rates as notified under ESI Act and subject to revision by the Government any time.

**PENALTY FOR NON PAYMENT OF STATUTORY CONTRIBUTION LIKE ESI, PF etc:**
The Contribution such as ESI, PF etc. Paid to the respective authorities to be made on or before 20th of every month, otherwise interest or penalty charged by the respective Authority on such payment is to be paid by the contractor. If the authorities demand, such amount shall be recovered from the payment of contractor which is due from IIMB and remitted to the respective authorities.
37. **PENALTY FOR DELAY IN EXECUTION:**

In case of failure on the part of Contractor to complete the work and clear the site on or before the time stipulated in the contract or the extended date / period of completion, the Contractor shall, without prejudice to any other right or remedy of the Company on account of such breach pay penalty as compensation @ **1.0 %** per week on unfinished work/balance work upto a maximum of **10 %**.

The amount of compensation may be adjusted or set off against any sum payable to the Contractor under this or any other contract with IIMB.

<table>
<thead>
<tr>
<th><strong>Minimum daily wages of employee</strong></th>
<th><strong>Employees contribution (Recoverable from employee)</strong></th>
<th><strong>Employer’s contribution</strong></th>
<th><strong>Total contribution (employees and employer’s contribution)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>As notified by statutory government agency from time to time.</td>
<td>1.75% of the wages (to be 5% of the wages competed for each person) (Rounded off to higher rupee)</td>
<td>4.75% of the wages</td>
<td>6.5% of the wages</td>
</tr>
</tbody>
</table>
E. CONDITIONS OF CONTRACT

SUBJECT: Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

1. DEFINITIONS:

For the purpose of the agreement, the following words and expression shall have the meaning hereby assigned to them except where the context otherwise requires:

i. ‘Approved’ means approved by IIMB, representative in writing including subsequent confirmation of previous approval and 'Approval' means approval by IIMB, representative in writing as above said.

ii. IIMB, means the INDIAN INSTITUTE OF MANAGEMENT BANGALORE, BANNERGHATTA ROAD, BANGALORE - 560 076 which expression shall unless excluded by or repugnant to the context include its representative.

iii. IIMB representative means the Chief Manager (Infrastructure), Indian Institute of Management, Bangalore or any person authorized by him as in charge of the work and would sign the agreement on behalf of the INDIAN INSTITUTE OF MANAGEMENT IIMB, BANNERGHATTA ROAD, BANGALORE - 560 076.

iv. “Firm” means the Firm/Interior Designer awarded with the Turnkey works namely M/s.__________________________ along with their service/associate consultant engaged by them for the works or their assigns or successors in office and authorized representative.

v. “Project/Works” shall mean the interior works of Proposed New Indian Institute of Management Campus at Visakhapatnam.

2. The successful Firm shall undertake the services by themselves except for the specialist / service associate consultant and shall not sublet or assign or transfer or sub contract any part of the services. No personnel employed by the firm or associate consultant for the work will be liable for any sort of compensation or employment from the IIMB.
3. STATUTORY PERMISSIONS:

Wherever necessary, the firm shall provide necessary details/drawings etc to statutory authorities like for their permissions with regards to execution of works. The design shall be such that it meets the local bye laws requirements. This includes any clarifications/modifications and coordinating with various agencies and authorities.

4. STAGES:

I   PRE- CONSTRUCTION STAGE:

i. Finalizing the planning of interiors, prepare general layout, sketch and designs with drawings good for offering.

ii. After obtaining the approval of the IIMB, prepare the drawings according to the Municipal bye laws, local Acts, Regulations etc., if any and take the approval of the IIMB Making necessary submissions to the Local authorities & obtain their approval, if required.

iii. Concurrently to plan for execution of the work incorporating all heads of the work & activities in such a manner that the work is completed in shortest possible time agreeable to the IIMB,

II  CONSTRUCTION STAGE:

i. Supply 4 sets of working drawings to the IIMB, and for use in construction. A soft copy shall also be submitted in form of CD.

ii. All details and drawings required for smooth execution of work in phases, if so required. Architectural and Interior drawings, sketches, specifications and details that may be required for proper execution of the work.

iii. Obtain approval of the IIMB for any material deviation in designs or cost, due to changes in working drawings, schedule and specifications from the approved scheme. Also prior approval of the IIMB to be obtained in case of any quantity variations/substitutions to the items of work which are quoted high or low beyond 25% to the estimate.

iv. Obtain approval of IIMB for the colour scheme, materials like flooring tiles, fixtures, veneers, paint, furnishing materials, artifacts, plants and related items for landscaping etc including visiting show rooms/suppliers within the overall scheme and specifications furnished in the offer.

v. Periodical site visit to ensure that the works are being carried out as per the proposed scheme of work, attending to weekly/fortnightly site meetings, wherever necessary to clear any site details not concurring with
the drawings or any other problems related to site calling for modifications in the drawings.

vi. The scope of work and assignment described above for this stage is general but is not exhaustive i.e. does not mention the entire incidental work required to be carried out for complete execution of the work. The services shall be provided, all in accordance with true intent and meaning, regardless of whether the same may or may not be particularly described, provided that the same can be reasonably inferred there from. There may be several incidental services & assignments, which are not mentioned herein but will be necessary to complete the work in all respects. All such incidental services/assignments thereof which are not mentioned herein but are necessary to complete the work shall be deemed to have been included in the rate quoted by the firm. Nothing extra shall be payable beyond the amount quoted by the Firm.

vii. On completion to prepare ‘as built’ / completion drawing, as completed, and supply 4 sets of completion drawings in A-1 size to the IIMB and also hand over the originals of the completion drawings to the IIMB. One soft copy in CD after the completion drawings shall also be submitted.

5. ASSOCIATE CONSULTANTS

The Firm shall engage the services of well qualified Specialists in the relevant field as his associate consultants pertaining to services other than architectural if in house facilities are not available and coordinate with them.

The Firm shall indicate the names of his associate consultants for various services their organization, qualifications and experience and get the prior approval of the IIMB before availing their services by the Firm. The IIMB, reserves the right to reject the name of any of the associate consultant proposed to be engaged by the Firm

The Firm shall also be responsible for all the work, action, and omissions of such associate consultants. The Firm shall be fully responsible for the correctness and accuracy of services designs notwithstanding the approval by the IIMB of these designs.

The fees and any related expenses + service tax etc to the Associate consultants appointed for the above services shall be payable by the Firm, within the overall approved fee payable to the Firm by the IIMB, including expenses incurred by the associate consultants towards site / office / market visits required in connection with the project.
6. DESIGN AND EXECUTION FEE

The IIMB shall pay to the Firm the following FEES as remuneration for the project to be rendered by the Firm in relation to said work:

Amount calculated at Rs.____ for complete the Design & Execution (Turnkey basis) as detailed in clause (4) above for the works detailed in clause (I & II).

The above amount is inclusive of fees payable by the Firm to their associate consultants and the associates, Site visits, Lodging, Boarding and Travelling Expenses and nothing extra shall be payable by the IIMB.

The fees payable to the firm shall be in full discharge of functions to be performed by the Firm and associate and no claim whatsoever against the IIMB in respect of any proprietary right or copy right by the consultant or any other party will be entertained. The Firm shall indemnify and keep indemnified the IIMB against all cost and expenses paid by the IIMB in defending such claims.

The amount is also inclusive of responsibilities of carrying out modifications, additions in approved designs and drawings, if any, required during execution of work due to site conditions or any other reason.

The amount quoted should include all these work and IIMB shall pay only statutory payments to be made to the statutory / local authorities against demand from of such authorities or reimburse the same to the Firm on production of receipts paid in the name of the IIMB. The IIMB may make payments directly to the statutory authorities on demand or on production of receipts towards application fee, deposits and service charges etc. issued by statutory authorities. The amount quoted should include all the above work and it shall also include all miscellaneous and incidental expenses to be incurred for getting approval, NOC’s.

The quoted amount is inclusive of all statutory taxes plus service tax. Income tax as payable as per statutory orders / laws shall be deducted at source. TDS certificate shall be issued for such deductions.

All running Payments made to Firm are on account and shall be adjusted against final amount payable. For claiming the payment Firm shall submit necessary bills in duplicate. Payments due to Firm will be made within one month of submission of bills of the corresponding stage subject to satisfactory performance.
7. PAYMENT TERMS:

A. The percentage of payment for this project shall be broken up in components as detailed below:

   a. On Submission of Floor Plan and sketches 15%
   b. On Supply of Furniture without Polishing (Tables, Lecturn, Chairs, Back rack & Storage Cabinet) 10%
   c. On completion of Washrooms 15%
   d. On completion of UPS Work, AC, Telephone, FAX, Generator and AMF Panel 10%
   e. On completion of Electrical and Lighting Works 15%
   f. On completion of false ceiling finishing work 10%
   g. On completion of painting and electrical finishing works 15%
   h. On completion of works 10%

   --------------
   100%
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B. Payment-Interim and Final

(i) After scrutiny and certification by the Engineer, the payment of the certified interim amount (80% of the certified value of work done) shall be made by the Employer within 3 working days from the date of issue of Interim Payment Certificate by the Engineer.

(ii) Balance 20% of the certified value of work done shall be made by the Employer within 21 working days of receipt of the same from Engineer duly certified.

(iii) In calculating the amount payable to the Firm for the Rupee portion, for each item, sums of less than Fifty Paise shall be omitted and sums of Fifty Paise and more, up to one Rupee, shall be reckoned as one Rupee.

(iv) All payments to the Firm for the Rupee portion shall be made by crossed cheque, but no cheque will be issued for an amount of less than Rs.1000/-. This shall not apply to the final payment.

C. False measurements or bills

In the event of Firm submitting false measurements or bills for the first time, the Engineer will issue a written warning to him to the effect that the facility of 80% payment without detailed check will be withdrawn in future. If the firm repeats the offence for the second time, this 80% payment facility shall be completely withdrawn in respect of this firm for all his assignments / contracts with IIMB.
D. Final Bill

On completion of the work, there upon a final bill shall be submitted by the firm within ONE MONTH from the date of completion of the work, so as to ensure payment being made before the expiry of six months from the date of completion of work. A ‘NO DEMAND CERTIFICATE ‘against the company under the contract.

As the contract is Turnkey basis (Design & execution of contact) variation in BOQ quantity shall not be entertained and the value of the contract is final.

E. Adhoc Payments

If payment for final bill could not be arranged within 6 months from the date of the completion of the contract for reasons other than undue delay the final bill, the Accounts Department of the Division will make an adhoc payment against the final bill, based on the recommendations of the Engineer-in-charge. The following guidelines may be adopted while making such adhoc payment.

i) Such payment should normally exceed 95 % of the final bill value.

ii) All conditions of contract and recoveries to be effected should have been taken care of in the final bill.

iii) If a firm has no other contract concurrently running in the Division. Adhoc payment need not be made. Instead, final bill should be expedited and paid at least within six months from the date of completion of the contract.

F. Computerized Measurement Book

Engineer-in-Charge shall, except as otherwise provided, ascertain determine by measurement the value of work done in accordance with the contract.

All measurements of all items having financial value shall be entered by the firm and compiled in the shape of the Computerized Measurement entered by Book having pages of A-4 size as per the format of the department so that a complete record is obtained of all the items of works performed under the contract.

All such measurements and levels recorded by the firm or his authorized representative from time to time, during the progress of the work, shall be got checked by the firm from the Engineer-in-Charge or his authorised representative as per interval or program fixed in consultation with Engineer-in-Charge or his authorised representative. After the necessary corrections
made by the Engineer-in-Charge, the measurement sheets shall be returned to the firm for incorporating the corrections and for resubmission to the Engineer-in-Charge for the dated signatures by the Engineer-in-Charge and the firm or their representatives in token of their acceptance.

Whenever bill is due for payment, the firm would initially submit draft computerized measurement sheets and these measurements would be got checked in his draft computerized measurements, and submit to the department a computerized measurement book, duly bound, and with its pages numbered. The Engineer-in-Charge and/or his authorised representative would thereafter check this MB, and record the necessary certificates for their checks.

The final, fair, computerized measurement book given by the firm, duly bound, with its pages numbered, should be 100% correct, and no cutting or over-writing in the measurements would thereafter be allowed. If at all any error is notice, the firm shall have to submit a fresh computerized MB with its pages duly numbered and bound, after getting the earlier MB cancelled by the department. The firm shall submit two spare copies of such computerized MB's for the purpose of reference and record. The firm shall also submit to the department separately his computerized Abstract of Cost and the bill based on these measurements, duly bound, and its pages numbered along with two spare copies of the bill. Thereafter, this bill will be processed by the Office and allotted a number as per the computerized record in the same way as done for the measurement book meant for measurements. The firm shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements/levels by the Engineer-in-Charge or his representative.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In case of items which are not covered by specifications, measurements shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available then a mutually agreed method shall be followed.

The firm shall give not less than seven days’ notice to the Engineer-in-Charge or has authorised representative in charge of the work before covering up or otherwise placing beyond the reach of checking the measurement of any work in order that the same may be checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Engineer-in-Charge or his authorised representative in-charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of checking
measurements without such notice having been given or the Engineer-in-Charge’s consent being obtained in writing the same shall be uncovered at the Firm’s expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer-in-Charge or his authorised representative may cause either themselves or through another officer of the department to check the measurements recorded by firm and all provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this contract that checking the measurements of any item of work in the measurement book and/or its payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the firm from liabilities from any over measurement or defects noticed till completion of the defects liability period.

G. **Maintenance Period**

The normal period of maintenance for all work (other than maintenance works) will be **SIX months** from actual completion of work and for special items of work such as Tar-felting, Anti-termite treatment etc., as mentioned in the body of the specification. During this period the Firm will be responsible to rectify all defects noticed and attributable to defective workmanship in respect of the work executed by him. As soon as any defects come to the notice, Engineer-in-Charge shall request the Firm in writing to rectify the defects noticed.

H. **Defect Liability Deposit**

The Security Deposit will be refunded only after the Completion of the maintenance period after inspection by the Engineer-in-Charge.

The above deposit will be held by the company as security for the satisfactory performance of the firm. All compensations or other sums or money payable by the firm to the IIMB under the terms and conditions of this contract may be deducted from this security deposit or from any other sums that may be due, or may become due to the firm by the IIMB on any account what so ever, and in the event of the security deposit being reduced by reasons of any such deductions the firm shall within ten days thereafter make good these deductions. No deposit will be recovered for work of routine maintenance works except for special works where maintenance period is essential and specifically stipulated in the contract etc., like tar-felting, water proofing etc.
I. **Recovery for any Over-Payment Made**

Should there be any over payments made inadvertently to the Firm on this account or in any other contract, the IIMB shall recover such amount from the Firm either by deducting the amount from any sums that may due or may become due to the Firm by the IIMB on any account whatsoever from this or any other contract or from the security-cum-earnest money deposit made by the Firm.

9. **SECURITY DEPOSIT:**

The Security Deposit amount may be deducted from the running bills of the firm at the rate of 5% or higher of the gross value of each bill. However, the entire security deposit amount will be withheld before completion.

During the above maintenance period the firm shall be responsible to make good, free of cost, of all defects or damages which are due to defective workmanship / use of substandard materials. If the firm fails to make good such defects or damages even after intimation to him within a reasonable time, IIMB shall get the same rectified as deemed fit at the firms risk and the expenditure incurred by IIMB shall be recovered from any bills or deposits of the firm either pertaining to this contract or from any other contracts or in case any such sum being insufficient or not available for the recovery / deductions the expenditure incurred by IIMB shall be deemed as a debt due.

10. **ADDITIONS AND ALTERATIONS:**

a. The IIMB shall have the right to request in writing changes, additions, modifications or deletions in the design and drawing of any part of the work and to request in writing additional work in connection there with and the Firm shall comply with such request provide necessary services for completion of such works.

b. That if the IIMB deviates substantially from the original approved scheme which involves for its proper execution extra services, expenses and extra labour on the part of the Firm for making changes and additions to the drawings, specifications and other documents due to rendering major part of whole of his work in fructuous, the Firm may then be compensated for such extra services and expenses on quantum merit basis at percentages applicable under this agreement and to be determined mutually unless such changes, alteration are due to Firm own omission and / or discrepancies including changes under clause. The decision of the IIMB shall be final on whether the deviations and additions are substantial as requiring any compensation to be paid to the Firm. However, in case of minor modification, material changes or alteration which does not affect the entire design, planning etc., no such amount will be payable.
c. If it is found after call of offers that the offer is not within the sanctioned amount, the Firm shall if so desired by the IIMB take steps to carry out the necessary modifications in the design and specifications to see that the offered cost does not exceed the amount of corresponding sanction say by 10%. If the IIMB is convinced that the trend of market rates is such that the work cannot be done within the amount of sanctioned estimate, the Firm shall submit a revised estimate with due rate analysis and justifications expeditiously for obtaining sanction of the competent authority. The Firm shall not be paid anything extra for such modifications and related works thereon.

d. The Firm shall not make any material deviation, alteration, additions to or omission from the work shown and described in the contract documents except for structural safety and emergencies, without first obtaining the written consent of the IIMB

11. **TIME SCHEDULE:**

Time is the essence of this work.

**Commencement of work:** The commencement of services will be considered from the 1st day after issue of award of work to the Firm:

a. Concurrently after approval of the interior schemes, to submit the necessary applications/drawings to statutory authorities within 7 days and obtain approvals without affecting the time lines for commencement, execution and completion of works as scheduled.

b. During the execution period, furnishing necessary working drawings, shall not be unduly delayed and affect the time lines including any clarifications shall be attended and cleared within a maximum of 3 days on reference, unless other wise situation warrants extra time and in concurrence with the IIMB.

c. On completion of works, submission of completion drawings and other documents including fulfilling the obligations and conditions stipulated by the statutory authorities within 30 days from the date of completion of works.

12. **NUMBER OF DRAWINGS SETS ETC. AND COPY RIGHT:**

All the estimates, details of quantities, detailed design, reports and any other details envisaged under this agreement including drawings-architectural, electrical, Air conditioning or other services should be supplied by the Firm without any extra cost. Apart from submitting the hard copies, soft copies of all the drawings, details, designs shall also be submitted to the IIMB for IIMB record & future reference at no extra cost.
a. All such drawings and copies as are required to be submitted to the local authorities for approval of drawings and construction and for sanctioning all service connections, including all drawings required for resubmissions incorporating any changes or amendments as required by such authorities.

b. The original drawings approved by the local authorities with their seal shall be submitted to the IIMB

c. Four sets of all drawings of various trades to IIMB

d. Four sets of final completion drawings including services drawings with all amendments, services identification marks and layouts of all services to the IIMB

e. Along with one complete set of final services design. One complete set out of this shall be reproducible copy on A 1 size. Cost of supplying copies of drawings over and above the above sets shall be reimbursed by the IIMB. All these drawings will become the property of the IIMB and the IIMB will have the right to use the same anywhere else. In that event, the IIMB will pay a royalty to the Firm on mutually acceptable basis.

f. If any changes are made in the drawings already issued, whether by the Firm or as required by the IIMB, additional copies of drawings as mentioned in (ii) to (iv) above, shall be issued.

g. The drawings cannot be issued to any other person, firm or authority or used by the Firm for any other project. No copies of any drawings or documents shall be issued to anyone except to the IIMB or their authorized representative.

13. EXTENSION OF TIME:

If the Firm’s work is unavoidably hindered in carrying out the designs / drawings on account of delayed decision or the approval by the IIMB which are necessary to carry out further work beyond the time specified, he shall be allowed suitable extension of time by IIMB whose decision shall be final and binding on the Firm. No claim of any kind shall be entertained from the Firm for such delayed approvals/decisions by the IIMB except request for suitable extension of time.

14. GUARANTEE:

The firm shall agree to redesign at his cost any portion of his engineering and design work, which due to his failure to use a reasonable degree of design skill shall be found to be defective within one year from the date of
completion of the work. The IIMB shall grant right of access to the Firm to these portions of the work claimed to be defective, for inspection.

The IIMB may make good the loss by recovery from the dues/security deposits of the Firm in case of failure to comply with the above clause.

15. **RESTRICTION / SUSPENSION:**

The IIMB reserves the right of restricting the Firm’s work at any stage and make other arrangements for continuing the balance services after withdrawing such work from him or suspend the work.

The IIMB shall have the liberty to omit, postpone or not to execute any work and / or any item of work and the Firm shall not be entitled to any compensation or damages for such omission, postponement, or non-execution including whole of project of the work and / or any item of work, except the fees which have become payable to them for the services actually rendered by them.

16. **ABANDONMENT OF WORK:**

That if the Firm abandons the work for any reasons whatsoever or becomes incapacitated from acting as aforesaid, the IIMB may make full use of all or any of the drawings & details prepared by the Firm and that the Firm shall be liable to **refund all the Excess amount paid to him up to that date** plus such damages as may be assessed by the IIMB subject to a maximum of 10% of the total amount payable to the Firm under this agreement. Further the IIMB shall be entitled to make use of all or any drawing(s), designs or other documents prepared by the Firm.

Provided, however that in the event of the termination of the agreement being under proper notice as provided in the clause hereinafter, the Firm shall **be liable only to refund any excess payment made to** him over and above which is due to him in accordance with the terms of this agreement for the services performed by him till the date of termination of agreement.

If the Firm closes their business or abandons the work or if this agreement is terminated as provided for in clause hereinbefore, the IIMB shall be entitled to make use of all or any drawing(s), designs or other documents prepared by the Firm.

17. **INSURANCE AND INDEMNITIES:**

**Insurance of Works:**

Firm shall provide for adequate cover to his employees as per provisions of Workmen’s Compensation Act. The Firm shall ensure that his insurance
includes for all liabilities, which should cover material and building damage, workmen’s compensation, third party liabilities etc. All the above-mentioned insurance can be covered by CAR Policy for the Contract Value. The Firm should produce evidence of insurance coverage for all above before submitting invoices for payment. Such insurance shall be affected with an insurer and in the terms approved by IIMB.

If the Firm has a blanket insurance policy for all his works and the policy covers all the items to be insured under this Contract, the Firm may assign such policy/ policies in favour of Indian Institute of Management Bangalore, in lieu of taking out fresh policies in the name of Indian Institute of Management Bangalore.

Insurance against accident or injury to Workers:

IIMB shall not be liable for or in respect of any damage or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other person or any Sub-Firm. The Firm shall indemnify and keep indemnified IIMB against all such damages and compensation, and against all liability, claims, proceeding, costs, charges and expenses whatsoever in respect thereof or in relation thereto

18. ARBITRATION:

Except where otherwise provided for in the contract, all question and disputes relating to the meaning of the specifications, designs, drawing and instruction herein before mentioned and as to quality of workmanship or materials used on the work or as to any other question, claim, right matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or the conditions or otherwise concerning the works, or the execution or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the sole arbitration of the Director if the Director is unable or unwilling to act, to the sole arbitration of some other person appointed by the Director willing to act as such arbitrator. The arbitrator to whom the matter is originally referred being transferred or vacating his Office or being unable to act for any reason such Director / aforesaid at the time of such transfer, vacation of Office or inability to act, shall appoint another person to act as arbitrator in accordance with the terms of the contract. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

a. Subject to as aforesaid the provision of the Arbitration & Conciliation Act or any statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this Clause.
b. It is a term of the contract that the party involving arbitration shall specify the dispute or dispute to be referred to arbitration under the Clause together with the amount or amounts claimed in respect of each dispute.

c. The arbitrator(s) may from time to time with consent of the parties enlarge the time, for making and publishing the award.

d. The work under the contract shall, if reasonably possible, continue during the arbitration proceedings and no payment due or payable to the Firm shall be withheld on account of such proceedings.

e. The arbitrator shall be deemed to have entered on the reference on the date he issues notice to both parties / fixing date of the first hearing.

f. The arbitrator shall give a separate award in respect of each dispute or difference referred to him.

g. The venue of arbitrator shall be a place as may be fixed by the arbitrator in his sole discretion.

h. The award of the arbitrator shall be final, conclusive and binding on both the parties to this contract.

19. **FAIR WAGE:**

The Firm shall pay wages not less than fair wages to labourers, workmen engaged by him on the work fair wage means wage for the various categories of labour workmen fixed from time to time by the Labour Authorities of the area. The Firm shall ascertain the minimum fair wage prevailing in the area before submitting tender.

The Firm shall abide by all the provision of the Contract Labour (Regulation and Abolition) Act, which the Firms are expected to have gone through before quoting for the tender, which inter-alia contain the following:

a) Safeguard the welfare and health of labourers.
b) Ensuring timely payment of wages to the labourers by the Firms.
c) Provide Rest Rooms and Canteen Facility and First Aid Facility.
d) Obtain Registration Certificates and License issue by the competent authority.
e) The Firm shall also comply with the requirements of act regarding the employment of the Child Labour.
20. **CONTRACT AGREEMENT:**

The Firm shall submit the contract agreement on a stamp paper of **Rs.1,600/-** in a prescribed form duly signed within Seven days of issue of Acceptance Letter to the Chief Manager (Infrastructure).

21. **TERMINATION OF CONTRACT FOR DEATH:**

Without prejudice to any of the rights or remedies under this contract, if the Firm dies or attains legal disability, the Accepting Officer shall have the option of terminating the contract without any compensation to the Firm. IIMB shall have the right to get the work completed by itself, or through any other firms or agency at the cost and risk of the firms or his successors in interest, damages etc. as aforesaid. The Firm shall solely be responsible for protecting and securing such property.

22. **OTHER CONDITIONS:**

a. IIMB may have the details & designs submitted by the firm inspected at any time by any officer nominated by the IIMB any external agency who shall be at liberty to examine the records, drawings etc. The above inspection by IIMB does not absolve the Firm of his responsibility. The Firm shall remain solely responsible for all the services rendered by him.

b. IIMB or any officer nominated by IIMB will have the liberty to meet Firm and / or his associate Consultants at mutually agreed meeting time and shall be at liberty to inspect and examine their records and designs in their office.

c. Firm shall ensure timely flow of working drawing / instructions. He shall ensure that there is no delay in the execution of work on account of supply of design, drawings and details.

d. Rendering every assistance, guidance and advice in general to the IIMB on any matter concerning the technical aspects of the projects.

e. The Firm will function as part of the team for the project. The Firm shall prepare design/drawings keeping in view the economy and aesthetic considerations.

f. The Firm shall be fully responsible for the work including the technical soundness of the designs and shall assume full responsibility for the design and furnish a certificate to that effect including for the services rendered by their associate consultants and specialist engaged, if any, by him.

g. The Firm hereby agrees that the amount to be paid as provided herein will be in full discharge of function to be performed by him and no claim
whatsoever shall be against the IIMB in respect of any proprietary rights or copy rights on the part of any other party relating to the plans and drawings, except as provided elsewhere above. The Firm shall indemnify and keep indemnified the IIMB against any such claims and against all cost and expenses paid by the IIMB in defending itself against such claims.

For and on behalf of                                          for and on behalf of

Indian Institute Of Management Bangalore               M/s ______________

IN THE PRESENCE OF:

1.

2.

NAME & SIGNATURE OF FIRM
F- APPLICATION FORMAT

SUBJECT: Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

1. (a) Name of the Firm : 
   Address : 
   Telephone No. : 
   Office : 
   Mobile : 
   Fax : 
   E-Mail : 

(b) Address of Local office in : 
   Bangalore

2. (a) Status of the Firm 
   (Whether company/Partnership/proprietary) : 

   (a) Name of the Proprietor/Partners/ Directors 
   (With professional qualifications, if any):
   I) 
   II) 
   III)

   (c) Year of establishment:

3. Registration with Tax Authorities : 
   (a) Income-tax No. PAN/GIR NO; 
   (Furnish copies of Income-tax returns)

   (b) Service Tax Regn Number : 
   (Furnish the latest copies of the returns filed)

   (c) Registration Number with Council of Firms:
4. Details of the works executed which are older than 5 years (please mention only such works relevant to **eligibility criteria 2**)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Name of the work</th>
<th>Work executed for (name of the organization with address, concerned office and telephone number)</th>
<th>Nature of work (in brief)</th>
<th>Location of the work with month &amp; year of execution</th>
<th>Actual Value of the works</th>
</tr>
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</table>

(These details can also furnished in separate page as Annexure duly quoting the para reference)

Note: Copies of satisfactory completion certificate from the client's shall be enclosed.

5. Details of the works executed during the last 5 years (please mention only such works relevant to **eligibility criteria 3**)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Name of the qualifying work</th>
<th>Work executed for (name of the organization with address, concerned office and telephone number)</th>
<th>Nature of work (in brief)</th>
<th>Location of the work with month &amp; year of execution</th>
<th>Actual Value of the works</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

(These details can also furnished in separate page as Annexure duly quoting the para reference) Note: Copies of satisfactory completion certificate from the client's shall be enclosed. The photo images of these works shall be enclosed.
6. Key personnel permanently employed in your organization:

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Name</th>
<th>Qualifications</th>
<th>Experience</th>
<th>Particulars of work done</th>
<th>Employed in your firm since</th>
<th>Any other</th>
</tr>
</thead>
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</tbody>
</table>

(These details can also furnished in separate page as Annexure duly quoting the para reference)

7. Furnish the details of AWARDS, CITATIONS etc received in recognition of your services in projects designed/ associated

<table>
<thead>
<tr>
<th>Year</th>
<th>Name of the Award with details</th>
<th>Name of the organization from whom award was received</th>
<th>Name of the project for which such award was received</th>
</tr>
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</table>

**DECLARATION**

1. All the information furnished by me / us here above is correct to the best of my knowledge and belief.

2. I / We have no objection if enquiries are made about the work listed by me / us in the accompanying sheets / Annexure.

3. I / We agree that the decision of INDIAN INSTITUTE OF MANAGEMENT in selection will be final and binding to me / us.

Place :               Name & Signature Of The Applicant
Date :
PROFORMA – A

(Please submit this letter in your letter head at the time of opening of bids)

To

Chief Manager (Infrastructure)
Estate & Maintenance Section
Indian Institute of Management
Bannerghatta Road,
Bangalore - 560 076

Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

This has reference to your above subject. Mr./Miss/Mrs.____________________ is hereby authorized to attend the bid opening on _____________ on behalf of our organization.

The specimen signature is attested below:

_________________________________ Specimen Signature of Representative

__________________________________
Signature of Attesting Authority Signature of Authorizing the Applicant

Name of Authorizing Authority of the Applicant
PROFORMA – B

(Please submit this acceptance letter in your letter head with technical bid)

To

Chief Manager (Infrastructure)
Estate & Maintenance Section
Indian Institute of Management
Bannerghatta Road,
Bangalore - 560 076

Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam

CONFIRMATION FOR ACCEPTANCE OF THE TERMS & CONDITIONS:

I/We have read and examined the Notice Inviting offer and all its components the draft agreement to be entered with the IIMB and understood all other relevant particulars.

I/We are fully qualified to provide the Architectural / Interior services on Turnkey to the said work and have understood the scope of work, terms and conditions, IIMB time schedule. We are agreeable to extend our Architectural / Interior services on Turnkey for the subject project and the charges have been conveyed separately in "Financial-bid in Proforma-E and F" furnished.

I/We fully understand that you are not bound to accept the lowest or any offer you may receive.

I/We agree that until a regular agreement is executed, this document with the IIMB written acceptance thereof shall constitute a binding contract between us.

DATE: 

Signature of the Applicant
PROFORMA – C

AGREEMENT WITH THE FIRM

Memorandum of agreement, made at__________________ this __________day of
the month of __________ in the year ______________ between INDIAN INSTITUTE OF
MANAGEMENT, BANNERGHATTA ROAD, BANGALORE - 560 076 having its Head
amongst others ………………………represented by its duly constituted attorney
(hereinafter referred to as IIMB) which expression shall unless excluded by or
repugnant to the context be deemed to include their successors, and assigns in
office) of the one part and M/s.________________________________________
Firm, having its office at __________________________________________
(hereinafter referred to as the Firm) which expression shall unless excluded by or
repugnant to the context, be deemed to include their successors and assigns) of the
other part.

WHEREAS the IIMB is desirous of undertaking the Architectural and Interior
Turnkey works of the building in accordance with the general requirements, and
whereas the Firm have agreed to perform the services as set out and subject to the
terms and conditions set forth
in the said “Conditions of contract ” herein under.

NOW, these present witnesseth and it is hereby agreed and delivered by between
the parties hereto as follows: The IIMB appoints the Firm and the Firm accepts the
work on a clear understanding that the Firm shall not be an employee of IIMB for
any reason whatsoever including for the reason of his appointment by virtue of this
agreement and on the terms and conditions ( ie Conditions of Agreement) set-
forth as stated in the foregoing, which shall form part and parcel of the agreement.
IN witness whereof, the parties hereunto have set their hands and seals the day
and year first above written.

For and on behalf of                                      For and on behalf of

M/s____________________      INDIAN INSTITUTE OF MANAGEMENT BANGALORE,
                                BANNERGHATTA ROAD, BANGALORE - 560 076

In the presence of:

1. 
2. 
PROFORMA – D

(Please submit this undertaking letter in your letter head with technical bid)

To

Chief Manager (Infrastructure)
Indian Institute of Management,
Estate & Maintenance Section
Bannerghatta Road,
Bangalore - 560 076

**Architectural Design and Interior Services on Turnkey Basis for Setting Up of New Indian Institute of Management Campus at Visakhapatnam**

**Dear Sir,**

This has reference to your above Notice inviting the offer (NIO) published in your IIMB web site.

We hereby state that we M/s ______________________________________
have submitted the above offer documents duly filling at the appropriate places without making any alterations, corrections, omissions in the offer issued by the IIMB.

Signature & Name of the Applicant
PROFORMA – E

Financial Bid

(Submit this financial bid strictly as per this prescribed format in a separate sealed envelope- third envelope)

Commercial bids (Forms E & F) will be issued only after being qualified in the technical bid and concept presentation.

Commercial Bid opening date will be intimated.
PROFORMA – F

Highlights of Proposed Drawings and cost of project

(Please submit the following details along with the Financial Bid)

Commercial bids (Forms E & F) will be issued only after being qualified in the technical bid and concept presentation.

Commercial Bid opening date will be intimated.
Particular specifications for civil works

Preamble:

1. These particular specifications shall be read in conjunction with the various other documents forming the contract, namely, notice inviting tender. Conditions of contract, bill of quantities, and other related documents, together with any addenda there to issue.

1.1 Scope of work

The work to be carried out under this contract shall consist of various items as generally described above as well as description of works contained in the bill of quantities or as given in the nomenclature of the items in the particular specifications, earlier taking precedence over the latter.

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

General works such as setting out, clearance of site before setting out and clearance of works after completion.

a. A detailed programme 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.

b. Samples of various materials proposed to be used on the work for conducting tests thereon as required as per the provisions of the contract.

c. Design of mixes as per relevant clauses of the specifications giving proportion of ingredients, source of aggregate and binder along with accompanying trial mixes/mix designs to be submitted to the Engineer in charge for his approval before use in the works.

d. Any other item of work which is not specifically provided in bill of quantities but which is necessary for complying with the provisions of the contract and the specifications.

e. Cost of setting up laboratory at site and carrying out all necessary quality control measures/ tests enumerated in the specification, by the contractor at his own cost and submission of tests results on completing of tests to the Engineer in charge thereof.
1. **Particular Specifications:**

2.1 The works will be executed as indicated in nomenclature of each item and particular specifications as given here under as made applicable to this contract.

2.2 In the absence of any definite provision in the particular specifications contained here in reference may be made to the CPWD SSR & Indian standards codes in that order. wherever these are silent, the construction and completion of works shall conform to sound Engineering practice and in case of any dispute arising out of the interpretation of the above, the decisions of the Engineer-in-charge shall be final and binding on the contractor.

2.3 In addition, the abbreviations CPWD all be considered to have the following meaning:


2.4 All the codes of practice, Standards and specification applicable shall be the latest editions with all correction slips etc. or as directed by the Engineer-in-charge.

1. **EARTHWORK, EXCAVATION AND SUB BASE**

1.1. Applicable Codes

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest editions including all applicable official amendments and revisions shall be referred to.

b) IS: 3764 - Excavation work - Code of Safety.
c) IS: 2720 - Methods of test for soils:
d) (Part-1) - Preparation of dry soil samples for various tests.
e) (Part-2) - Determination of Water Content.
f) (Part-4) - Grain size analysis.
g) (Part-5) - Determination of liquid and plastic limit.
h) (Part-7) - Determination of water content - dry density relation using light compaction.
i) (Part-8) - Determination of water content – dry density relation using heavy compaction.
j) (Part-9) - Determination of dry density – moisture content by constant weight of soil method.
i)  (Part-14)  - Determination of density index (relative density) of cohesion less soils.

m) (Part-22)  - Determination of organic matter.

n) (Part-26)  - Determination of pH Value.

o) (Part-27)  - Determination of total soluble sulphates.

p) (Part-28)  - Determination of dry density of soils in place, by the sand replacement method.

q) (Part-33)  - Determination of the density in place by the ring and water replacement method.

r) (Part-34)  - Determination of density of soil in place by rubber balloon method.

s) (Part-38)  - Compaction control tests (Hilf Method).

1.1.1. General
   Excavation for trenches over areas and for pits, etc. shall be done to widths, lines and levels as shown in drawings or to such lesser or greater widths, lines and levels as directed. The bottom and sides of excavation shall be trimmed to require levels, profile, etc. watered and thoroughly rammed. Should any excavation be taken below the specified levels, the contractor shall at his own cost fill up such excavation with cement concrete (M-10) to required levels. Filling in such excavation with excavated material is prohibited.

   All excavation work shall be carried out by mechanical equipment unless, in the opinion of Engineer-in-charge, the work involved requires it to be carried out by manual methods.

1.1.2. Grubbing and Clearing
   Before excavation is started, the area coming under cutting/excavation shall be thoroughly grubbed and cleared off shrubs, rank vegetation, grass, bush wood, debris, trees/sapling of girth upto 300 mm. The roots shall be removed upto depth of 600 mm below ground. The rubbish shall be removed outside the site as directed by the Engineer-in-charge.

1.1.3. Dewatering
   The Contractor shall ensure that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction programme. Sumps made for dewatering must be kept clear of the excavations/trenches required for further work. The method of pumping shall be approved by Engineer-
in-charge, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results on stopping of dewatering.

The Contractor shall study the sub-soil conditions carefully and shall conduct any tests necessary at the site with the approval of the Engineer-in-charge to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.

The scheme for dewatering and disposal of water shall be approved by the Engineer-in-charge. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a build up of water in the opinion of the Engineer-in-charge obstructs the progress of the work, leads to unsanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.

When there is a continuous inflow of water and the quantum of water to be handled is considered in the opinion of Engineer-in-charge, to be large, a well point system- single stage or multistage, shall be adopted. The Contractor shall submit to the Engineer-in-charge, details of his well point system including the stages, the spacing, number and diameter of well points, headers etc., and the number, capacity and location of pumps for approval.

**Unless separately provided for in the Schedule of quantities, cost of dewatering is deemed to have been included in the unit rates quoted for excavation. If separately provided for, the unit of measurement shall be as indicated in the Schedule of Quantities.**

1.1.4. Timbering to excavation (shoring)
Where the soil is soft and sides of excavation needs supporting, suitably designed planking and strutting shall be provided.

Close timbering shall be done by completely covering the sides of the trenches and pits generally with short, upright members called 'polling boards'. These shall be of minimum 25 cm x 4 cm sections or as
approved by the Engineer-in-charge. The boards shall generally be placed in position vertically side by side without any gap on each side of the excavation and shall be secured by horizontal walling of strong wood at maximum 1.2 metre spacings, strutted with ballies or as approved by the Engineer-in-charge. The length of the ballie struts shall depend on the width of the trench or pit. If the soil is very soft and loose, the boards shall be placed horizontally against each side of the excavation and supported by vertical wallings, which in turn shall be suitably strutted. The lowest boards supporting the sides shall be taken into the ground and no portion of the vertical side of the trench or pit shall remain exposed, so as to render the earth liable to slip out.

Timber shoring shall be 'close' or 'open' type, depending on the nature of soil and the depth of pit or trench. The type of timbering shall be as approved by the Engineer-in-charge. It shall be the responsibility of the Contractor to take all necessary steps to prevent the sides of excavations, trenches, pits, etc. from collapsing.

Timber shoring may also be required to keep the sides of excavations vertical to ensure safety of adjoining structures or to limit the slope of excavations, or due to space restrictions or for other reasons. Such shoring shall be carried out, except in an emergency, only after approval from the Engineer-in-charge.

The withdrawal of the timber shall be done carefully to prevent the collapse of the pit or trench. It shall be started at one end and proceeded with, systematically to the other end. Concrete or masonry shall not be damaged during the removal of the timber. In the case of open timbering, the entire surface of the side of trench or pit is not required to be covered. The vertical boards of minimum 25 cm x 4 cm sections shall be spaced sufficiently apart to leave unsupported strips of maximum 50 cm average width. The detailed arrangement, sizes of the timber and the spacing shall be subject to the approval of the Engineer-in-charge. In all other respects, the Specifications for close timbering shall apply to open timbering.

In case of large pits and open excavations, where shoring is required for securing safety of adjoining structures or for any other reasons and where the planking across sides of excavations/pits cannot be strutted against, suitable inclined struts supported on the excavated bed shall be provided. The load from such struts shall be suitably distributed on the bed to ensure no yielding of the strut. If however, Engineer-in-charge directs any timbering to be left-in, keeping in mind the type of
construction or any other factor, Contractor shall be paid for at the scheduled item rate for such left-in timbering.

Unless otherwise separately provided for in Schedule of Quantities, the timber shoring is deemed to have been included in the unit rates quoted for excavation.

If separately provided for, then the actual effective area of shored faces as approved by Engineer-in-charge shall be measured in sq.mtrs. The area of planking embedded in the bed/sides of excavation will not be considered, nor the area supporting inclined struts in case of large pits/open excavation. All planks, boards, wallings, verticals, struts, props and all other materials required for shoring and subsequent safe dismantling and removal shall be included in the quoted unit rates.

1.1.5. Soil / Rock Classification

1.2.5.1 General
All materials to be excavated shall be classified by Engineer-in-charge, into one of the following classes and shall be paid for at the rate contracted for that particular class of material. No distinction shall be made whether the material is dry, moist or wet. The decision of Engineer-in-charge regarding classification of the material shall be final and binding on contractor and not be a subject matter of any appeal or arbitration. Excavation shall be classified under one of the following categories by the Engineer-in-charge.

a) Ordinary and Hard Soils
These shall include all kinds of soils containing kankar, sand, silt, murrum and/or shingle, gravel, clay, loam, peat, ash, shale etc. which can generally be excavated by spade, pick-axes and shovel and which is not classified under “soft and decomposed rock” and “hard rock” defined below. This shall also include embedded rock boulders not longer than 1 metre in any direction and not more than 200 mm in any one of the other two directions.

b) Hard Rock
This shall include all rock occurring in large continuous masses, which cannot be removed except by blasting for losening it. Hard varieties of rock with or without veins and secondary minerals, which, in the
opinion of Engineer-in-charge require blasting, shall be considered as hard rock. Concrete work both reinforced and unreinforced to be dismantled will be measured under this item unless a separate provision is made in the Schedule of Quantities.

c) **Soft and Decomposed Rock**

This shall include rock, boulders, slag, chalk, slate, hard mica schist, laterite, sand stone and all other materials which in the opinion of Engineer-in-charge is rock but does not need blasting and could be removed with picks, hammer, crow bars, wedges and pneumatic breaking equipment. The mere fact that contractor resorts to blasting for reasons of his own, shall not qualify for classification under “hard rock”.

1.2.5.2 **Stripping Loose Rock**

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Engineer-in-charge, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Engineer-in-charge, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed. The cost of such stripping will be paid for at the unit rates accepted for the class of materials in question.

Where blasting has to be resorted to for rock cutting it shall be the responsibility of the contractor to arrange for the following at his entire risk, cost and responsibility.

a) Permission from all the connected Public Authorities such as Municipal Corporation, Inspector of Explosives, Police, Highway Authorities, etc. shall be obtained.

b) Fees, royalties and any other levies, attendant on such blasting work shall be entirely borne by the contractor.
c) All precautionary measures such as notices to adjoining property and other agencies working in and around the plot, signaling and watch etc. shall strictly adhere to according to the various regulations in force.

d) Storing of blasting materials shall be strictly as per Explosive Regulations. The tendered must acquaint himself with the site conditions in regard to blasting, nature of rock likely to be met with, timing and other restrictions to blasting etc. No. Claims whatsoever in these regards shall be entertained.

1.1.6. **Disposal of Surplus excavated materials**
All materials considered surplus shall be removed to destinations and disposed off as directed. The disposal of the material can be in any of the following ways as directed by the Engineer-in-charge.

1. Filling in low lying areas
2. Filling in at places of filling such as under floors, in roads, etc.
3. Stacking of material in pre-designated stacking yard.
4. Removal of material outside the plot for disposal.

1.1.7. **Measurements**
Measurements for all excavation, filling, carting away and earthwork shall be in solid measure. The rates quoted by the tenderers are thus for solid measure units. The following factors shall be applied to obtain quantities of solid measure.

- **Excavation**: Volume shall be determined by levels taken before commencement of excavation and after completion up to the required level.

- **Filling watered and consolidated in layers**: Volume shall be determined by levels taken before and after compacted filling and by measuring the length...
- Stack measure as in: Volume of stack less 40% rubble, etc.

The mode of measurement for various types of excavations & disposal shall be as under: -

a) In case of trenches, pits and areas, measurements shall be on the basis of the width of foundation and the depth to bottom of foundation (bottom of bed concrete if provided) formation. Excavation for trenches and pipes & cables shall be measured separately.

b) Excavation in rock shall be measured up to levels indicated or required. No undulations as physically appearing after excavation shall be taken into consideration while arriving at the quantities.

c) Where such measurement is not possible as in the case of strata intermixed with soil, excavated rock shall be properly stacked as directed by the Engineer-in-charge and the volume of rock calculated on the basis of stack measurements after making appropriate allowance for voids.

d) Excavation beyond the widths or depths required will not be paid for, any additional concrete or bedding material required as a result of over-excavation shall be at the Contractor’s expense.

e) Rates
The rates shall be inclusive of all the operations described above including clearing and grubbing, dewatering, shoring and disposal at site as directed by the Engineer-in-charge.

f) Earth Filling, Backfilling and Site Grading

g) General
All fill material shall be subject to the Engineer-in-charge’s approval. If any material is rejected by Engineer-in-charge, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited/disposed off as directed by Engineer-in-charge after the fill work is completed.

No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Engineer-in-charge.
The Contractor shall not commence the placement of any fill or backfill at any location without the approval of the EIC.

1.1.8. Material
To the extent available, selected surplus soils from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill the voids and the mixture used for filling.

If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Engineer-in-charge. The pH value of soil shall be between 5.5 to 9 and the soil shall have the following grading analysis.

- Sand : 20% to 75%
- Silt : 10% to 60%
- Clay : 05% to 30%

The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Topsoil containing foreign material shall be removed. The materials so removed shall be disposed off as directed by Engineer-in-charge. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist, at his cost.

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

1.1.10. **Sand Filling in Plinth and Other Places**
At places where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours and drained to ensure maximum hydraulic compaction. Any temporary work required to contain sand under flooded condition shall be on Contractor’s account. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the Engineer-in-charge has inspected and approved the fill.

1.1.11. **Murrum Filling**
The liquid limit & plasticity index of such materials shall be below 20 and 6 respectively and the fraction passing 75-micron sieve does not exceed 10 %. It shall be laid in layers not exceeding 15 cm & compacted as per the directions of Engineer-in-charge.

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

Where the trenches are excavated in soil, the filling from the bottom of the trench to the level of the center line of the pipe shall be done by hand compaction with selected approved earth in layers not exceeding 8 cm; backfilling above the level of the center line of the pipes shall be done with selected earth by hand compaction, or other approved means in layers not exceeding 15 cm.

In case of excavation of trenches in rock, the filling up to a level 30 cm above the top of the pipe shall be done with approved excavated soil. The filling up to the level of the center line of the pipe shall be done by hand compaction in layers not exceeding 8 cm whereas the filling above the center line of the pipe shall be done by hand compaction or approved means in layers not exceeding 15 cm. The filling from a level 30 cm above the top of the pipe to the top of the trench shall be done by hand or other approved mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.
Filling of the trenches shall be carried out simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.

1.1.12.1. Measurement
Excavation for trenches for pipes, cables etc. shall be paid as under.

(a) Upto 1 meter depth, the width of the trench for the purpose of measurement of excavation shall be arrived at by adding 40 cm to the external diameter of the pipe (not the sockets), cable, conduits etc. When a pipe is laid on concrete bed/cushioning layer the authorized width shall be cable external diameter of the pipe/cable plus 40 cm for the width of concrete bed/cushioning layer, whichever is more.

(b) For depths exceeding 1 meter as allowance of 5 cm per meter of depth for each side of the trench shall be added to the authorized width (i.e. External diameter of the pipe plus 40 cm) except where battering or benching has been ordered. This allowance shall be the entire depth of the trench. The authorized width in such case shall, here fore, be equal to (depth of trench) /10 plus external diameter of pipe plus 40 cm or the width of concrete Bed/cushioning, whichever is more

(c) When more than one pipe, cable, conduit etc. are laid, the diameter shall be reckoned as the horizontal distance from outside to outside of the outermost pipes, cables, conduits etc.

1.1.13. General Site Grading
Site grading shall be carried out as indicated in the drawings and as approved by the Engineer-in-charge. Excavation shall be carried out as specified in the Specifications. Filling and compaction shall be carried out as specified and elsewhere unless specified otherwise shall be carried out as indicated below.

The fill shall be placed in layers not exceeding 200 mm and leveled uniformly and mechanically compacted before the next layer is deposited.

To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Contractor at his own cost.
Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. This shall hold good for embankments as well. The fill will be considered as incomplete if the desired compaction has not been obtained.

The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, the Contractor should remove the affected material and make good the slip at his cost.

If so specified, the rock as obtained from excavation may be used for filling and leveling to indicate grades without further breaking. In such an event, filling shall be done in layers not exceeding 50cms approximately. After rock filling to the approximate level, indicated above has been carried out, the voids in the rock filling shall be filled with finer materials such as earth, broken stone, etc. and the area flooded so that the finer materials fill up the voids. Care shall be taken to ensure that the finer fill material does not get washed out. Over the layer so filled, a 100 mm thick mixed layer of broken material and earth shall be laid and consolidation carried out by a 12 ton roller. No less than twelve passes of the roller shall be accepted before subsequent similar operations are taken up.

1.1.14. Fill Density
The compaction, where so called for, shall comply with minimum 95% of maximum dry density as per IS 2720 (Part 8) at moisture content differing not more than 4% from the optimum moisture content. The Contractor shall demonstrate adequately by field and laboratory tests that the specified density has been obtained.

1.1.15. Lead
Lead for deposition/disposal of excavated material, shall be the crow flight distance as specified in the respective item of work. No extra compensation is admissible on the grounds that the lead including that for borrowed material had to be transported over marshy or ‘katcha’ land/route.

1.1.16. Measurements
Backfilling as per specification the sides of foundations of columns, footings, structures, walls, tanks, rafts, trenches etc. with excavated material will be paid for separately. It shall be clearly understood that
the rate quoted for excavation shall include stacking of excavated material as directed, excavation/packing of selected stacked material, conveying it to the place specified etc. as specified. As a rule, material to be backfilled shall be stacked temporarily as directed by the Engineer-in-charge.

Backfilling, plinth filling etc. with borrowed earth will be paid for at rates quoted. The quoted rate shall include all operations such as clearing, excavation, lead and transport, fill, compaction etc, as specified. Quantity of consolidated filling based on payment line for excavation shall be measured and paid for in cubic meters. The lead, lift etc. shall be as indicated in the schedule of quantities.

Actual quantity of consolidated sand filling and murrum filling shall be measured and paid for in cubic meters.

1.1.17. Rates
The rates shall be inclusive of clearing and grubbing, spreading, watering and compaction etc. as per specification above.

**PLAIN & REINFORCED CONCRETE**

2.1. Applicable Codes

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest editions including all applicable official amendments and revisions shall be referred to.

2.1.1. Materials

1) IS.269 Specification for 33 grade ordinary Portland cement.
2) IS.455 Specification for Portland slag cement.
3) IS.1489 Specification for Portland-pozzolana cement (Part 1 & 2).
4) IS: 8112 Specification for 43 grade ordinary Portland cement.
6) IS: 383 Specification for coarse and fine aggregates from natural sources for concrete.
7) IS: 432 Specification for mild steel and medium (tensile steel bars and hard-drawn steel) wires for concrete reinforcement. (Part 1 & 2)
8) IS: 786 Specification for high strength deformed steel bars and wires for concrete reinforcement.
11) IS: 2645 Specification for integral cement waterproofing compounds.
12) IS: 4990 Specification for plywood for concrete shuttering work.

2.1.2. Material Testing
1) IS.4031 Methods of physical tests for hydraulic cement (Parts 1 to 15)
2) IS: 4032 Method for chemical analysis of hydraulic cement.
3) IS: 650 Specification for standard sand for testing of cement.
4) IS: 2430 Methods for sampling of aggregates for concrete.
5) IS.2386 Methods of test for aggregates for concrete (Parts 1 to 8)
6) IS: 3025 Methods of sampling and test (physical and chemical) for water used in industry.
7) IS: 6925 Methods of test for determination of water soluble chlorides in concrete admixtures.

2.1.3. Material Storage
1) IS: 4082 Recommendations on stacking and storing of construction materials at site.

2.1.4. Concrete Mix Design
1) IS: 10262 Recommended guidelines for concrete mix design.
2) SP: 23 (S&T) Handbook on Concrete Mixes

2.1.5. Concrete Testing
1) IS.1199 Method of sampling and analysis of concrete.
2) IS: 516 Method of test for strength of concrete.
3) IS: 9013 Method of making, curing and determining compressive strength of accelerated cured concrete test specimens.
4) IS: 8142 Method of test for determining setting time of concrete by penetration resistance.
5) IS: 9284 Method of test for abrasion resistance of concrete.
6) IS: 2770 Methods of testing bond in reinforced concrete.

2.1.6. Equipments
1) IS: 1791 Specification for batch type concrete mixers.
2) IS: 2438 Specification for roller pan mixer.
3) IS: 4925 Specification for concrete batching and mixing plant.
4) IS: 5892 Specification for concrete transit mixer and agitator.
5) IS: 7242 Specification for concrete spreaders.
6) IS: 2505 General Requirements for concrete vibrators: Immersion type.
7) IS: 2506 General Requirements for screed board concrete vibrators.
8) IS: 2514 Specification for concrete vibrating tables.
9) IS: 3366 Specification for pan vibrators.
13) IS: 2722 Specification for portable swing weigh batchers for concrete (single and double bucket type).
14) IS: 2750 Specification for steel scaffoldings.

2.1.7. Codes of Practice
2) IS: 457 Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
3) IS: 3370 Code of practice for concrete structures for storage of liquids (Parts 1 to 4)
4) IS: 3935 Code of practice for composite construction.
6) IS: 2210 Criteria for the design of reinforced concrete shell structures and folded plates.
7) IS: 2502 Code of practice for bending and fixing of bars for concrete reinforcement.
8) IS: 5525 Recommendation for detailing of reinforcement in reinforced concrete works.
9) IS: 2751 Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction.
13) IS: 4326 Code of practice for earthquake resistant design and construction of building.
14) IS: 4014 Code of practice for steel tubular scaffolding (Parts 1 & 2)
17) IS: 1893 Criteria for earthquake resistant structures subjected to seismic forces.
18) IS: 13920 Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic forces.

2.1.8. Construction Safety
1) IS: 3696 Safety code for scaffolds and ladders. (Parts 1 & 2)
2) IS: 7969 Safety code for handling & storage of building materials.
3) IS: 8989 Safety code for erection of concrete framed structures.

2.1.9. Measurement
1) IS 1200 Method of measurement of building and Engineering Works
2) IS 3385 Code of practice for measurement of Civil Engineering Works

2.2. General

Concrete and reinforced concrete work shall be carried out generally in conformity with the latest Indian Standard IS: 456 except for provisions indicated herein below. All work is to be carried out with utmost precision and upto date scientific know-how and the contractor shall employ thoroughly competent staff to achieve the highest standards.
2.3. **Materials**  
2.3.1. **Cement**  
Cement for the work shall be ordinary Portland Cement conforming to the latest Indian Standards IS: 8112-43 grade and of the best normal setting quality unless a quick setting quality is expressly instructed in the specifications or otherwise during the course of the work by the Engineer-in-charge. Only one type of cement shall be used in any one mix. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without approval from the Engineer-in-charge. The contractor shall always purchase Portland cement as fresh as possible after manufacture and shall supply the manufacture’s test certificate, corresponding to the batch of cement intended for use in work. Where there is reason to believe the cement has been long stored, the Engineer-in-charge may demand a Laboratory Test Certificate regarding the character of cement and the contractor shall furnish the same at no extra cost from authorized laboratory. The Engineer-in-charge shall reject any cement, which in his opinion does not meet the required standards.

All bags and containers in which cement is packed shall be stored in a dry, weather-tight, and properly ventilated structure with adequate provision for prevention and absorption of moisture. The contractor shall at all times maintain for the inspection of the Engineer-in-charge a log book indicating the receipt of cement brand and agent from whom obtained and the age of cement. Cement, which has caked or perished by being wet or otherwise, shall on no account be used on the work.

Cement shall be consumed on the works in the same sequence as that of its receipt at site. Cement reclaimed from cleaning of bags or from spillage from containers or otherwise shall on no account be used.

If cement is not stored properly and has deteriorated, the material shall be rejected. Cement bags shall be stored in dry weatherproof shed with a raised floor, well away from the outer walls allowing clearance for man movement and insulated from the floor to avoid moisture from ground. Not more than 10 bags shall be stacked in any tier. Storage arrangement shall be approved by the Engineer-in-charge. Storage under tarpaulins shall not be permitted.
2.3.2. **Sand** (Refer Table No. I)
Sand (fine aggregated) shall generally conform to IS 383. Sand shall be natural sand, crushed gravel sand or crushed stone sand at the discretion of the Engineer-in-Charge. Use of sea sand is prohibited. Sand shall be composed of hard siliceous material and shall be clean and of sharp angular grit type. Sand shall be properly graded minimizing voids. Allowance for bulk age of sand shall be made. The fineness modulus of sand shall neither be less than 2.2 nor more than 3.2.

2.3.3. **Coarse Aggregate** (Refer Table No. II & III)
Coarse aggregate shall be approved hard aggregate generally conforming to IS 383.

Each size of coarse and fine aggregates shall be stacked separately and shall be protected from leaves and contamination with foreign material. The stacks shall be on hard, clean, free draining bases, draining away from the concrete mixing area.

2.3.4. **Water**
Water for all concrete work shall be clean, free from deleterious matter such as oils, acids, alkalies, sugar and vegetable matter. Every attempt shall be made to use water, which is fit for drinking purposes. Water storage facilities provided by the contractor shall be maintained properly to preclude contamination of water by any of the harmful substances. The quantity of water to be added to concrete for mixing shall be such as to afford workability consistent with strength.

The Contractor shall make his own arrangements for storing water at site in tanks to prevent contamination.

**TABLE – I**

Unless otherwise directed or approved, the grading of sand shall be within the limits indicated hereunder: -

Fine aggregate conforming to Grade Zone IV shall not be used for RCC works.
<table>
<thead>
<tr>
<th>I.S. Sieve</th>
<th>PERCENTAGE PASSING FOR</th>
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<tr>
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<td>Grading Zone I</td>
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<tr>
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<td>0 – 10</td>
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<tr>
<td>I.S. Sieve Designation</td>
<td>Percentage passing for single sized aggregate of nominal size</td>
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<td>------------------------</td>
<td>-------------------------------------------------------------</td>
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<td>Percentage passing for Grading aggregate of nominal size</td>
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<td>63 mm</td>
<td>100</td>
</tr>
<tr>
<td>40 mm</td>
<td>95–100</td>
</tr>
<tr>
<td>20 mm</td>
<td>30–70</td>
</tr>
<tr>
<td>16 mm</td>
<td>-</td>
</tr>
<tr>
<td>12.5 mm</td>
<td>-</td>
</tr>
<tr>
<td>10 mm</td>
<td>10–35</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>0–5</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>-</td>
</tr>
</tbody>
</table>
The percentages of deleterious substances in the aggregate delivered to the mixer shall not exceed the following:-

<table>
<thead>
<tr>
<th>i)</th>
<th>Material finer than 75 micron I.S sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Coarse Aggregates (CA)</td>
</tr>
<tr>
<td></td>
<td>- Fine Aggregates (FA)</td>
</tr>
<tr>
<td></td>
<td>Percent by Weight</td>
</tr>
<tr>
<td></td>
<td>Uncrushed</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>3.00</td>
<td>15.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ii)</th>
<th>Coal and lignite (CA) and (FA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent by Weight</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>iii)</th>
<th>Clay lumps (CA) and (FA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent by Weight</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>iv)</th>
<th>Soft fragments (CA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(FA)</td>
</tr>
<tr>
<td></td>
<td>Percent by Weight</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>v)</th>
<th>Total of all above substances (CA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(FA)</td>
</tr>
<tr>
<td></td>
<td>Percent by Weight</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>5.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>
2.3.5 Reinforcement Steel

2.3.4.1 Material Specification

Steel used for reinforcement shall be any of following types specifically applicable as per Bill of Quantities:

- Mild steel and medium tensile bar IS 432 Part I (FE 415)
- HYS deformed bars/TMT bars (Fe 415) IS 1786
- Structural steel section (Grade A) IS 2062

2.3.4.2 Tolerance in Mass

Refer to the following:

**TABLE**

(Tolerance of Nominal Mass)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nominal Size</th>
<th>Tolerance on the nominal mass percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in mm</td>
<td>Batch</td>
</tr>
<tr>
<td>a)</td>
<td>upto and including 10</td>
<td>± 7</td>
</tr>
<tr>
<td>b)</td>
<td>over 10, upto and including 16</td>
<td>± 5</td>
</tr>
<tr>
<td>c)</td>
<td>over 16</td>
<td>± 3</td>
</tr>
</tbody>
</table>

+ For individual sample plus tolerance is not specified

(x) For coil batch tolerance is not applicable.

Tolerance shall be determined in accordance with method given in IS1786.
2.3.4.3  a) TMT / HYS Deformed Bar  
High strength deformed bars and wires shall conform to IS : 1786. The physical properties for all sizes of steel bars are mentioned below in Table below.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Property</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fe 415</td>
</tr>
<tr>
<td>1.</td>
<td>0.2% proof stress / yield stress, min N/mm²</td>
<td>415</td>
</tr>
<tr>
<td>2.</td>
<td>Elongation, percent min. on gauge length 5.65 √A, Where A is the X - Sectional Area of the test piece.</td>
<td>14.5</td>
</tr>
<tr>
<td>3.</td>
<td>Tensile strength(min)</td>
<td>10% more than actual 0.2% proof stress but not less than 485 N/mm²</td>
</tr>
</tbody>
</table>

**Tests:** Selection and preparation of Test sample. All the tests pieces shall be selected by the EIC or his authorized representative in accordance with provisions as laid in IS: 1786 either –
a) From cutting of bars
   Or
b) If he so desires, from any bar after it has been cut to the required or specified size and the test piece taken from any part of it.
   In no case, the test pieces shall be detached from the bar or coil except in the presence of the Engineer-in-charge or his authorized representative.

The test pieces obtained in accordance with as above shall be full sections of the bars as rolled & subsequently cold worked and shall be subjected to physical/chemical tests without any further modifications. No deductions in size by machining or otherwise shall be permissible. No test piece shall be enacted or otherwise subject to heat treatment. Any straightening, which a test piece may require shall be done cold.

2.3.4.4 Stacking and Storage
Steel for reinforcement shall be stacked on top of timber sleepers to avoid contact with ground / water and shall be stored in such a way to prevent distorting and corrosion. Bars of different classifications, sizes and lengths shall be stored separately to facilitate issue in such sizes and lengths to cause minimum wastage in cutting from standard length.

Fabrication and Fixing of Reinforcement
a) General Requirements
Steel for reinforcement shall be clear and free from loose milscales, dust, loose rust, coats of paints, oil or other coatings, which may destroy or reduce bond. It shall be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. Prior to assembly of reinforcement on no account any oily substance shall be used for removing the rust.
b) **Assembly of Reinforcement**

Bars shall be bent correctly and accurately to the size and shape as shown in the detailed drawing or as directed by the Engineer-in-charge. Preferably bars of full length shall be used. Necessary cutting and straightening is also included. Overlapping of bars, where necessary shall be done as directed by the Engineer-in-charge. The overlapping bars shall not touch each other and these shall be kept apart with concrete between them by 25 mm or 1 ¼ times the maximum size of the coarse aggregate whichever is greater. But where this is not possible, the overlapping bars shall be bound together at intervals not exceeding twice the dia. Of such bars with two strands annealed steel wire of 0.90 mm to 1.6 mm twisted tight. The overlaps / splices shall be staggered as per directions of the Engineer-in-charge. But in no case the overlapping shall be provided in more than 50% of cross sectional area at one section.

c) **Bonds and Hooks Forming End Anchorages**

Reinforcement shall be bent and fixed in accordance with procedure specified in IS 2502, code of practice for bending and fixing of bars for concrete reinforcement.

d) **Anchoring Bars in Tension**

Deformed bars may be used without end anchorages provided, development length requirement is satisfied. Hooks should normally be provided for plain bars in tension. Development length of bars will be determined as per IS : 456.

e) **Anchoring Bars in Compression**

The anchorage length of straight bar in compression shall be equal to the “Development Length” of bars in compression as specified in IS : 456. The projected length of hooks, bends and straight lengths beyond bend, if provided for a bar in compression, shall be considered for development length.

f) **Binders, stirrups, links and the like**

In case of binders, stirrups, links etc. the straight portion beyond the curve at the end shall be not less than eight times nominal size of bar.

g) **Placing in Position**

Fabricated reinforcement bars shall be placed in position as shown in the drawings or as directed by the Engineer-in-charge. The bars crossing one another shall be tied together at every intersection with two strands of annealed steel wire 0.9 to 1.6 mm thickness twisted tight to make the
skeleton of the steel work rigid so that the reinforcement does not get displaced during deposition of concrete.

The bars shall be kept in correct position with combination of cover blocks, spacers and templates as directed by Engineer-in-charge.

**TABLE**

<table>
<thead>
<tr>
<th>Nominal Size Mm</th>
<th>Cross Sectional Area Sq.mm</th>
<th>Mass per meter Run Kg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>28.3</td>
<td>0.222</td>
</tr>
<tr>
<td>7</td>
<td>38.5</td>
<td>0.302</td>
</tr>
<tr>
<td>8</td>
<td>50.3</td>
<td>0.395</td>
</tr>
<tr>
<td>10</td>
<td>78.6</td>
<td>0.617</td>
</tr>
<tr>
<td>12</td>
<td>113.1</td>
<td>0.888</td>
</tr>
<tr>
<td>16</td>
<td>201.2</td>
<td>1.58</td>
</tr>
<tr>
<td>18</td>
<td>254.6</td>
<td>2.00</td>
</tr>
<tr>
<td>20</td>
<td>314.3</td>
<td>2.47</td>
</tr>
<tr>
<td>22</td>
<td>380.3</td>
<td>2.98</td>
</tr>
<tr>
<td>25</td>
<td>491.1</td>
<td>3.85</td>
</tr>
<tr>
<td>28</td>
<td>616.0</td>
<td>4.83</td>
</tr>
<tr>
<td>32</td>
<td>804.6</td>
<td>6.31</td>
</tr>
<tr>
<td>36</td>
<td>1018.3</td>
<td>7.99</td>
</tr>
<tr>
<td>40</td>
<td>1257.2</td>
<td>9.85</td>
</tr>
<tr>
<td>45</td>
<td>1591.1</td>
<td>12.50</td>
</tr>
<tr>
<td>50</td>
<td>1964.3</td>
<td>15.42</td>
</tr>
</tbody>
</table>
h) **Rate**

The rate for reinforcement shall include the cost of labour and materials required for all operations described above such as cleaning of reinforcement bars, straightening, cutting, hooking, bending, binding, placing in position etc. as required or directed including tack welding on crossing of bars in lieu of binding with wires.

2.3.5 **Testing of Materials:**

(a) **Manufacturer’s Tests**

For each batch of materials supplied Manufacturer’s Test Certificate as per IS :1786 shall be submitted for approval.

(ii) **Tests** – Following type of lab test shall be carried out.

1) Tensile Tests

   This shall be done as per IS 1608

2) Bend Test

   This shall be done as per IS 1599

3) Re-test

   This shall be done as per IS 1786

4) Rebend Test

   This shall be done as per IS 1786

5) Chemical composition Test

   This shall be done as per IS 228

6) Unit weight Test

   This shall be done as per IS 1786

Should any one of the test pieces first selected fail to pass any of the tests specified above, two further samples shall be selected for testing in respect of each failure. Should the test pieces from both these additional samples pass, the materials represented by the test samples shall be deemed to comply with the requirement of the particular test. Should the test piece from either of these additional samples fail, the material represented by the test samples shall be considered as not having complied with standard.

(b) **Acceptance Criteria**

Based on the results of tests carried out as mentioned above, the Engineer-in-charge will decide the acceptance of the batch under test for use in RCC structures, and his decision shall be final and binding on the Contractor.

The charges for all the tests in an authorized laboratory shall be borne by the Contractor and are deemed to have been included in the price.
quoted for the relevant BOQ item. It shall be clearly understood by the Contractor that the confirmatory test stipulated here before are mandatory and the time required for such testing shall be catered for in the delivery schedule for materials.

All reinforcement shall be clean, free from pitting, oil, grease, paint, loose mill scales, rust, dirt, dust, or any other substance that will destroy or reduce bond.

2.4 Concrete
All structural concrete shall be Mix designed & weight batched.

2.4.1 Design Mix
Design mix concrete is that in which design of mix i.e. the proportion by weight of cement, aggregates and water is arrived as to have mean target strength with required workability in wet condition and the desired durability in hardened state.

2.4.2 Grade of Concrete
The compressive strength of various grades of designed concrete shall be as per Table below (Table IV)

### TABLE IV

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Concrete</th>
<th>Min. Cement Content in Kg/ Cum of Concrete</th>
<th>Compression Strength 7 day N/mm²</th>
<th>28 days N/mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>M 15 (PCC)</td>
<td>240</td>
<td>10.0</td>
<td>15</td>
</tr>
<tr>
<td>2.</td>
<td>M 20 (RCC)</td>
<td>300</td>
<td>13.5</td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>M 25 (RCC)</td>
<td>300</td>
<td>17.0</td>
<td>25</td>
</tr>
</tbody>
</table>
Compressive Strength indicated above pertains to pressure test on works test cubes 15 cm x 15 cm x 15 cm after normal curing for 14 days as per IS: 516 and satisfy the test requirements as per table II of IS 456-2000.

The minimum cement content stipulated above should be adopted irrespective of whether the Contractor achieves the desired strength with less quantity of cement. The Contractor’s quoted rates for concrete shall provide for the above eventuality and nothing extra shall become payable to the Contractor in this account. Even in the case where the quantity of cement required is higher than that specified above to achieve desired strength based on an approved mix design, nothing extra shall become payable to the Contractor.

The Contractor shall not commence concreting in the Permanent Works until details of trial mixes and test results for each class of concrete have been submitted to and approved by the EIC.

The Contractor shall not alter the approved mix proportions nor the approved source of supply of any of the ingredients without having previously obtained the approval of the Engineer-in-charge.

During production, the Engineer-in-charge may require trial mixes to be made before a substantial change is made in the materials or in the proportions of the materials to be used.

It shall be the Contractor's sole responsibility to carry out the mix designs at his own cost from a reputed institute as approved by Engineer-in-charge. He shall furnish to the Engineer-in-charge at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained.

A range of slumps, for pavements is given below which shall generally be used unless otherwise instructed by the EIC:

<table>
<thead>
<tr>
<th>Structure/Member</th>
<th>Slump in millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td>Pavements</td>
<td>50</td>
</tr>
<tr>
<td>Heavy mass construction</td>
<td>75</td>
</tr>
</tbody>
</table>
Note: All concreting done for water retaining structures shall have a minimum slump value of 60 mm and maximum of 100 mm

2.4.3 Design Procedure for Concrete Mix (refer IS 10262)

2.4.3.1 Data to be stipulated / specified
1. Characteristics compressive strength of concrete at 28 days
2. Degree of workability
3. Limitations on Water Cement ratio
4. Standard Deviation
5. Minimum Cement Content as per IS: 456
6. Standard Deviation (Table V)
7. Degree of Control (Table VI)

2.4.3.2 Target Strength
As per IS 456 and IS 1343 target average Compressive strength at 28 days is $f_{ck} + 1.65s$

Where $f_{ck} = $ characteristics compressive strength at 28 days

$S = $ standard deviation.

Batching

In proportioning concrete, the quantity of cement and aggregates shall be determined by mass. Water shall be measured by volume in calibrated Can/tanks. Uniform quality of graded aggregates and water cement ratio shall be maintained.

Admixtures if required shall be mixed as per the relevant IS: 9103/456 and as recommended in the mix design without any extra cost.

2.4.3.3 Mixing
Concrete shall be mixed in a mechanical mixer. The mixer should comply with IS 1791. It shall be fitted with hopper. The mixing shall be continuous until there is uniform distribution of the material and the mass is uniform in colour and consistency. If there is segregation after unloading from the mixer, the concrete should be remixed. The mixing time shall not be less than 2 minutes.
Each time the work stops, the mixer shall be cleaned out, and while recommencing; the first batch shall have 10% additional cement to allow for sticking in the drum.

2.4.4 Transporting, Placing and Compacting
2.4.4.1 Transportation
Concrete shall be transported from the mixer to the place of laying as rapidly as possible by methods, which will prevent the segregation or loss of any of the ingredients, and maintaining the required workability.

2.4.4.2 Placing
The concrete shall be deposited as nearly as practicable in its final position to avoid rehandling. It shall be laid gently (not thrown) and shall be thoroughly vibrated and compacted before setting commences and should not be subsequently disturbed. Method of placing shall be such as to preclude segregation. Care shall be taken to avoid displacement of reinforcement or movement of form work and damage due to rains. Concrete shall not be dropped from a height of more than 1 m.

While placing concrete the Contractor shall proceed as specified below and also ensure the following:

(a) Continuously between construction joints and pre- determined abutments.
(b) Without disturbance to forms or reinforcement.
(c) Without disturbance to pipes, ducts, fixings and the like to be cast in; ensure that such items are securely fixed. Ensure that concrete cannot enter open ends of pipes and conduits etc.
(d) Without dropping in a manner that could cause segregation or shock.
(e) In deep pours only when the concrete and formwork designed for this purpose and by using suitable chutes or pipes.
(f) Do not place if the workability is such that full compaction cannot be achieved.
(g) Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting if necessary. In supported excavations, withdraw the linings progressively as concrete is placed.
(h) If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.

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

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

(k) Maintain separate pour card for each pour as per the format approved by Engineer-in-charge.

2.4.4.3 Compaction
Concrete shall be thoroughly compacted and fully worked around embedded fixtures and into corners of the form work. Mechanical vibrator of appropriate type shall do compaction till a dense concrete is obtained. The mechanical vibrators shall conform to IS 2505, IS 2506, IS 2514, IS 4656 specifications for concrete vibrators (immersion type). To prevent segregation, over vibration shall be avoided. The use of mechanical vibrator may be relaxed by the Engineer-in-charge at his discretion for certain items and permit hand compaction.

Hand compaction shall be done with the help of tamping rods. Compaction shall be completed before the initial setting starts. For the items where mechanical vibrators are not to be used, the contractor shall take permission of the EIC in writing before the start of the work. After compaction the top surface shall be finished even and smooth with wooden trowel before the concrete begins to set.

2.4.4.4 Construction Joints
Concreting shall be carried out continuously upto construction joints. The position and arrangement of construction joints shall be as per approved drawings or as directed by the Engineer-in-charge. Number of such joints shall be kept minimum. Joints shall be kept as straight as possible.

As soon as the exposed concrete has sufficiently hardened, the surface of the joint shall be water jetted or brushed with a stiff brush to expose the larger aggregate without being disturbed. Alternatively, if the preparation is not satisfactory, or proper joint preparation is not possible due to inclement weather, the Contractor shall thoroughly remove the laitance of hardened concrete by mechanical chipping after seven days of concrete work at his own cost. Before placing fresh concrete against a construction joint all loose material shall be removed and the surface sluiced with water until it is perfectly clean, thereafter all pounded water should be removed.
When concreting is to be resumed on a surface, which has not fully hardened, all laitance shall be removed by wire brushing, the surface wetted, free water removed and a coat of cement slurry applied. On this, a layer of concrete not exceeding 150 mm thickness shall be placed and well rammed against the old work. Thereafter work shall proceed in the normal way.

2.4.4.5  **Standard of Acceptance**

(a) The average strength of group of cubes for each grade cast for each day shall not be less than the specified work cube strength. 20 per cent of cubes cast for each day may have values less than the specified strength provided that the lowest value is not less than 85% of the specified strength.

(b) Concrete strength less than specified may as a special case be accepted in a member with the approval of EIC provided that the maximum stress in the member under the maximum design live load does not exceed the permissible safe stress appropriate to the lower strength of the concrete.

(c) Concrete which does not meet the strength requirements as specified but has a strength greater than that of the lowest value of 85% may, at the discretion of the designer, be accepted as being structurally adequate without further testing. However in such cases pro-rata reduction in the rate of concrete shall be incorporated for payment.

(d) Concrete of each grade shall be assessed separately.

(e) Concrete shall be assessed daily for compliance.

2.4.4.6  **Criteria for acceptance of work**

Part or element of concrete work shall be deemed to be acceptable, provided the three cubes tested for 28 days strength conform to the following:

a) Average of the three cubes strengths shall not be less than the specified strength.

b) No individual cube strength shall be less than 90% of the specified strength.

c) If any individual cube strength exhibits more than 133% of the specified strength, such cube shall be classified as freak and the criteria in (a) and (b) above, shall be applied for the remaining two cubes only and the acceptability determined.
d) **Quantum of cubes and testing**

A set of 6 cubes shall be cast per every sample of concrete. The minimum frequency of sampling of concrete of each grade shall be as under:

<table>
<thead>
<tr>
<th>Quantity of Concrete (in m³)</th>
<th>No. of samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>1</td>
</tr>
<tr>
<td>6 – 15</td>
<td>2</td>
</tr>
<tr>
<td>16 – 30</td>
<td>3</td>
</tr>
<tr>
<td>31 – 50</td>
<td>4</td>
</tr>
<tr>
<td>51 and above</td>
<td>4+1 additional sample for each additional 50 m³ or part thereof.</td>
</tr>
</tbody>
</table>

At least one sample shall be taken from each shift and a set of 6 Cubes on every important element as decided by the EIC.

The decision of The Engineer-in-charge in this regard shall be final and binding.

### TABLE 5

<table>
<thead>
<tr>
<th>Grade of concrete</th>
<th>Standard Deviation for different degree of control in N / mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>M15</td>
<td>2.5</td>
</tr>
<tr>
<td>M20</td>
<td>3.6</td>
</tr>
<tr>
<td>M25</td>
<td>4.3</td>
</tr>
<tr>
<td>M30</td>
<td>5.0</td>
</tr>
<tr>
<td>M35</td>
<td>5.3</td>
</tr>
</tbody>
</table>

(f) Degree of quality control expected under different site conditions is described in table 6.
### TABLE 6

<table>
<thead>
<tr>
<th>Degree of Control</th>
<th>Condition of production of concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very Good</strong></td>
<td>Fresh cement from single source and regular tests, weigh batching of all materials, aggregates supplied in single size, control of aggregates grading and moisture content, control of water added, frequent supervision, regular workability and strength tests and field laboratory facilities.</td>
</tr>
<tr>
<td><strong>Good</strong></td>
<td>Carefully stored cement and periodic test, weigh batching of all materials, controlled water, graded aggregate supplied, occasional grading and moisture tests, periodic check of workability &amp; strength, intermittent supervision and experienced workers.</td>
</tr>
<tr>
<td><strong>Fair</strong></td>
<td>Proper storage of cement, volume batching of all of the aggregates, allowing for bulking of sand, weigh batching of cement, water content controlled by inspection of mix &amp; occasional supervision and tests.</td>
</tr>
</tbody>
</table>

#### 2.4.4.7 Finish to concrete surfaces

Finish to concrete surfaces at various situations shall be as per directions of The Engineer-in-charge. Where form finish is specified, the final surface shall be smooth and even and no undulations, ridges, spots etc. shall be permitted. They shall also be laid to pattern as directed. In case surfaces intended and directed for form finish, exhibit any of the defects above mentioned, the surfaces shall be rubbed with carborundum or plastered and finished as directed at the risk and cost of the contractor. The decision as to the acceptability or otherwise of a surface will be notified by The Engineer-in-charge and the contractor will implement the instructions accordingly.
2.4.4.8 Concrete cover for reinforcement
Where not specifically indicated in the drawings, concrete cover for reinforcement shall be as per the latest IS 456 or as per directions at site from time to time. Proper concrete cover blocks to suit various covers as required shall be provided in adequate numbers sufficiently ahead of the work.

2.4.4.9 Curing
It is very important that all cement concrete work shall be cured properly. All concrete work shall be covered with a layer of sacking, canvas, Hessian or similar absorbent material and kept wet continuously for not less than a fortnight or as directed. Water used for curing shall also be free from any deleterious substances and shall generally be fit for drinking. The work shall be adequately protected from premature drying, winds, directed sun rays, rapid cooling during the first few days after placing, vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement. Membrane curing shall be allowed with prior permission of EIC without any extra payment.

2.4.4.10 Repair and Replacement of Unsatisfactory Concrete
Immediately after the shuttering is removed, all the defective areas such as honey-combed surfaces, rough patches, holes left by form bolts etc. shall be inspected by the Engineer-in-charge who may permit patching of the defective areas or reject the concrete work.

All through holes for shuttering shall be filled for full depth and neatly plugged flush with surface.

Rejected concrete shall be removed and replaced by the Contractor at no additional cost to the IIMB.

For patching of defective areas all loose materials shall be removed and the surface shall be prepared as approved by the Engineer-in-charge.

Bonding between hardened and fresh concrete shall be done either by placing cement mortar with approved bonding agent or
by applying epoxy. The decision of the Engineer-in-charge as to
the method of repairs to be adopted shall be final and binding on
the Contractor. The surface shall be saturated with water for 24
hours before patching is done with 1:4 cement sand mortar. The
use of epoxy for bonding fresh concrete shall be carried out as
approved by the Engineer-in-charge.

All the form bolt repairs and delayed repairs shall be carried out
using a proportion of white cement in repair mix to the approval
of the Engineer-in-charge, so as to match the colour of the
surrounding area.

2.5  Nominal Mix Concrete
2.5.1 Mix Design & Testing
Mix design and preliminary tests are not necessary for Nominal Mix
Concrete. However works tests shall be carried out as per IS:456.
Proportions for Nominal Mix Concrete may be adopted as per Table 9
of IS:456. However it will be the Contractor's sole responsibility to
adopt appropriate nominal mix proportions to yield the specified
strength.

2.5.2 Batching & Mixing of Concrete
Based on the adopted nominal mixes, aggregates shall be measured
by volume. However cement shall be by weight only, using whole bags
of cement.

2.6  Optional Tests
If the Engineer-in-charge is not satisfied with the results of the tests or
otherwise considers that the materials i.e. cement, sand, coarse
aggregates, reinforcement and water are not in accordance with the
Specifications or if specified concrete strengths are not obtained, he
may order tests to be carried out on these materials in laboratory, to
be approved by the Engineer-in-charge, as per relevant IS Codes.
Contractor shall have to pay for these tests.

In the event of any work being suspected of faulty material or
workmanship requiring its removal or if the works cubes do not give
the stipulated strengths, the Engineer-in-charge reserves the right to
order the Contractor to take out cores and conduct tests on them or do
ultrasonic testing or load testing of structure as referred to in IS 456,
etc.

The Engineer-in-charge also reserves the right to ask the Contractor to
dismantle and re-do such unacceptable work, at no cost to the IIMB.
If the structure is certified as failed by Engineer-in-charge, the cost of the test and subsequent dismantling/reconstruction shall be borne by the Contractor.

The quoted unit rates/prices of concrete shall be deemed to provide for all tests mentioned above.

2.7 Preformed Fillers and Joint Sealing Compound

2.7.1 Materials

Preformed filler for expansion/isolation joints shall be non-extruding and resilient type of bitumen impregnated fibres conforming to IS: 1838 (Part I).

Bitumen coat to concrete/masonry surfaces for fixing the preformed bitumen filler strip shall conform to IS: 702. Bitumen primer shall conform to IS: 3384.

Sealants shall be: Sealant Polysulphide
Sealant shall be a cold pouring compound complying with BS 4254/IS 12118, suitable for sealing movement and construction joints in concrete and other areas. It shall be water tight & non-sagging. It shall be tough, abrasion-resistant and shall not decompose in strong sunlight.

Hardness (Shore A) : 15-20
Transverse Movement Accommodation : ±12.5%

2.7.2 Workmanship
The thickness of the preformed filler shall be 25mm for expansion joints and 50mm for isolation joints around foundation supporting rotatory equipments. Contractor shall procure the strips of the desired thickness and width in lengths as manufactured. Assembly of small pieces/thicknesses of strips to make up the specified size shall not be permitted.

The concrete/masonry surface shall be cleaned free from dust and any loose particles. When the surface is dry, one coat of industrial blown type bitumen of grade 85/25 conforming to IS:702 shall be applied hot by brushing at the rate of 1.20 kg/sq.m. When the bitumen is still hot the preformed bitumen filler shall be pressed and held in position till it completely adheres. The surface of the filler against which further
concreting/masonry work is to be done shall similarly be applied with one coat of hot bitumen at the rate of 1.20 kg/sq.m.

Sealing compound shall be heated to a pouring consistency for enabling it to run molten in a uniform manner into the joint. Before pouring the sealing compound, the vertical faces of the concrete joint shall be applied hot with a coat of bitumen primer conforming to IS:3384 in order to improve the adhesive quality of the sealing compound.

The Contractor shall construct recesses at all joints and on both faces of the concrete work except on the underside of ground slabs. The recesses shall be accurately formed to the lines and dimensions shown on the Drawings or as agreed with the Engineer-in-charge.

The Contractor shall prepare the surfaces of the recess and shall supply a joint sealer and fill or caulk the recess completely with it.

Joint sealing shall not be commenced without the approval of the Engineer-in-charge.

All joint sealers shall be from an approved manufacturer. The Contractor shall supply the manufacturer’s test certificates for each consignment of each type of joint sealant delivered to the Site and shall if requested supply to the Engineer-in-charge sufficient samples of each type and consignment for confirmatory tests to be carried out in accordance with the appropriate test procedure.

Sealants shall be installed in strict accordance with the manufacturer’s instructions. De-bonding strip shall be used in conjunction with the sealers as indicated on the Drawings. The de-bonding strip shall be compatible with the joint sealer and shall be resistant to attach from the primer used to bond the sealer to the concrete.

Polysulphide sealants shall not abut bitumen sealers. Surfaces to receive Polysulphide sealants shall be kept free from bituminous paints. All sealants shall be appropriate for the prevailing climatic conditions. Bituminous sealants shall comply with the BS 2499 and Polysulphide sealants shall comply with IS 12118/BS 4254.
2.7.3 Measurement

Measurement for the preformed joint filler shall be in sq.m correct to two places of decimal for the specified thickness as per items of work. Measurement for applying the bitumen coat to concrete / masonry surfaces shall be in sq.m correct to two places of decimal. Measurement for the joint sealing compound shall be in running meters correct to two places of decimal for the specified width and thickness as per the items of work.

25. Quality control:

Following quality control tests shall be carried out at frequencies specified against each:

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Test Method</th>
<th>Frequency</th>
<th>Acceptance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moisture content just before compaction. (IS:2720 Part II)</td>
<td>1 test per 250 Sq m</td>
<td>1% above to 2% below OMC. As per Para 20</td>
</tr>
<tr>
<td>2</td>
<td>Cement content immediately after mixing (IS:1514)</td>
<td>1 test per 250 Sq m</td>
<td>Moving average of 10 tests not to be &lt; designed cement content provided further that no test value is &lt; 75% of the designed cement content.</td>
</tr>
<tr>
<td>3</td>
<td>Compaction control (IS: 2720 Part XXVIII)</td>
<td>1 test for 500 Sq m</td>
<td>As per Para 22.</td>
</tr>
<tr>
<td>4</td>
<td>Degree of pulverization (As per Para 4.4)</td>
<td>Regularly</td>
<td>As per Para 12.</td>
</tr>
<tr>
<td>5</td>
<td>Surface Accuracy</td>
<td>Regularly</td>
<td>As per Para 23.</td>
</tr>
</tbody>
</table>

2.8 Rectification of surface irregularity:
2.8.1 High Surface:
2.8.2 Where it is detected within three hours of mixing of cement and soil/blended materials that the surface is low it shall be corrected by scarifying to a depth of 5 cm supplemented with freshly mixed materials and re-compaction.
2.8.3 Where the detection is made after three hours of mixing of cement and oil/blended materials, the full depth of the layer shall be removed and replaced with fresh mixed materials for at least 10 Sq m areas and re-compacted.

2.8.4 Maintenance of compacted formation:
   The completed formation shall be maintained in a undisturbed condition. If the completed formation is loosened or damaged in any way, the same shall be repaired or replaced as directed by the Engineer-in-charge before laying the overlying constructions. Nothing extra shall be paid on this account. Charge before laying the overlying construction, nothing extra shall be paid on this account.

2.8.5 Measurements:
2.8.6 Fixing of base line and bench mark shall be carried out.
2.8.7 With the help of this base line and bench mark, ground levels shall be taken at 3m intervals longitudinally and transversely. Where there are local depressions or mounds, the intervals of 3m shall be suitable be reduced both longitudinally and transversely, as directed by the Engineer-in-charge. The levels shall be taken in the presence of the contractor or his authorized representative who will sign the level book in token of his acceptance.

2.8.9 After the completion of the work, the final levels shall be taken at the grid points, where previously the ground levels were taken, in the presence of the contractor or his authorized representative and his dated signature obtained on the level in token of his acceptance.

2.8.10 The contractor shall be responsible for accurate fixing of all levels, for setting clear & firm bench marks & base lines & maintaining them throughout the contract period. The contractor shall bear the cost of all the operations including materials & labour described above for fixing & checking the levels at all stages of the work.

2.8.11 These levels shall make the basis of payment.

2.8.12 The quantity shall be computed in cubic meters correct two places of decimals from cross-sections after compaction. No deduction shall be made for voids.

2.8.13 The quantity for payment shall be the theoretical quantity (Based on proposed formation levels) or actual quantity (based on actual levels) whichever is less.
2.8.14 Rates:
2.8.15 Rate shall include the cost of all materials, plant, machinery and labour required for all the operations described above including all cartages and lifts,

2.8.16 The rate also includes all cost of setting up the laboratory at site and carrying out the quality control measures/tests enumerated above by the contractor at his own cost in the presence of EIC or his authorized representative and submission of test results on completion of tests to the Engineer-in-charge thereof.

GENERAL BUILDING WORKS
MASONRY, PLASTERING AND PAINTING

Applicable Codes and Specifications

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest editions including all applicable official amendments and revisions shall be referred to.

IS: 110 - Ready mixed paint, brushing, grey filler, for enamels for use over primers
IS: 269 - Specification for 33 grade ordinary Portland cement
IS: 280 - Specification for mild steel wire for general Engineering purposes
IS: 287 - Recommendations for maximum permissible moisture content of timber used for different purposes
IS: 304 - High Tensile Brass Ingots and Castings.
IS: 337 - Varnish, finishing interior
IS: 348 - French polish
IS: 383 - Specification for coarse and fine aggregates from natural sources for concrete
IS: 412 - Expanded metal steel sheets for general purposes
IS: 419 - Specification for putty for use on window frames
IS: 428 - Distemper, oil emulsion, colour as required
IS: 459 - Specification for un-reinforced corrugated and semi-corrugated asbestos cement sheets
IS: 702 - Specification for industrial bitumen
IS: 710 - Specification for marine plywood
IS: 712 - Specification for building limes
IS: 730 - Specification for hook bolts for corrugated sheet roofing
IS: 733 - Wrought aluminum and aluminum alloys, bars, rods and sections for general Engineering purposes
IS: 777 - Specification for glazed earthenware tiles
IS: 1003 - Specification for timber panelled and glazed shutters (Parts 1 & 2)
IS: 1038 - Specification for steel doors, windows and ventilators
IS: 1077 - Specification for common burnt clay building bricks
IS: 1081 - Code of practice for fixing and glazing of metal (steel & aluminum) doors, windows and ventilators
IS: 1124 - Method of test for determination of water absorption, apparent specific gravity & porosity of natural building stones
IS: 1237 - Specification for cement concrete flooring tiles
IS: 1322 - Bitumen felts for water proofing and damp proofing
IS: 1346 - Code of practice for water proofing of roofs with bitumen felts
IS: 1361 - Specification for steel windows for industrial buildings
IS: 1397 - Specification for kraft paper
IS: 1443 - Code of practice for laying and finishing of cement concrete flooring tiles
IS: 1477 - Code of practice for painting of ferrous metals in buildings (Parts 1 & 2)
IS: 1542 - Specification for sand for plaster
IS: 1580 - Specification for bituminous compounds for water-proofing and caulking purposes
IS: 1597 - Code of practice for construction of stone masonry: Part 1 Rubble stone masonry
IS: 1659 - Specification for block boards
IS: 1661 - Code of practice for application of cement and cement-lime plaster finishes
IS: 1834 - Specification for hot applied sealing compound for joint in concrete
IS: 1838 - Specification for preformed fillers for expansion joint in concrete pavements and structures (non extruding and resilient type): Part 1 Bitumen impregnated fiber
IS: 1948 - Specification for aluminum doors, windows and ventilators
IS: 1949 - Specification for aluminum windows for industrial buildings
IS: 2074 - Ready mixed paint, air-drying, red oxide- zinc chrome, and priming
IS: 2098 - Asbestos cement building boards
IS: 2114 - Code of practice for laying in-situ terrazzo floor finish
IS: 2116 - Specification for sand for masonry mortars
IS: 2185 - Specification for concrete masonry units (Parts 1, 2 & 3)
IS: 2202 - Specification for wooden flush door shutters (Solid core type): Parts 1 & 2
IS: 2212 - Code of practice for brickwork
IS: 2250 - Code of practice for preparation and use of masonry mortars
IS: 2338 - Code of practice for finishing of wood and wood based materials (Parts 1 & 2)
IS: 2339 - Aluminum paint for general purposes, in dual container
IS: 2395 - Code of practice for painting concrete, masonry and plaster surfaces (Parts 1 & 2)
IS: 2402 - Code of practice for external rendered finishes
IS: 2571 - Code of practice for laying in-situ cement concrete flooring
IS: 2572 - Code of practice for construction of hollow concrete block masonry
IS: 2645 - Specification of integral cement waterproofing compounds
IS: 2690 - Specification for burnt clay flat terracing tiles: Part 1 Machine made
IS: 2691 - Specification for burnt clay-facing bricks
IS: 2750 - Specification for steel scaffolding
IS: 2835 - Flat transparent sheet glass
IS: 2932 - Specification for enamel, synthetic, exterior type (a) undercoating, (b) finishing
IS: 3007 - Code of practice for lying of asbestos cement sheets - corrugated and (Part 1 & 2) semi-corrugated sheets
IS: 3036 - Code of practice for laying lime concrete for a waterproofed roof finish
IS: 3067 - Code of practice of general design details and preparatory work for damp-proofing and water-proofing of buildings
IS: 3068 - Specification for broken brick (burnt clay) coarse aggregates for use in lime concrete
IS: 3384 - Specification for bitumen primer for use in waterproofing and damp proofing
IS: 3461 - Specification for PVC-asbestos floor tiles
IS: 3462 - Specification for unbacked flexible PVC flooring
IS: 3495 - Method of test for burnt clay building bricks: Part 1 to 4
IS: 3536 - Specification for ready mixed paint, brushing, wood primer, pink
IS: 3564 - Specification for door closers (hydraulically regulated)
IS: 3614 - Specification for fire checks doors: Part –I Plate metal covered and rolling type (Part -1)
IS: 3614 - Specification for metallic and non-metallic fire check doors Resistance test and performance criteria (Part -2)
IS: 3696 - Safety code of scaffolds and ladders (Parts 1 & 2)
IS: 4020 - Methods of test for wooden flush door: Type test
IS: 4021 - Specification for timber door, window and ventilator frames
IS: 4351 - Specification for steel doorframes
IS: 4443 - Code of practice for use of resin type chemical resistant mortars
IS: 4457 - Specification for ceramic unglazed vitreous acid resisting tile
IS: 4631 - Code of practice for laying epoxy resin floor toppings
IS: 4832 - Specification for chemical resistant mortars (Part II)
IS: 4860 - Specification for acid resistant bricks
IS: 4948 - Specification for welded steel wire fabric for general use
IS: 5318 - Code of practice for laying of flexible PVC sheet and tile flooring
IS: 5410 - Cement paint, colour as required
IS: 5411 - Specification for plastic emulsion paint (Parts 1 & 2)
IS: 5437 - Wired and figured glass
IS: 5491 - Code of practice for laying of in-situ granolithic concrete floor topping
IS: 6041 - Code of practice construction of autoclaved cellular concrete block masonry
IS: 6042 - Code of practice for construction of light weight concrete block masonry
IS: 6248 - Specification for metal rolling shutters and rolling grilles
IS: 7193 - Specification for glass fiber base coal tar pitch and bitumen felts
IS: 7452 - Specification for hot rolled steel sections for doors, windows and ventilators
IS: 8042 - Specification for white Portland cement
IS: 8543 - Methods of testing plastics
IS: 8869 - Specification for washers for corrugated sheet roofing
IS: 9197 - Specification for epoxy resin, hardeners and epoxy resin composites for floor topping
IS: 9862 - Specification for ready mixed paint, brushing, bituminous, black, lead-free, acid, alkali, water and chlorine resisting
IS: 12200 - Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams
BS: 476 - Methods for determination of the fire resistance of elements of construction (General Principles) (Part – 20)
BS: 476 - Methods for determination of the fire resistance of load bearing elements of construction (Part – 21)
3.0 Brick Masonry

Materials

Bricks used in the works shall conform to the requirements laid down in IS: 1077. The class of the bricks shall be as specifically indicated in the respective items of work.

The nominal size of the modular brick shall be 200mmx100mmx100mm with the permissible tolerances over the actual size of 190mmx90mmx90mm as per IS: 1077. The nominal thickness of one brick and half brick walls using modular bricks shall be considered as 200 mm and 100 mm respectively. In the event of use of traditional bricks of nominal size 230 mmx115mmx75mm with tolerance up to ±3 mm in each dimension, one brick and half brick walls shall be considered as 230 mm and 115 mm respectively.

Bricks shall be sound, hard, homogenous in texture, well burnt in kiln without being vitrified, hand/machine molded, deep red, cherry or copper coloured, of regular shape and size & shall have sharp and square edges with smooth rectangular faces. The bricks shall be free from pores, cracks, flaws and nodules of free lime. Hand molded bricks shall be molded with a frog and those made by extrusion process may not be provided with a frog. Bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 35N/sq.mm unless otherwise specified in the items of work.

The average water absorption shall not be more than 20 percent by weight up to class 12.5 and 15 percent by weight for higher classes. Bricks, which do not conform to this requirement, shall be rejected. Over or under burnt bricks are not acceptable for use in the works.

Sample bricks shall be submitted to the Engineer-in-charge for approval and bricks supplied shall conform to approve samples. If demanded by Engineer-in-charge, brick samples shall be got tested as
per IS: 3495 by Contractor. Bricks rejected by Engineer-in-charge shall be removed from the site of works within 24 hours.

**Mortar**

Mortar for brick masonry shall consist of cement and sand and shall be prepared as per IS: 2250. Mix shall be in the proportion of 1:6 for brickwork of thickness one brick or above and 1:4 for brickwork of thickness half brick or below, unless otherwise specified in the respective items of work. Sand for masonry mortar shall conform to IS: 2116. The sand shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be approved by Engineer-in-charge. If so directed by the Engineer-in-charge, sand shall be screened and washed till it satisfies the limits of deleterious materials.

For preparing cement mortar, the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. Mixing shall be done thoroughly in a mechanical mixer, unless hand mixing is specifically permitted by the Engineer-in-charge. The mortar thus mixed shall be used as soon as possible preferably within 30 minutes from the time water is added to cement. Incase, the mortar has stiffened due to evaporation of water, this may be re-tempered by adding water as required to restore consistency, but this will be permitted only up to 30 minutes from the time of initial mixing of water to cement. Any mortar, which is partially set, shall be rejected and shall be removed forthwith from the site. Droppings of mortar shall not be re-used under any circumstances.

The Contractor shall arrange for test on mortar samples if so directed by the Engineer-in-charge.

**Soaking of Bricks**

Bricks shall be soaked in water before use for a period for the water to just penetrate the whole depth of the bricks. Alternatively, bricks may be adequately soaked in stacks by profusely spraying with clean water at regular intervals for a period not less than six hours. The bricks required for masonry work using mud mortar shall not be soaked. When the bricks are soaked they shall be removed from the tank sufficiently early so that at the time of laying they are skin-dry. Such
soaked bricks shall be stacked on a clean place where they are not again spoiled by dirt earth etc.

**Note I**
The period of soaking may be easily found at site by a field test in which the bricks are soaked to water for different periods and then broken to find the extent of water penetration. The least period that corresponds to complete soaking will be this one to be allowed for in construction work.

**Note II**
If the bricks are soaked for the required time in water that is frequently changed the soluble salt in the bricks will be leached out, and subsequently efflorescence will be reduced.

**Laying**
Bricks shall be laid in English Bond unless otherwise specified. For brick work in half brick wall, bricks shall be laid in stretcher bond. Half or cut bricks shall not be used except as closer where necessary to complete the bond. Closers in such cases, shall be cut to the required size and used near the ends of the wall. Header bond shall be used preferably in all courses in curved plan for ensuring better alignment.

**Note**
Header bond shall also be used in foundation footings unless thickness of walls (width of footing) makes the use of headers impracticable. Where thickness of footing is uniform for a number of courses, the top course of footing shall be header.

All loose materials, dirt and set lumps of mortar which may be lying over the surface on which brick work is to be freshly started, shall be removed with a wire brush and surface wetted. Bricks shall be laid on a full bed of mortar, when laying, each brick shall, be properly bedded and set in position by gently pressing with the handle of trowel. Its inside face shall be buttered with mortar before the next brick is laid and pressed against it. Joints shall be fully filled and packed with mortar such that no hollow spaces are left inside the joints.
The walls shall be taken up truly in plumb or true to the required batter where specified. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in the alternate course shall come directly one over the other. Quoin, Jambs and other angles shall be properly plumbed as the work proceeds. Care shall be taken to keep the perpends properly aligned within following maximum permissible tolerances:

a) Deviation from vertical within a storey shall not exceed 6 mm per 3 m height.
b) Deviation in vertically in total height of any wall of building more than one storey in height shall not exceed 12.5 mm.
c) Deviation from position shown on plan of any brick work shall not exceed 12.5 mm.
d) Relative displacement between loads bearing wall in adjacent storeys intended to be vertical alignments shall not exceed 6 mm.
e) A set of tools comprising of wooden straight edge, Masonic spirit levels, square, 1-meter rule line and plumb shall be kept on the site of work for every 3 masons for proper check during the progress of work.

All quoins shall be accurately constructed and the height of brick courses shall be kept uniform. This will be checked using graduated wooden straight edge or storey rod indicating height of each course including thickness of joints. The position of damp proof course, windowsills, bottom of lintels, top of the wall etc. along the height of the wall shall be marked on the graduated straight edge or storey rod. Acute and obtuse quoins shall be bonded, where practicable in the same way as square quoins. Obtuse quoins shall be formed with squint showing three quarters brick on one face and quarter brick on the other.

The brickwork shall be built in uniform layers.

No part of the wall during its construction shall rise more than one metre above the general construction level. Parts of wall left at different levels shall be raked back at an angle of 45 degrees or less with the horizontal. Toothing shall not be permitted as an alternative to raking back. For half brick partition to be keyed into main walls, indents shall be left in the main walls.
All pipe fittings and specials, spouts, hold fasts and other fixtures which are required to be built into the walls shall be embedded, as specified, in their correct position as the work proceeds unless otherwise directed by the Engineer-in-charge.

Top courses of all plinths, parapets, steps and top of walls below floor and roof slabs shall be laid with brick on edge, unless specified otherwise. Brick on edge laid in the top courses at corner of walls shall be properly radiated and keyed into position to form cut (maru) corners. Where bricks cannot be cut to the required shape to form cut (maru) corners, cement concrete 1:2:4 (1 cement; 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) equal to thickness of course shall be provided in lieu of cut bricks.

Bricks shall be laid with frog (where provided) up. However, when top course is exposed, bricks shall be laid with frog down. For the bricks to be laid with frog down, the frog shall be filled with mortar before placing the brick in position.

In case of walls one brick thick and under, one face shall be kept even and in proper plane, while the other face may be slightly rough. In case of walls more than one brick thick, both the faces shall be kept even and in proper plane.

To facilitate taking service lines later without excessive cutting of completed work, sleeves (to be paid separately) shall be provided, where specified, while raising the brickwork. Such sleeves in external walls shall be sloped down outward so as to avoid passage of water inside.

Top of brickwork in coping & sills in external walls shall be slightly tilted. Where brick coping & sills are projecting beyond the face of wall, drip course/throating shall be provided where indicated.

Care shall be taken during construction that edges of jambs, sills and projections are not damaged in case of rain. New built work shall be covered with gunny bags or tarpaulin so as to prevent the mortar from being washed away. Damage, if any, shall be made good to the satisfaction of the Engineer-in-charge.
Vertical reinforcement in the form of bars (MS or high strength deformed bar), considered necessary at the corners and junction of walls and jamb opening doors, windows etc. shall be encased with cement mortar not leaner than 1:4 (1 cement: 4 coarse sand), or cement concrete mix as specified. The reinforcement shall be suitably tied, properly embedded in the foundation and at roof level. The diameter of bars shall not be less than 8 mm and concrete grade shall be minimum 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size).

In retaining walls and the like, where water is likely to accumulate, weep holes, 50 to 75 mm square shall be provided at 2 m vertically and horizontally unless otherwise specified. The lowest weep hole shall be at about 30 cm above the ground level. All weep holes shall be surrounded by loose stones and shall have sufficient fall to drain out the water quickly.

Work of cutting chases, wherever required to be made in the walls for housing G.I pipe, CI pipe or any other fixtures shall be carried out in various locations as per guidelines given below:

a) Cutting of chases in one brick thick & above load bearing walls.
   i) As far as possible services should be planned with the help of vertical chases. Horizontal chases should be avoided.
   ii) The depths of vertical chases and horizontal chases shall not exceed one third and one-sixth of the thickness of the masonry respectively.
   iii) When narrow stretches of masonry (or short length of walls) such as between doors and windows, cannot be avoided they should not be pierced with openings for soil pipes or waste pipes or timber joints, etc. where there is a possibility of load concentration such narrow lengths of walls shall be checked for stresses and high strength bricks in mortar or concrete walls provided, if required.
   iv) Horizontal chases when unavoidable should be located in the upper or lower one-third of height of storey and not more than three chases should be permitted in any stretch of a wall. No continuous horizontal chase shall exceed one metre in length. Where unavoidable, stresses in the affected area should be checked and kept within the permissible limits.
v) Vertical chases should not be closer than 2 m in any stretch of a wall. These shall be kept away from bearings of beams and lintels. If unavoidable, stresses in the affected area should be checked and kept within permissible limits.

vi) Masonry directly above a recess, if wider than 30 cm horizontal dimension) should be supported on lintel. Holes in masonry may be provided up to 30 cm width and 30 cm height without any lintel. In the case of circular holes in the masonry, no lintel need be provided for holes up to 40 cm in diameter.

b) Cutting of chases in half brick load bearing walls.
No chase shall be permitted in half brick load bearing walls and as such no recessed conduits and concealed pipes shall be provided with half brick thick load bearing, walls.

c) Cutting of chases in half brick non-load bearing wall:
Services should be planned with the help of vertical chases. Horizontal chase should be provided only when unavoidable.

**Joints**

The thickness of all types of joints including brick wall joints and cross joints shall be such that four course and three joints taken consecutively shall measure as follows:

i) In case of modular bricks conforming to IS: 1077 specification for common burnt clay buildings bricks, equal to 39 cm.

ii) In case of non-modular bricks, it shall be equal to 31 cm.

**Note**
Specified thickness of joints shall be of 1 cm deviation from the specified thickness of all joints shall not exceed one-fifth of specified thickness.

**Finishing of Joints**

The face of brick work may be finished flush or by pointing. In flush finishing either the face joints of the mortar shall be worked out while still green to give a finished surface flush with the face of the brick work or the joints shall be squarely raked out to a depth of 1 cm while the mortar is still green for subsequently plastering. The faces of brick work shall be cleaned with wire brush so as to remove any splashes of mortar during the course of rising the brick work. In pointing, the joints shall be squarely raked out to a depth of 1.5 cm while the
mortar is still green and raked joints shall be brushed to remove dust and loose particles and well wetted, and shall be later refilled with mortar to give ruled finish. Some such finishes are ‘flush’, ‘weathered’, ruled, etc.

Curing

The brickwork shall be constantly kept moist on all faces for a minimum period of seven days. Brickwork done during the day shall be suitably marked indicating the date on which the work is done so as to keep a watch on the curing period.

Scaffolding

Scaffolding shall be strong to withstand all dead, live and impact loads, which are likely to come on them. Scaffolding shall be provided to allow easy approach to every part of the work.

Double Scaffolding

For all brick masonry work double scaffolding having two independent supports, clear of the work, shall be provided.

Measurements

Brickwork shall be measured in cubic metres unless otherwise specified. Any extra work over the specified dimensions shall be ignored. Dimensions shall be measured correct to the nearest 0.01 m i.e. 1 cm. Areas shall be calculated to the nearest 0.01 sq mtrs and the cubic contents shall be worked out to the nearest 0.01 cubic metres.

No deductions or additions shall be done and no extra payment made for the following:

Note

Where minimum area is defined for deduction of an opening, void or both, such areas shall refer only to opening or void within the space measured.
a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc); up to 0.1 m² in section;
b) Opening up to 0.1 m² in area
c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;
d) Cement concrete blocks as for hold fasts and holding down bolts;
e) Iron fixtures, such as wall ties, pipes up to 300 mm diameter and hold fasts for doors and windows; and
f) Chases of section not exceeding 50 cm in girth.
g) Bearing portion of drip course, bearing of molding and cornice.

Note
In calculating area of an opening, any separate lintel or sills shall be included with the size of the opening but end portions of lintel shall be excluded. Extra width of rebated reveals, if any, shall also be excluded.

Walls half brick thick and less shall each be measured separately in square metres stating thickness.

String courses, projecting pilasters, aprons, sills and other projections shall be fully described and shall not be measured separately.

Circular pillars shall be measured separately in cubic metres as per actual dimensions.

Brick work curved on plan shall be measured like the brick work in straight walls and shall include all cutting and wastage of bricks, tapered vertical joints and use of extra mortar, if any. Brickwork curved on plan to a mean radius not exceeding six metres shall be measured separately and extra shall be payable over the rates for brick work in straight walls. Nothing extra shall be payable if the mean radius of the brickwork curved in plan exceeds six metres.

Tapered walls shall be measured net as walls and no extra payment shall be allowed for making tapered surface for brickwork in walls.
Rate

The rate shall include the cost of materials and labour required for all the operations described above except the vertical reinforcement and its encasement in cement mortar or cement concrete. The rate shall also include the following:

a) Raking out joints or finishing joints flush as the work proceeds;
b) Preparing tops of existing walls and the like for raising further new brickwork.
c) Rough cutting and waste for forming gables, splays at eaves and the like.
d) Leaving holes for pipes up to 150 mm diameters And encasing hold fasts etc.
e) Rough cutting and waste for brick work curved in plan and for backing to stone or other types of facing.
f) Embedding in ends of beams, joists, slabs, lintels, sills, trusses, etc.
g) Bedding wall plates, lintels, sills, roof tiles, corrugated sheets, etc. in or on walls if not covered in respective items and
h) Leaving chases of section not exceeding 50 cm in girth or 750 sq. cm in cross-section.
i) Brick on edge courses, cut brick corners, splays reveals, cavity walls, brick works

Cement Plastering Work

Materials

The proportions of the cement mortar for plastering shall be 1:4 (one part of cement to four parts of sand) or as specified in respective items. Cement and sand shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water and cement shall be as per relevant IS standards.

The quality and grading of sand for plastering shall conform to IS:1542. The mixing shall be done thoroughly in a mechanical mixer unless hand mixing is specifically permitted by the Engineer-in-charge. If so desired by the Engineer-in-charge sand shall be screened and washed to meet the Specifications. The mortar thus mixed shall be used as soon as possible preferably within 30 minutes from the time water is added to cement. In case the mortar has stiffened due to evaporation of water this may be re-tempered by adding water as required to restore consistency but this will be permitted only up to 30
minutes from the time of initial mixing of water to cement. Any mortar, which is partially set, shall be rejected and removed forthwith from the site. Droppings of plaster shall not be re-used under any circumstances.

Workmanship

Preparation of surfaces & application of plaster finishes shall generally conform to the requirements specified in IS: 1661 & IS: 2402.

Plastering operations shall not be commenced until installation of all fittings and fixtures such as door/window panels, pipes, conduits etc. are completed.

All joints in masonry shall be raked as the work proceeds to a depth of 10mm/20mm for brick/stone masonry respectively with a tool made for the purpose when the mortar is still green. The masonry surface to be rendered shall be washed with clean water to remove all dirt, loose materials, etc., Concrete surfaces to be rendered shall be roughened suitably by hacking or bush hammering for proper adhesion of plaster and the surface shall be evenly wetted to provide the correct suction. The masonry surfaces should not be too wet but only damp at the time of plastering. The dampness shall be uniform to get uniform bond between the plaster and the masonry surface.

Interior plain faced plaster - This plaster shall be laid in a single coat of 15mm thickness. The mortar shall be dashed against the prepared surface with a trowel. The dashing of the coat shall be done using a strong whipping motion at right angles to the face of the wall or it may be applied with a plaster machine. The coat shall be trowelled hard and tight forcing it to surface depressions to obtain a permanent bond and finished to smooth surface. Interior plaster shall be carried out on jambs, lintel and sill faces, etc. as shown in the drawing and as directed by the Engineer-in-charge.

Plain Faced Ceiling plaster - This plaster shall be applied in a single coat of 10 mm thickness. Application of mortar shall be as stipulated in above paragraph.

Exterior plain faced plaster - This plaster shall be applied in 2 coats. The first coat or the rendering coat shall be approximately 14mm thick. The rendering coat shall be applied as stipulated above except finishing it to a true and even surface and then lightly roughened by
cross scratch lines to provide bond for the finishing coat. The rendering coat shall be cured for at least two days and then allowed to dry. The second coat or finishing coat shall be 6 mm thick. Before application of the second coat, the rendering coat shall be evenly damped. The second coat shall be applied from top to bottom in one operation without joints and shall be finished leaving an even and uniform surface. The mortar proportions for the coats shall be as specified in the respective item of work. The finished plastering work shall be cured for at least 7 days.

Exterior Sand Faced Plaster for Stone Masonry, Roof gutters etc. - This plaster shall be applied in 2 coats. The first coat shall be approximately 14mm thick and the second coat shall be 6mm thick. These coats shall be applied as stipulated above. However, only approved quality sand shall be used for the second coat and for the finishing work. Sand for the finishing work shall be coarse and shall be of even size and shall be dashed against the surface and sponged. The mortar proportions for the first and second coats shall be as specified in the respective items of work.

Wherever more than 20mm thick plaster has been specified, which is intended for purposes of providing beading, bands, etc. this work shall be carried out in two or three coats as directed by the Engineer-in-charge duly satisfying the requirements of curing each coat (rendering/floating) for a minimum period of 2 days and curing the finished work for at least 7 days.

In the case of pebble faced finish plaster, pebbles of approved size and quality shall be dashed against the final coat while it is still green to obtain as far as possible a uniform pattern all as directed by the Engineer-in-charge.

Where specified in the drawings, rectangular grooves of the dimensions indicated shall be provided in external plaster by means of timber battens when the plaster is still in green condition. Battens shall be carefully removed after the initial set of plaster and the broken edges and corners made good. All grooves shall be uniform in width and depth and shall be true to the lines and levels as per the drawings.

Curing of plaster shall be started as soon as the applied plaster has hardened sufficiently so as not to be damaged when watered. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days.
For waterproofing plaster, the Contractor shall provide the waterproofing admixture as specified in manufacturers instruction while preparing the cement mortar.

For external plaster, the plastering operations shall be commenced from the top floor & carried downwards. For internal plaster, the plastering operations for the walls shall commence at the top & carried downwards. Plastering shall be carried out to the full length of the wall or to natural breaking points like doors/windows etc. Ceiling plaster shall be completed first before commencing wall plastering.

The finished plaster surface shall not show any deviation more than 4mm when checked with a straight edge of 2m lengths placed against the surface.

To overcome the possibility of development of cracks in the plastering work following measures shall be adopted.

a) Plastering work shall be deferred as much as possible so that fairly complete drying shrinkage in concrete and masonry works takes place.

b) Where plastering is to be done over junction of two different materials e.g. concrete and masonry, a chicken mesh of 100 mm width shall cover the junction with margins on either side and then the plaster shall be applied. Where only one of the materials is plastered over, the plaster at junction shall be struck to obtain a groove as shown below:
Ceiling plaster shall be done, with a trowel cut at its junction with wall plaster. Similarly trowel cut shall be adopted between adjacent surfaces where discontinuity of the background exists.

Measurements

Measurement for plastering work shall be in sq.m correct to two places of decimal. Unless a separate item is provided for grooves, moldings, etc., these works are deemed to be included in the unit rates quoted for plastering work. The quantity of work to be paid for under these items shall be calculated by taking the projected surface of the areas plastered after making necessary deductions for openings for doors, windows, fan openings etc. The actual plasterwork carried out on jambs/sills of windows, openings, etc. shall be measured for payment.

The rate includes for following:
(a) Preparation of surfaces
(b) Thickness of plasters Key in joints.
(c) Arrisers, chamfers of any width, internal rounded angles up to 80 mm in Width on girth except in case of mud plaster and leaping when angle etc. of any girth are included.
(d) All labors & equipment necessary for incorporating admixtures in the manner specified by the manufacturer and in proportions indicated. The admixture (liquid water proofing compound) supplied shall be paid for Separately under relevant item of work, if not included in relevant item.
(e) Scoring surface of plastering for key, when the surface is not required to be finished fair.
(f) Providing Chicken mesh at the joints of dissimilar materials.
(g) Curing of plaster surface.
(h) Cleaning stains & dripping mortar from floors & walls etc.

Water-Proofing Admixtures

For use in cement works: Waterproofing admixture shall be liquid conforming to the requirements of relevant IS and shall be of approved manufacturer as approved by Engineer-in-charge. The admixture shall not contain calcium chloride. The quantity of the admixture to be used for the works and method of mixing etc. shall be as per manufacturer's instructions and as directed by the Engineer-in-charge.

Painting of Concrete, Masonry & Plastered Surfaces

Materials

Oil bound distemper shall conform to IS: 428. The primer shall be alkali resistant primer of the same manufacture as that of the distemper.

Cement paint shall conform to IS: 5410. The primer shall be a thinned coat of cement paint.

Lead free acid, alkali and chlorine resisting paint shall conform to IS: 9862.

White wash shall be made from good quality fat lime conforming to IS: 712. It shall be slaked at site and mixed with water in the proportion of 5 liters of water to 1 kg of un-slaked lime stirred well to make a thin cream. This shall be allowed to stand for a minimum period of one day and strained through a clean coarse cloth. Four kg of adhesive dissolved in hot water shall be added to each cu.m of cream. 1.30 kg of sodium chloride dissolved in hot water shall then be added per 10 kg of lime used for the white wash to be ready for application.

Colour wash shall be made by addition of a suitable quantity of mineral pigment, not affected by lime, to the prepared white wash to obtain the shade/tint as approved by the Engineer-in-charge.
All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer-in-charge for the brand of manufacture and the colour/shade. All materials shall be brought to the site of works in sealed containers.

**Workmanship**

Contractor shall obtain the approval of the Engineer-in-charge regarding the readiness of the surfaces to receive the specified finish, before commencing the work on painting.

Painting of new surfaces shall be deferred as much as possible to allow for thorough drying of the sub-strata.

The surfaces to be treated shall be prepared by thoroughly brushing them free from dirt, mortar droppings and any loose foreign materials. Surfaces shall be free from oil, grease and efflorescence. Efflorescence shall be removed only by dry brushing of the growth. Cracks shall be filled with Gypsum. Workmanship of painting shall generally conform to IS: 2395.

Surfaces of doors, windows etc. shall be protected suitably to prevent paint finishes from splashing on them.

**White Wash**

The prepared surfaces shall be wetted and the finish applied by brushing. The operation for each coat shall consist of a stroke of the brush first given horizontally from the right and the other from the left and similarly, the subsequent stroke from bottom upwards and the other from top downwards, before the first coat dries. Each coat shall be allowed to dry before the next coat is applied. Minimum of 2 coats shall be applied unless otherwise specified. The dry surface shall present a uniform finish without any brush marks.

**Colour Wash**

Colour wash shall be applied in the same way as for white wash. A minimum of 2 coats shall be applied unless otherwise specified. The surface shall present a smooth and uniform finish without any streaks. The finished dry surface shall not show any signs of peeling/powdery and come off readily on the hand when rubbed.
The prepared surfaces shall be wetted to control surface suction and to provide moisture to aid in proper curing of the paint. Cement paint shall be applied with a brush with stiff bristles. The primer coat shall be a thinned coat (50% consistency) of cement paint. The quantity of thinner shall be as per manufacturer's instructions. The coats shall be vigorously scrubbed to work the paint into any voids for providing a continuous paint film free from pinholes for effective water proofing in addition to decoration. Cement paint shall be brushed in uniform thickness and the covering capacity for two coats on plastered surfaces shall be 3 to 4 kg/sq.m. A minimum of 2 coats of the same colour shall be applied. At least 24 hours shall be left after the first coat to become sufficiently hard before the second coat is applied. The painted surfaces shall be thoroughly cured by sprinkling with water using a fog spray at least 2 to 3 times a day. Curing shall commence after about 12 hours when the paint hardens. Curing shall be continued for at least 2 days after the application of final coat. The operations for brushing each coat shall be as detailed above.

**Oil Bound Distemper**

The prepared surfaces shall be dry and provided with one coat of alkali resistant primer by brushing. The surface shall be finished uniformly without leaving any brush marks and allowed to dry for at least 48 hours. A minimum of two coats of oil bound distemper shall be applied, unless otherwise specified. The first coat shall be of a lighter tint. At least 24 hours shall be left after the first coat to become completely dry before the application of the second coat. Broad, stiff, double bristled distemper brushes shall be used for the work. The operations for brushing each coat shall be as detailed above.

**Plastic Emulsion Paint**

Paint shall be as per IS 5411. The prepared surface shall be dry and provided with one coat of primer, which shall be a thinned coat of emulsion paint. The quantity of thinner shall be as per manufacturer's instructions. The paint shall be laid on evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in a direction at right angles. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off constitutes one coat. The next coat shall be applied only after the first coat has dried and sufficiently become hard which normally takes about 2 to 3 hours.
A minimum of 2 finishing coats of the same colour shall be applied unless otherwise specified. Paint may also be applied using rollers. The surface on finishing shall present a flat velvety smooth finish and uniform in shade without any patches.

Painting Priming coat on Wood, Iron or Plastered Surfaces: **Primer**

The primer for woodwork, ironwork or plastered surface shall be as specified in the description of the item.

Primer for wood work / Iron & Steel / Plastered / Aluminum surfaces shall be as specified below:

<table>
<thead>
<tr>
<th>Surfaces</th>
<th>Primer to be used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood work (hard and soft wood)</td>
<td>Pink conforming to IS 3536 – 1966</td>
</tr>
<tr>
<td>Resinous wood and ply wood</td>
<td>Aluminum Primer</td>
</tr>
<tr>
<td>Iron &amp; Steel, aluminum and galvanized steel work:</td>
<td>Zinc chromate primer conforming to IS 104-1962</td>
</tr>
<tr>
<td>d. Plastered surfaces, cement brick work, Asbestos surfaces for oil bound distemper and paint</td>
<td>Cement primer</td>
</tr>
</tbody>
</table>

1. The primer shall be ready mixed primer of approved band and manufacture.

Preparation of Surface:

Wood work:

The wood work to be painted shall be dry and free from moisture

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate filler material
with same shade as paint shall be used where so desired by the Engineer-in-charge.

The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glaziers putty or wood putty (for specifications for glaziers putty and wood putty – refer as mentioned herein before). Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in the stopping and the latter is therefore liable to crack.

**Application:**

The primer/paint shall be applied with brushes, worked well into the surface and spread even and smooth. Crossing and laying off as described herein before shall do the painting.

**Measurement**

Measurement for all painting work shall be in sq.m correct to two places of decimal. Measurement shall be for the areas as executed duly deducting for any openings etc. as specified in MES mode of measurement Rate quoted shall also take into account the provision of necessary enabling works such as scaffolding, painter’s cradle, tools & plants and cleaning of paint / primer spillage etc.

**Flashing**

**Materials**

Anodized Aluminum sheets shall be 1.00mm thick with anodic film thickness of 0.025 mm.
Galvanized mild steel sheets shall be 1.00mm thick with zinc coating of 800 gms/sq.m.
Bitumen felt shall be either Hessian base self finished bitumen felt Type-3 Grade I conforming to IS: 1322 or glass fiber base self finished felt Type-2 Grade 1 conforming to IS: 7193.

**Workmanship**

The type of the flashing and method of fixing shall be as specified. Flashing shall be of the correct shape and size as indicated in the construction drawings and they shall be properly fixed to ensure their effectiveness.
Flashing shall be of long lengths so as to provide minimum number of joints. The minimum overlap at joints shall be 100mm.
Fixing of the flashing shall be either by bolting with bitumen washers or by tucking into the groove 75 mm wide x 65 mm deep in masonry/concrete along with cement mortar 1:4 filletting as indicated in the Drawings. Curing of the mortar shall be carried out for a minimum period of 4 days.
Bitumen felt flashing of the type as specified shall be provided with 2 coats of bituminous paint at the rate of 0.10 liter/sq.m after the installation.

Measurement shall be in sq.m correct to two places of decimal. Measurement shall be for the actual area of the flashing material provided and the rate shall include for all the incidental works of bending to shape and fixing details as per the construction drawings.

**FLOORING, TILING AND DADO**

**Vitrified tile Flooring, Dado / Skirting / Facia:**

**Materials :**
The tiles shall be of approved make and shall generally conform to ISO: 13006 They shall be flat and true to shape, free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade.

The tiles shall be as specified in the schedule of quantity or drawings. The length of all four sides shall be measured correct to 0.1 mm and average length breadth shall not vary more than ±0.8 mm from specified dimensions. The variation of individual dimensions from average value of length / breadth shall not exceed ± 0.5 mm. Tolerance in thickness shall be (±) 0.4 mm.

The thickness of the tiles shall not be less than 6.5 mm or as specified in the items and shall conform to ISO: 13006 in all respects. The Engineer-in-charge before use on the work shall be approved samples of tiles.

**Preparation of Surface and laying:**

Sub grade concrete or RCC slab or side brick wall / or plastered surfaces on which tiles are to be laid shall be thoroughly hacked, cleaned of all mortar scales, concrete lumps etc. brushed, washed with water to remove mud, dirt etc. from the surface, wetted and mopped.
12 mm thick plaster of CM 1.3 shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal lines 1.5 mm deep at 7.5 mm center both ways.

The back of tiles shall be buttered with a cost of grey cement slurry paste and edges with white cement slurry and set in the bedding mortar. The tiles shall be tapped and corrected to proper planes and lines. The tile shall be butt jointed in pattern and joints shall be as fine as possible. The top of skirting / dado shall be truly horizontal and joints truly vertical.

After a period of curing of 7 days minimum, the tiles shall be cleaned and shall not sound hollow when tapped.

The surface during laying shall be checked with a straight edge 2m. Long.

Tiles shall enter not less than 10mm under side skirting.

After the tiles have been laid, surplus cement grout shall be cleaned off.

**Mortar and Bedding:**

Cement mortar for bedding shall be of proportion specified in items schedule and shall conform to the specification for materials, preparation etc. as specified under cement mortar. The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed the base shall be cleaned of all dirt, scum or laitance and loose materials and well wetted without forming any pools of water on the surface. The mortar of specified proportion and thickness shall then be even and smoothly spread over the base by use of screed battens to proper level or slope.

Cement mortar of thickness and proportion as specified in the schedule for dado shall be applied to the wall after preparing the wall surface as specified under cement plaster 20 mm thick and brought to correct line and plumb and the surface left rough to receive the tiles.
Fixing of tiles for flooring: -

The tiles before laying shall be soaked in water for at least 2 hours. The tiles shall be laid on the bedding mortar when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles. Tiles, which are fixed on the flooring adjoining the wall, shall be so arranged that the surface on the round edge tiles shall correspond to the skirting or dado. Neat cement mortar grout 1:2, using fine sand (table III, zone IV and as per IS 383) of honey like consistency shall be spread over the bedding mortar just to cover as much area as can be tiled within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints, shall be kept as close as possible and in straight line. The joints between tiles shall not exceed 1.00 mm, in width. The joint shall be grouted with white cement slurry. After fixing the tiles, finally in an even plane or slope, the flooring shall be covered with wet sand and allowed undisturbed for 14 days.

Fixing tiles for Dado and Skirting / Facia: -

The dado work, shall be done only after fixing the tiles / slabs on the floor. The approved glazed tiles before laying shall be soaked in water for at least 2 hours. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff.

The back of the tile shall be covered with this layer of cement mortar 1:3 using fine sand (table III, zone IV, IS383-1963), and the edge of the tile smeared with neat white cement slurry. The tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from bottom of wall upwards without any hollows in the bed of joints. Each tile shall be as close as possible to one adjoining. The tiles shall be jointed with white cement slurry. Any thickness difference in the thickness of the tiles shall be arranged out in cushioning mortar so that all tiles faces are in one vertical plane. The joints between the tiles shall not exceed 1.00 mm in width and they shall be uniform.
While fixing tiles in dado work, care shall be taken to break the joints vertically. The top of the dado shall be touched up neatly with the rest of the plaster above.

After fixing the dado / skirting etc. they shall be kept continuously wet for 7 days.

If doors, windows or other openings are located within the dado area, the corners, sills, jambs etc. shall be provided with true right angles without any specials. The contractor will not be entitled to any extra claims on this account for cutting of tiles if required.

**Cleaning: -**

After the tiles have been laid in a room or the day fixing work is completed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting over shall be washed thoroughly clean. In the case of flooring, once the floor has set, the floor shall be carefully washed clean and dried. When dry, the floor shall be covered with oil free dry sawdust. It shall be removed only after completion of the construction work and just before the floor is used.

**Pointing and Finishing: -**

The joints shall be cleaned off with wire brush to a depth of 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement and floor kept wet for 7 days and then cleaned. Finished floor shall not sound hollow when tapped with a wooden mallet.

**DOORS AND WINDOWS**

**Aluminum Doors & Windows**

**Aluminum Sections**

All the aluminum windows, doors and ventilators shall be fabricated as per specified section as directed by the Engineer-in-charge. The Aluminum sections for Side hung, Top hung, Center hung, sliding and fixed windows and ventilators shall have an adequate thickness so that
they can withstand flash-butt welding. In case of sliding windows, the bottom member of the frame shall have drainage provision.

Aluminum alloy used in the manufacture of extruded sections for the fabrication of doors, windows, and ventilators shall conform to designation 63400 of IS: 737. Transparent sheet glass shall conform to the requirements of IS: 2835. Wired and figured glass shall be as per IS: 5437.

**Corner Joints**

All aluminum window frames and shutters for Side-hung, Top hung and Fixed will be flush-butt welded to obtain uniformly strong joints which are necessary for proper functioning without sagging or warpage over the years.

Corners of sliding window shutters and frames swing doors and fixed side shutters will be mechanically joined with properly designed cleats and fixtures.

**Accessories**

**Side Hung Windows**

a. All side-hung windows shall be provided with heavy gauge aluminum anodized handles and aluminum peg-stay, which have been so, designed to give trouble-free performance over the years.

b. All side hung windows shall be provided with sturdy aluminum butt-hinges with special alloy pins, which would ensure smooth movement of the shutters in addition to preventing any sagging due to the weight of the glass or continuous usage.

**Top Hung Ventilators**

All top hung ventilators shall be provided with sturdy butt type aluminum hinges and are provided with heavy gauge 300 mm long aluminum peg stays.
Center Hung Ventilators

a. Specifically extruded neoprene lining

b. All windows shall be made weather-tight by means of special rayon weather lining fitted in the grooves around the periphery of the shutters.

c. Specially designed nylon rollers, with brass axles shall be provided (two numbers per shutter).

d. Locking arrangement.

e. Aesthetically appealing and sturdy handles, one per shutter.

Entrance Doors and Fixed Panels

a. Aluminum swing doors shall be provided with double action heavy duty. Everite floor springs with necessary locks and aluminum handles as per design.

b. Fixed sidelights shall be fabricated as per design with relevant hardware.

Finish

Anodized in light dull silver grey finish/or as specified. All the aluminum sections shall be mechanically polished and buffed for the removal of extrusion defects.

Thoroughly cleaned aluminum sections shall be anodized. The anodizing process results in aluminum oxide film of 15 microns shall be provided.

All the aluminum sections shall be coated with lanolin paper wrapping which will prevent the sections from getting damaged due to handling or due to vagaries of construction work at site. This coating will be removed after the completion of erection.
Erection

The erection of aluminum windows/doors in position would involve the following work: -

a. All the items shall be fixed in level, line and plumb.

b. The joints between aluminum and masonry shall be adequately caulked with approved sealant to prevent any seepage of water.

c. The frame shall be fixed to the masonry with the help of suitable screws / holdfasts.

d. In case of aluminum windows erected in rough ground, contractor shall ensure that the joint between the aluminum windows and the rough ground is made completely water-tight with approved sealant.

Rates

The quoted price is inclusive of all materials, labour, fabrication and carryout the construction as described above.

Shop Drawing

Before commencing the fabrication work at the factory contractor shall submit detailed shop drawing, which gives the exact details of the products, and get approved from the Engineer-in-charge.

Sample

The Contractor shall present one sample of any type of window for approval and comments by the Engineer-in-charge.
WATER PROOFING

General

Various methods of waterproofing are in practice. The recommended specifications are described hereinafter. The contractor shall satisfy himself about adequacy, effectiveness and effective service life of these methods. In most cases specialized agencies may have their own ‘proprietary’ methods and chemicals.

Brickbat Coba & Top stop Method Cement based Water-proofing for Terraces, chajjas, Canopies, Staircases, Gutters, etc.

This method is recommended for terraces and gutters. Water proofing treatment shall start directly over the RCC slab setting brickbats on a grout consisting of chemical and cement mortar to provide necessary gradient of 1 in 120 (1 inch in 10 feet) for the easy flow away of rainwater. The treatment shall consist of laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces, etc. consisting of following operations.

a) Applying and grouting a slurry coat of neat cement using 2.75 kg/sq.m of cement admixed with proprietary liquid water proofing compound conforming to IS 2645 over the RCC slab including cleaning the surface before treatment.

b) Laying cement concrete using broken bricks / brick bats 25 mm to 100 mm size with 50% of cement mortar 1:5 (1 cement: 5 coarse sand) admixed with proprietary liquid water proofing compound conforming to IS: 2645 over 20 mm thick layer of cement mortar of mix 1:5 (1 cement: 5 coarse sand) admixed with proprietary liquid water proofing compound conforming to IS: 2645 to required slope and treating similarly the adjoining walls with plaster up to 300 mm height including rounding of junctions of walls and slabs.

c) After two days of proper curing applying a second coat of cement slurry admixed with proprietary water proofing compound conforming to IS: 2645.

d) Finishing the surface with 20 mm thick joint less cement mortar of mix 1:4 (1 cement: 4 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 and finally finishing the surface with trowel with neat cement slurry and making of 300 x 300 mm square.
e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by the Engineer-in-charge.

The average thickness of the above treatment shall be 120 mm and minimum thickness at water outlet shall be 65 mm.

Notes:

1. If it is desired to cover the treatment with decorative tiles, marble, china mosaic, etc. the surface shall be finished rough to receive the same.
2. Due to the location of rainwater pipes being far apart and/or due to the span being wider than 6 meters & if the water is required to travel on one side only, then the thickness of the treatment shall increase proportionately to maintain the minimum gradient for the easy flow away of rainwater. The average thickness of coba shall be 150 mm.

Testing

The contractor shall test the work carried out for a period for minimum 72 hours and diligently rectify if leakages are detected: -

Terraces

Impound 10 – 15 cm of water for 72 hours and check underside.

Surface area of terrace, surface area of parapet for a height 300 mm measured from top of RCC roof slab.

Surface area of canopies and chajjas. Surface area of sidewalls abutting the chajja for a height of 300 mm measured from RCC top of chajja / canopy / gutter. Covings to be done at the junction of slabs and wall is deemed to be included in above and shall not be separately measured.

Rates

The rates shall be inclusive of work to be carried out as above and including all materials, labour, testing rectification, etc.
1) The supply, fabrication, erection and painting of structural steel works shall comply with the following specifications, standards and codes unless otherwise specified herein. All standards, specifications and codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions.

- **IS: 808** Dimensions for Hot Rolled Steel sections
- **IS: 814** Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon Manganese Steel
- **IS: 817** Code of practice for training and testing of metal arc welders
- **IS: 800** Code of Practice for General Construction in Steel
- **IS: 801** Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members in General Building Construction.
- **IS: 806** Code of Practice for Use of Steel Tubes in General Building Construction
- **IS: 7205** Safety Code for Erection of Structural Steel Work
- **IS: 7215** Tolerances for Fabrication of Steel Structures
- **IS: 4000** High Strength Bolts in Steel Structure – Code of Practice
- **AISC** Specifications for Design, Fabrication and Erection of Buildings
- **IS: 1161** Steel Tubes for structural purposes
- **IS: 102** Ready Mixed paint, Brushing, Red Lead, Non-setting, Priming.
- **IS: 110** Ready Mixed paint, brushing, grey filler for enamels for use over primers.

IS:158  Ready Mixed paint, Brushing, Bituminous, and Black; Lead free, Acid, Alkali and heat resisting.

IS:159  Ready Mixed paint, Brushing, Acid resisting for protection against acid fumes, colour as required.

IS:341  Black Japan, Types A, B and C

IS:2339  Aluminum paint for general purposes, in Dual container

IS:2932  Specification for enamel, synthetic, exterior, type 1,

(a) undercoating, (b) finishing

IS:2933  Specification for enamel, exterior, type 2,

(a) undercoating, (b) finishing

IS:3613  Acceptable tests for wire flux combination for submerged arc welding

IS:5905  Sprayed Aluminum and Zinc coatings on Iron and Steel.


IS:9862  Specification for ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water & chlorine resisting.

IS:13183  Aluminum paint, Heat resistant.

IS : 1239  Mild steel tubes, tubular and other Wrought steel fittings

Part 1 – Mild steel tubes

Part 2 – Mild steel tubular and other wrought steel pipe fittings

IS : 1363  Hexagon Head Bolts, Screws and Nuts of product Grade C

(Part 1to3)  (Size range M5 to M64)
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Steel Materials
Steel materials shall comply with the Codes and Standards referred to herein under.

All materials used shall be new, unused and free from defects.

Steel conforming to IS codes mentioned below shall be only be used for the following:

Fe310-0 (St 32-0) IS:1977 For general purposes such as door/window frames, window bars, grills, steel gates, handrails, fence posts, tee bars and other non-structural use.

Fe410 W A IS:2062 For all structural purposes in welded, bolted and nutted structures.

Fe410 W B IS:2062 For all structural purposes in welded, bolted and nutted structures subjected to severe fluctuation of stresses.

IS: 3502 For steel Chequered Plates.

Fabrication: -
Fabrication shall conform to IS: 800
All fabrication shall be done on a, well lit, laid up platform, big enough to accumulate men & material for the fabrication at the rate as specified by the work schedule. The Contractor shall ensure sufficient arrangement with back up arrangement for the continuous supply of welding power in order to adhere the work schedule.

All members shall be punch marked for identification before transportation from fabrication yard to erection yard.

General
All materials shall be straight and if necessary before being worked shall be straightened and or flattened by pressure, unless required being of curvilinear form and shall be free from twists. workmanship and finish shall be of the best quality and shall conform to the best approved method of fabrication. All materials shall be finished straight and shall be machined/ground smooth true and square where so specified. All holes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished. Unless otherwise approved by the Engineer-in-charge, reference may be made too relevant IS codes for providing standard fabrication tolerance. Material at the shops shall be kept clean and protected from weather.
The work shall be done as per approved fabrication drawings.

Connections
Shop/field connections shall be as per approved fabrication drawings.

Bolts and nuts shall be of grade ‘Black’ (B) conforming to the requirement given in the following IS specifications.

(a)IS: 1363 – Specification for Black Hexagonal bolts, nuts & locknuts (dia 6 to 39 mm) and Black Hexagonal screws (dia 6 to 24 mm).
(b)IS: 1367 – Technical Supply condition for threaded fasteners.
(c)IS: 6639 – Specifications for Hexagonal bolts for steel structures.
The electrode for manual metal arc welding shall conform to the requirement of IS: 814. The electrodes for Gas shielded welding procedure shall conform to IS: 6419 and the shielding gapes shall conform to as provided for in IS: 9595.

In case of bolted connections, taper washers or flat washers or spring washers shall be used with bolts as necessary. The length of the bolt
shall be such that at least one thread of the bolt projects beyond the nut.

In all cases where bearing is critical, the unthreaded portion of bolt shall bear on the members assembled. A washer of adequate thickness may be provided to exclude the threads from the bearing thickness, if a longer grip bolt has to be used for this purpose.

All connections and splices shall be designed for full strength of members or loads. Column splices shall be designed for the full tensile strength of the minimum cross section at the splice.

Splicing shall be avoided at critical locations and be done only after the approval of Engineer-in-charge as per the splice drawing submitted by Contractor and approved by Engineer-in-charge.

All members likely to collect rain water shall have drain holes provided.

**Straightening**
All materials shall be straight and, if necessary, before being worked shall be straightened and/or flattened by pressure and shall be free from twists. Heating or forging shall not be resorted to without the prior approval of the Engineer-in-charge in writing.

**Welding**
Only welding Generators and rectifiers shall be used for welding, transformers shall not be used for structural welding.

Welding procedure shall be submitted to the Engineer-in-charge for approval. Welding shall be entrusted to qualified and experienced welders who shall be tested periodically and graded Reference shall be made to IS 817, IS: 7310 (Part 1) and IS: 7318 (Part 1), as the case shall be.

Electrodes for use shall be approved by IIMB before use. The mechanical properties of the weld deposit shall be such as to satisfy all the requirements such as tensile strength, elongation strength & impact strength of parent metal.
Approval of the welding procedure by the Engineer-in-charge shall not relieve the Contractor of his responsibility for correct and sound welding without undue distortion in the finished structure.

No welding shall be done when the surface of the members is wet nor without adequate protection during periods of high wind.

Base metal shall be preheated to the temperature as per relevant IS codes.

Electrodes other than low-hydrogen electrodes shall not be permitted for thicknesses of 20 mm and above.

Deep penetration electrodes shall be used as specified.

All welds shall be inspected for flaws by any of the methods described under Sub-clause 6.5.3. The method adopted shall be agreed with the Engineer-in-charge.

The correction of defective welds shall be carried out without damaging the parent metal in a manner approved by the Engineer-in-charge. When a crack in the weld is removed, magnetic particle inspection or any other equally positive means approved by the Engineer-in-charge shall be used to ensure that the whole of the crack and material up to 25 mm beyond each end of the crack has been removed. The cost of all such tests and operations incidental to correction shall be borne by the Contractor.

**Tolerances**

The dimensional and weight tolerance for rolled shapes shall be in accordance with IS: 1852 for indigenous steel and equivalent applicable codes for imported steel. The tolerance for fabrication of structural steel shall be as per IS: 7215.

Cutting, punching, drilling, welding and fabrication tolerances shall be generally as per relevant IS codes.
End Milling
Where compression joints are specified to be designed for bearing, the bearing surfaces shall be milled true and square to ensure proper bearing and alignment.

Inspection
General
The Contractor shall give due notice to the Engineer-in-charge in advance of the works being made ready for inspection. All rejected material shall be promptly removed from the shop and replaced with new material for the Engineer-in-charge’s inspection. The fact that certain material has been accepted at the Contractor’s shop shall not invalidate final rejection at site by the Engineer-in-charge if it fails to conform to the requirements of these specifications, fails to be in proper condition or has fabrication inaccuracies which prevent proper assembly nor shall it invalidate any claim which the Employer may make because of defective or unsatisfactory materials and/or workmanship.

No materials shall be painted or dispatched to site without inspection and approval by the Engineer-in-charge unless such inspection is waived in writing by the Engineer-in-charge.

The Contractor shall provide all the testing and inspection services and facilities for shop work except where otherwise specified.

For fabrication work carried out in the field the same standard of supervision and quality control shall be maintained as in shop fabricated work. Inspection and testing shall be conducted in a manner satisfactory to the Engineer-in-charge.

Inspection and tests on structural steel members shall be as set forth below.

Material Testing
If mill test reports are not available for any steel materials the same shall be tested by the Contractor to the Engineer-in-charge satisfaction to demonstrate conformity with the relevant specification, before consumption in the work.
Tests on Welds

a) Liquid Penetrate Inspection
In the case of welds examined by Liquid Penetrate Inspection, such tests shall be carried out in accordance with relevant IS Code. All defects shown shall be repaired and rechecked.

b) Radiographic Inspection
Generally full Strength butt weld shall be tested with Ultrasound as per IS provision of IS. Raw material plates shall also be tested to check for laminar tearing, if any.

All full strength butt welds for important connection shall be radiographed as specified in accordance with the recommended practice for radiographic testing as per relevant IS code.

Dimensions, Workmanship & Cleanliness
Members shall be inspected at all stages of fabrication and assembly to verify that dimensions, tolerances, alignment, surface finish and painting are in accordance with the requirements shown in the Contractor’s approved fabrication drawings.

Test Failure: -
In the event of failure of any member to satisfy inspection or test requirement, the Contractor shall notify the Engineer-in-charge. The Contractor must obtain permission from the Engineer-in-charge before any repair is undertaken. The quality control procedures to be followed to ensure satisfactory repair shall be subject to approval by the Engineer-in-charge.

The Engineer-in-charge has the right to specify additional testing as he deems necessary, and the additional cost of such testing shall be borne by the Employer, only in case of successful testing.

The Contractor shall maintain records of all inspection, testing & retesting which shall be made available to the Engineer-in-charge.
Drilling Holes for other Works
As a part of this Contract, holes in members required for installing equipment or steel furnished by other manufacturers or the Contractor at no extra cost of the Employer shall drill other contractors. The information for such extra holes will be supplied by the Employer/Engineer-in-charge.

Marking of Members
After checking and inspection, all members shall be marked for identification during erection. This mark shall correspond to distinguishing marks on approved erection drawings and shall be legibly painted and stamped on it.

Errors
Any error in shop fabrication which prevents proper assembling and fitting up of parts in the field by moderate use of drift pins or moderate amount of reaming will be classified by the Engineer-in-charge as defective workmanship. Where the Engineer-in-charge rejects such material for defective workmanship, materials and workmanship conforming to these IIMB’s Requirements by the Contractor, at no cost to the IIMB, shall replace the same.

Site Operations
The Contractor shall complete all preliminary works at site well before the arrival of structural steel, such as establishment of a well equipped and adequately staffed site office, stores, unloading gantry, unloading and pre-assembly yard, labour quarters if any, electrical and water connections, electrical winches, derricks, cranes, compressors, all tools and tackles, rivet guns, welding sets, torque wrenches, spud wrenches, staging, etc., as well as experienced erection and supervisory personnel as part of this contract and any other work that may be necessary so as to start erection immediately after the arrival of the first batch of steel on site.

The Contractor shall furnish at his own expense, the necessary non-inflammable staging and hoisting materials or equipment required for the erection work and shall remove and take them away after completion of the job. The Contractor shall also provide necessary
passageways, fences, safety belts, helmets, lights and other fittings to the satisfaction of the Engineer-in-charge and to meet the rules of local authorities and for protection to his men and materials. A licensed electrician shall be kept on the job for the entire duration of the work to maintain the Contractor’s electrical equipment and connections.

The Contractor shall protect all existing plant, structures, piping, conduits, equipment and facilities against damage during erection. Any damage caused by Contractor shall be rectified entirely at his cost, to the satisfaction of the Engineer-in-charge. If work has to be carried out adjacent to existing switch yards or electrical installations which are live, the Contractor must ensure suitable safety precautions in consultation with Engineer-in-charge.

If a portion of the work of the project area cannot be made available to the Contractor for his activities due to operations being carried out by other agencies, he shall suitably modify his sequence of operations so as to continue work without interruption. The Contractor shall work in co-ordination with other agencies working on the project site and plan his work suitably so as not to hinder the progress of construction at site.

Acceptance of Steel, its Handling and Storage
The Contractor shall carefully check the steel to be erected at the time of acceptance. Any fabrication defects observed should be brought to the notice of the Engineer-in-charge.

No dragging of steel shall be permitted. All steel shall be stored 300mm above ground on suitable packing to avoid damage. It shall be stored in the order required for erection, with erection marks visible. All storage areas shall be prepared and maintained by the Contractor. Steel shall not be stored in the vicinity of areas where excavation or grading will be done and, if so stored temporarily, the Contractor well before such excavation shall remove this and/or grading commences to a safe distance to avoid burial under debris.

Scratched or abraded steel shall be given a coat of primer in accordance with these HAL’s Requirements for protection after unloading and handling prior to erection. All milled and machined
surfaces shall be properly protected from rust/corrosion by suitable coating and also from damage.

Proper record of movement of shop-tested steel from Fabrication yard to erection yard shall be maintained.

Anchor Bolts & Foundations
The Contractor shall carefully check the location and layout of anchor bolts embedded in foundations constructed, to ensure that the structures can be properly erected as shown on the drawings. Any discrepancy in the anchor bolts/foundation shall be reported to the Engineer-in-charge.

Leveling of column bases to the required elevation may be done either by providing shims or three nuts on the upper threaded portion of the anchor bolt. All shim stock required for keeping the specified thickness of grout and in connection with erection of structures on foundations, crane brackets or at any other locations shall be of good M.S. plates and shall be supplied by the Contractor at his cost.

A certain amount of cleaning of foundations and preparing the area is considered normal and shall be carried out by the Contractor at no extra cost.

Where beams bear in pockets or on walls, bearing plates shall be set and leveled as part of the work. The Contractor as specified by the Engineer-in-charge will carry out all grouting under column base plates or beam bearing plates.

Assembly & Connections
Field connections may be effected by riveting, bolting, welding or by use of high strength friction grip bolts as shown on the design and erection drawings.

The Contractor shall carry all field connection work as per the shop drawings prepared. All bolts, nuts, washers, rivets, electrodes required for the Contractor shall supply field connections.

All assembling shall be carried on a level platform.

Drifts shall be used only for drawing the work to proper position and must not be used to such an extent as to damage the holes. Size of
drifts larger than the normal diameter of hole shall not be used. Any damaged holes or burrs must be rectified to the satisfaction of the Engineer-in-charge.

Corrections of minor misfits and reasonable amount of reaming and cutting of excess stock from rivets shall be considered as a part of erection. Any error in the shop, which prevents proper fit on a moderate amount of reaming and slight chipping or cutting, shall be immediately reported to the Engineer-in-charge.

Erection
All structural steel shall be erected as shown on the drawings. Proper size steel cable slings, etc., shall be used for hoisting. Guys shall not be anchored to existing structures, foundations etc., unless so permitted by the Engineer-in-charge in writing. Care shall be taken to see that ropes in use are always in good condition.

Reference shall be made to IS: 7205 for safety precautions during the erection of steel.

Structural steel frames shall be erected plumb and true. Frames shall be lifted at points such that they are not liable to buckle and deform. Trusses shall be lifted only at node points. In the case of trusses, roof girders, all of the purlins and wind bracing shall be placed simultaneously and the columns shall be erected truly plumb on screed bars over the pedestals. All steel columns and beams shall be checked for plumb and level individually before and after connections are made. Temporary bracings shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including erection equipment and the operation thereof. Such bracings shall be left in place as long as may be required for safety and stability.

Chequered plates shall be fixed to supporting members by tack welding or by countersunk bolts as shown/specification in relevant drawings and/or as approved by the Engineer-in-charge. The edges shall be made smooth and no burrs or jagged ends shall be left. While splicing, care should be taken so that there is continuity in pattern between the two portions. Care should also be taken to avoid
distortion of the plate while welding. The erection of chequered plates shall include:

(a) Welding of stiffening angles/vertical stiffening ribs
(b) Cutting to size and making holes to required shape wherever necessary to allow service piping and/or cables to pass through
(c) Splicing as shown in relevant drawings
(d) Smoothening of edges
(e) Fixing of chequered plates by tack welding or by countersunk bolts
(f) Providing lifting hooks for ease of lifting.

As erection progresses, the work shall be securely bolted or tied to take care of all dead load, wind, seismic and erection stresses.

No riveting or welding or final bolting shall be done until the structure has been properly aligned and approved by the Engineer-in-charge. No cutting, heating or enlarging of the holes shall be carried out without the prior written approval of the Engineer-in-charge.

The erection scheme shall be got approved from Engineer-in-charge before start of erection work.

The Contractor shall furnish test certificates.

Inspection
The Engineer-in-charge shall have free access to all parts of the job during erection and all erection shall be subjected to his approval. In case of faulty erection, all dismantling and re-erection required will be at the Contractor’s cost. No paint shall be applied to rivet heads or field welds or bolts until these have been approved by the Engineer-in-charge.

Tolerances
Tolerances mentioned in the relevant IS codes of practice shall be achieved after the entire structure or part thereof is in line, level and plumb.

Painting
Surface Treatment
All the surfaces of steel work to be painted shall be thoroughly cleaned of all loose mill scale, rust, grease, dirt and other foreign matter. The
workmanship shall generally conform to the requirements of IS 1477-Part I.

Oil and grease removal shall be carried out either by solvent cleaning or by using alkali type degreasing agents. The procedure for cleaning shall be as per manufacturer’s instructions.

Loose mill scale, loose rust and loose paint shall be removed by wire brushing, scrapping, chipping, rubbing with abrasive paper or steel wool. This method shall not be employed when the surface has firmly adhering mill scale. After hand tool cleaning, the surface shall be rubbed with sand paper so as to ensure that no loose material exists and the surfaces shall be dusted off.

Materials:

a) Primer Coat
Anti-corrosive primers shall be either lead based or lead free types. Zinc chrome primer shall conform to IS 2074.

All the materials shall be of the best quality from an approved manufacturer. The Contractor shall obtain prior approval of the Engineer-in-charge for the brand of manufacture and the color/shade prior to procurement for usage in the works.

Primer and finish paints shall be compatible with each other to avoid cracking and wrinkling. And shall be from the same manufacturer for each painting system.

b) Workmanship
The type and the number of coats of the primer paint and finish paint shall be as specified.

Painting shall be carried out only on thoroughly dry surfaces.

No painting shall be done in frosty/foggy weather or when the humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is at 5deg.C or lower.

Primers shall adhere to the surface firmly and offer a key to the subsequent coats.

Workmanship shall generally conform to requirements specified in IS: 1477-Part II.
It is essential to ensure that immediately after preparation of the surfaces, the first coat of primer paint shall be applied by brushing and working it well to ensure a continuous film. After the first coat becomes hard dry a second coat of primer shall be applied by brushing.

The dry film thickness of each coat of primer shall be not less than 25 microns. This shall be checked with the help of electrometer before delivery of material from fabrication yard to erection yard.

Application of finishing paints shall be carried out within the shortest possible time interval after primer since the primer coats are too thin to give adequate corrosion protection of the steel surface over a long duration.

Painting shall be carried out either by brushing or by spraying. The Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer.

After the second coat of primer is hard dry, the entire surface shall be wet rubbed cutting down to a smooth uniform surface. When the surface becomes dry, the undercoat of paint of optimum thickness shall be applied by brushing/spraying with minimum of brush marks. The coat shall be allowed to hard dry. The undercoat shall then be wet rubbed cutting down to a smooth finish, taking adequate care to ensure that at no place the undercoat is completely removed. The surface shall then be allowed to dry.

The first finishing coat of paint shall be applied at the fabrication yard by brushing or by spraying and allowed to hard dry. The gloss from the entire surface shall then be gently removed and the surface dusted off. The second finishing coat shall then be applied by brushing or by spraying at work site after erection.

At least 24 hours shall elapse between the applications of successive coats. Each coat shall vary slightly in shade and shall be approved by the Engineer-in-charge, prior to applying the next coat.
Minimum dry film thickness of each coat of finish paint of synthetic enamel shall be 25 microns. Minimum dry film thickness of other finish paints shall be as specified in the respective item of work.

The final finished surface shall look smooth and even. The contractor shall ensure this by providing additional coat, if and when required. Nothing extra shall be paid for this.

Rate for steel: -
Rate is inclusive of all items indicated above including men, material and equipments. However Enamel painting shall be paid separately.

Measurement for steel: -
The structural steel shall be measured as built. No deduction for holes less than 0.02 sq.m shall be made. Steel as erected and specified shall be paid.

Rate for Painting: -
Rate for painting shall include all item indicated above inclusive of men, material and equipments.

Measurement for Painting: -
Measurement for painting shall be as of Metric tones of Structural steel erected and completed.

**ROOFING, WALL CLADDING SYSTEM USING PRE-COATED GI SHEETS OF TRAPEZOIDAL PROFILE**

**MATERIAL:** -
**APPLICATION:** ROOFING

**BASE METAL:** 0.50 mm Thick (BMT) 550 MPa – G550

**PROFILE:** Single Skin -TRAPEZOIDAL

**SUBSTRATE:** Zinc –Aluminum alloy Coating AZ150

**PAINT SYSTEM:** Super – Polyester XRW

**FASTENER:** Hex-head, Self-Drilling, Tapping Screw;

(Class 3 screws as per AS3566)
General: -
Supply, fabrication, errection and fixing of colour coated Single Skin Trapezoidal profiled sheeting 930 - 1020mm cover width 28-32 mm crests depth at 186-250 c/c (Above 195 mm c/c crest distance there will be minimum 2 ribs at the centre for stiffning). The feed material is manufactured out of 0.50 mm TCT (Total coated thickness) Hi-Tensile steel with min. 550Mpa yield strength coated with hot dip metallic zinc-aluminium alloy coating Zincalume AZ-150 or equivalent (as per AS1397) as 150 gms/sq.mt total on both sides of Zinc (43.5 %) & Aluminium (55%), with super polyester Colorbond XRW quality paint coat or equivalent as per AS/NZS-2728 (category 3) of approved color. The color shall have a total coating thickness of 35 microns of an super polyester XRW quality paint system or equivalent as per AS/NZS-2728 (category 3), comprising of 20 microns exterior coat on top surface and 5 micron reverse coat on back surface over 5 micron primer coat on both surfaces. The Steel manufacturers test certificate for the chemical and mechanical properties of steel must be submitted for approval by the concerned authority prior to installation. The sheet shall have brand marking of the manufacturer on the back of the sheet at every 1 mt c/c which should have the brand name, product specification and the coil number for confirming genuinity of the material. The profile and length of the sheet shall be commensurate with the site requirements and pre-coated with approved color. The contractor shall prepare the shop drawings based on the drawings supplied by the Engineer – in charge or the concern authority. These shall be submitted in five sets sufficiently in advance to the concern authority for approval.

Steel Sheet Material: -
The Steel base material of sheet shall have minimum 550 MPa Yield Strength made out of cold rolled steel and shall be coated with anti-corrosive layer of zinc-aluminum alloy coating as Zincalume AZ-150 coating or equivalent as per AS-1397 with min. 150 gms/sq.mt zinc-alluminium alloy coating mass (total on both side).
Profile:-
Single skin Trapezoidal profiled sheeting 930 -1020mm cover width 28-32 mm crests depth at 186-250 c/c (Above 195 mm c/c crest distance there will be minimum 2 ribs at the centre for stiffening).

Coating:-
The sheet shall is prepainted with super-polyester Colorbond XRW coat or equivalent as per AS/NZS-2728: 1997 (Category 3) of approved color on Zincalume zinc-alluminium alloy substrate or equivalent (as per AS 1397: 1993). The color shall have a total coating thickness of 35 microns of super polyester Color bond XRW quality paint system or equivalent as per AS/NZS-2728: 1997 (category 3), comprising of 20 microns exterior coat on top surface and 5 micron reverse coat on back surface over 5 micron primer coat on both surfaces.

All specials and accessories should also be factory fabricated. All the flashing and ridge cap or any other covering should be made out of the same material as that of roofing.

Erection and Fixing:-
- The product will be fastened using Class 3 screws as per AS3566 (as per design) galvanized hex headed, self drilling fasteners of approved make (Buildex or equivalent) and quality including EPDM / Neoprene washer on each crest (or as per design) of the sheet connecting with purlin.
- The standard practice as specified by the manufacturer and as approved by the concern authority. All sheets and accessories must be stored and finally erected without any damage, dent, scratches, etc.
- The contractor will be required to submit design calculation in support of the proposed profile of the sheet and over all the fixing system for the structural properties, standard loading etc. to the satisfaction of the design consultant and the client. The contractor shall also submit methodology for fixing and also a maintenance manual for routine maintenance.
- Flashing, capping and trims shall be formed out of same color coated substrate and thickness as that of the roofing sheet and shall be supplied in a minimum length of 2.5 mt. in the required shape and girths and fixed with fixtures compatible with the system. Silicon
sealant non-hardening, neutral cure type of approved make and grade shall be applied at all end laps.

- The contractor shall ensure that panel erector is familiarized with the erection procedure and all the supporting members are straight, level, plump and true (according to AISC) before starting panel erection. Panels shall be erected according to approved shop drawings.

**Measurement:**
The payment will be done on the actual finish / covered surface area of the sheet.

No separate payment will be made for the lap of sheet and accessories, bolts, nuts, washers, adjustable bolts and supports for gutters and other fixtures. These are assumed to be included in the quoted rates.

1. **PIPING MATERIALS**

- **Salt Glazed stoneware pipes:** Stoneware pipes shall be perfectly salt glazed, sound, free from cracks and imperfections in glazing. They shall be cylindrical, straight and of standard nominal diameter, length and depth of socket. They shall be made of hard burnt stoneware of dark grey colour, and thoroughly glazed and shall give a sharp note when struck with a light hammer.

  The pipes shall be conform to the requirement of IS No IS : 651 1980 salt glazed stoneware pipes and fittings and shall be manufactured by “DALMIA” or approved equivalent.

- **Cement concrete pipes:** Cement concrete pipes where called for on the drawing shall be centrifugally spun reinforced cement concrete pipes.

  Pipes shall be true, perfectly sound, free from cracks, cylindrical, straight with a uniform bore throughout.

  Cracked or wrapped pipes with uneven texture shall not be used. Pipes shall be reinforced cement concrete pipes of NP2 class manufactured by IS:458-1971- Concrete pipes (With and without reinforcement) – Second revision. Adequate number of suitable collars as required shall also be supplied along with the pipes.

- **Cast Iron Pipes:** Cast iron pipes shall be good tough quality, dark grey on fracture and capable of being worked with a drill or file. Cast iron pipes and fittings, shall be sound, with smooth inner and outer surfaces, free from laps, pinholes and other imperfections
and shall ring clearly when struck all over with alight hand hammer.

Cast iron pipes and fittings shall be coated with an approved anti corrosive treatment or by heating and dipping in Dr. Angus Smith’s solutions. Centrifugally cast iron pipes and fittings for drainage (Soil, waste and vent) shall conform to IS:3989-1970 and sand cast iron pipes and fittings shall conform to IS:1729-1964. All cast iron water main pipes and fittings shall be manufactures by Indian Iron and steel company or other approved equivalent. All cast iron pipes and fittings for drainage shall be manufactured by “Shree Iron Foundry” calcutta (TDS-Pipes) or other approved equivalent.

- **Galvanized Iron Pipes:** Galvanized Iron pipes and fittings where called for on the drawings shall be of galvanized mild steel. The pipes shall be ‘medium’ or ‘heavy’ class manufactured by Indian Tube Company or approved equivalent as called for. The fittings shall be ‘R’ brand fittings of Mehta corporation(Ahmedabad) of ‘medium’ class or approved equivalent as called for. All pipes and fittings shall conform to Indian Standard IS : 1239-1979 Mild steel tubes, tubular and wrought steel pipe fittings (Second revision) and the galvanizing shall conform to Indian standard IS:2629-hot dip galvanizing of iron and steel. On delivery to site, the pipes and fittings shall be inspected for the galvanized coating. Pipes with damaged coating shall be immediately segregated and removed from the site and not used in the installation.

- **Water fittings**

  - **Supply Fittings:** All supply fittings (including mixing fittings and accessories) shall be of brass/copper heavy chromium plated of the make and design specified. The fittings shall be cast fittings of screw type, machined and threaded properly for fixing to the supply pipes.

    The plating shall conform to Indian standard IS:4827-Electro plated coating of nickle and chromium on copper and copper alloys. The fittings shall be supplied complete with chromium plated matching flanges, nuts and extension pieces of required lengths. Metallic washers where required shall also be of chromium plated brass. All bid cocks and stop cocks shall conform to Indian standards IS:781-
1967-Bid taps for water services, sandcast brass screw-down (revised); pillar cocks to IS:1701-1969-mixing valves for ablutionary and domestic purposes. Bath filler, shower arm, rose, spouts and other fittings shall match the supply fittings and other in construction, performance and appearance. All fixing accessories and screws shall be similar to fittings with all exposed parts chromium plated. All washers shall conform to Indian standard IS:4326-1967-washers for water taps for waster services.

- **Waste water fittings:** All waste fittings (waste, chain pop-up, overflow) shall be of brass/copper, heavy chromium plated of the make and design specified and match the supply fittings. They shall conform to Indian standard IS:2963-1964-Waste fittings for wash basins and sinks non-ferrous.

- **Bottle traps:** Bottle Traps (for wash basins, sinks, baths etc) shall be deep seal cast brass bottle traps, heavy chromium plated. All bottle traps shall be provided with suitable cleaning eye, extension piece, flare nuts-all chromium plated. Bottele traps shall be of approved make and design. Traps for wash basins shall be 32mm (1-1/2 inch) for sinks 40mm(1-1/2 inch).

- **Wall flange:** Wall flange shall be provided on all walls, floors, columns etc. wherever supply and disposal pipes pierce through them. These wall caps shall be of chromium plated brass snugly fitting the receiving pipes and shall be large enough to cover the punctures properly.

- **Valves:** All valves (gate, globe, check, safety) shall be either all brass or gun metal valves suitable for the particular service. All vales shall be of the particular duty and design called for similar to 'Leader' make or approved equivalent. Valves shall either be of the screw type or flange type, with suitable flanges and non-corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valves. Gate, globe and check valves shall conform to Indian Standard IS:778-1971-gunmetal gate valves to swing check valves for general purposes; non-return valves to swing check tyoe reflux (non-return) valves IS:5312(Part-I)-1969.

- **Sluice valves:** Sluice valves, where called for shall be flanged sluice vlaves of cast iron body. The spindle, wall seat and wedge nuts shall be gunmetal. They shall generally have non-rising spindle and shall be of the particular duty and design called for. The valves shall be supplied with suitable flanges, non-corrosive
bolts and rubber/nylon gaskets. The valves shall be of ‘Kirloskar’ make or other approved equivalent sluice valves shall confirm to Indian standard IS:780-1969 and IS:2906-1969 sluice valves for water works purposes.

- **Ball valves with floats:** Ball valves with floats to be fixed in storage tanks, shall consist of cast brass lever arms having copper balls (26swg) screwed to the arm integrally. The copper ball shall have bronze welded seams. The closing/opening chanism incorporating the piston and cylinder shall be of a non-corrosive metal and include washers. The size and construction of ball valve and float shall be suitable for desired working pressure. Operating the supply systems. Ball valves shall be supplied with brass hexagonal backnuts to secure them to the tanks and a socket to connect to supply pipe. All ball valves with floats shall conform Indian standards IS:1703-1969-Ball valves (horizontal plunger type) including floats for water supply purposes.

- **Floor traps:** Floor traps shall be of cast iron of the size required of approved design incorporating a deep seal and venting device unless otherwise indicated. The traps shall be supplied with a cast iron cap with collar capable of receiving a screwed gratting.

- **Pipe Hangers Brackets etc.** Sturdy hangers, brackets and saddles of approved design shall be installed to support all pipe lengths which are not embedded over their entire run. The hangers and brackets shall be fabricated from suitable MS rolled sections. The hangers and brackets shall be adjustable heights and prime coated with red oxide primer. Clamps, collars and saddles to hold pipes shall be provided with suitable gaskets. The brackets and hangers shall be designed to carry the weight of pipes safely. All pipes and fittings shall be secured near every joint and half-way through every pipe length, unless otherwise specified. Pipe hangers shall also be supplied with proper sound and vibration dampering devices to minimize noise and vibration transmission.

- **Sockets and pipe inserts:** Adequate number of sockets, sleeves and pipe inserts of cast iron or mild steel shall be provided where pipes cross through concrete masonry and similar work. The sockets and pipe inserts shall be of a size larger than the pipe to be housed. The sockets and inserts shall have a flange welded in the centre around its circumference, in order to provide secure fixing into the structure. The unused sockets and inserts shall be provided with removable timber plugs to keep foreign matter cut.
- **Cowls:** Cowls of cast iron of proper size shall be supplied to cover all open terminals of soil waste, vent and rain water pipes. The cowls shall be of the indicated design, vent away type, bituminous coated and provided with a tail piece to fit snugly in the receiving pipe.

- **Gratings for floor traps and floor drains:** Gratings made of 3mm thick brass-heavily chromium plated shall be installed to cover all floor traps and floor drains. The gratings shall be of size required and be square or circular in shape as called for. The gratings shall be supplied complete with matching chromium plated brass screws to fasten the gratings to the caps provided in traps.

- **Insulation material:** The material for insulation shall be vermin proof fibre glass wool. The material shall have a thermal conductivity value of $K=0.4$ at $200^\circ F$ and a density not exceeding 200kg per cum. Samples of insulating material shall be submitted for approval.

- **Lead for caulking:** Lead for caulking of cast iron pipes shall conform to IS:782-1978(Caulking lead) and shall be free from impurities.

2. **LAYING AND JOINTING OF PIPES:**

- **ALIGNMENT AND Grade:** All pipes shall be laid true to alignment and gradients as per Engineers recommendation. No deviations from the lines, depths of cuttings or gradients called for shall be permitted without the written approval of the Engineer-In-charge.

- **Setting out Trenches:** The constructor shall set out all trenches, manholes and such other works to true grades and alignment as called for. He shall provide the necessary instruments for setting out and verification of the same.

All trenches shall be laid to true grade and in straight lines. The trenches shall be laid to proper levels by the assistance of boning rods and sight rails. All boning rods and straight rails shall have centre line accurately marked theron and shall be painted black and white as directed.

- **Excavating trenches for pipes:** The trenches for pipes shall be excavated with bottoms formed to levels and gradients as directed by the Engineer-in-charge. In soft and filled in ground the engineer-in-charge may require the trenched to be excavated to a greater depth and to fill up such additional excavation with
concrete (1:5:10) consolidated to bring the excavation to the required levels. All excavations shall be properly protected where necessary by suitable timbering, piling and sheeting as approved. All timbering and sheeting when withdrawn shall be done gradually to avoid falls. All cavities shall be adequately filled and consolidated.

Excavations below water table shall be done after dewatering of the trenches. No blasting shall be allowed without prior approval in writing from Engineer-in-charge. It shall be carried out under through and competent supervision, with the written permission of the appropriate authorities, taking full precautions connected with blasting operations.

All excavated earth shall be kept clear of the trenches to a distance equal to 750mm.

- Laying of pipes: The pipes shall generally be laid with the sockets leading uphill and shall rest on solid and even foundations for the full length of the barrel. To accommodate sockets, depressions shall be formed in the foundation sufficiently deep to allow sample space for the pipe jointer to work right round the pipes. Each separate pipe shall be individually set for line and level as described under “Alignment and Grade” and “Setting out”.

Inside buildings pipes shall not be installed in walls or floors or other inaccessible positions, except where absolutely necessary.

- Protection to pipes, etc.: All pipes, water mains, cables etc. met in the course of excavations shall be carefully protected and supported, care shall be taken not to disturb the cables, the removal of which shall arranged by the owners.

- Back Filling: Back filling of the trench shall not be commenced until the length of the pipes therein has been tested and approved. All timbering which may be withdrawn safely shall be removed as filling proceeds.

Where the pipes are unprotected by concrete hunching, selected fine materials shall be carefully hand-packed around the lower half of the pipes so as to buttress them to the sides of the trench.
The refilling shall then be continued to 150mm, over the top of the pipe using selected fine handpacked material, watered and rammed on both sides of the pipes with a wooden hammer. The process of filling and tamping shall proceed evenly in layers not exceeding 150mm in thickness, each layers being watered and consolidated so as to maintain an equal pressure on both sides of the pipeline.

In gardens and fields the top soil and turf, if any, shall be carefully replaced.

- **Drilling and cutting:** Drilling and cutting of installed pipe work and masonry shall be restricted to absolute minimum. Where such cutting and drilling is unavoidable it shall be executed only with prior permission of the Engineer-in-charge.

  All cutting and drilling shall be predetermined and suitable sockets and specials shall be employed to effect necessary connections. All cutting and drilling shall be executed by skilled workmen with proper tools. The disturbed surfaces shall be restored to the satisfaction of the Engineer-in-charge.

- **Marker Plates:** Markers indicating the particular service installed in a trench shall be provided along the routes of pipe trenchers. Markers shall be Mild steel with the type of service and the direction of flow painted on it. The markers shall be set firmly in a concrete base and installed at all corners and turning points. Over straight runs, markers shall be spaced t 100meters centuries generally.

- **Laying and Jointing:**

  - **Salt glazed stoneware pipes:** The laying and jointing of stoneware pipes shall be executed in accordance with code of practice for laying of glazed stoneware pipes IS:4127. Salt glazed stoneware pipes shall be jointed as follows: 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 the correct position and the gaskin caulked tightly depth of the socket. The remainder of the socket shall be filled with a stiff mixture of cement mortar (1:1) on part of cement to one part of washed sand. When the socket is filled fillet shall be formed round the joint with a trawl making an angle of 45°with the barrel of the pipe,. After the joint is made, any extraneous material shall be removed from the inside of the joint with a suitable scraper.
The newly made joint shall be protected until set from sun, drying winds, rain or dust. The joint shall be cured by keeping it continuously damp for four days. The inside of the pipes shall be left absolutely clear in bore and free from cement mortar or any other obstruction. The joint shall be tested to a head of 150 cms.

- **Cement Concrete pipes:** Concrete pipes shall be laid and jointed as described in IS:783-code of practice for laying of cement concrete pipes.

After setting out the pipes, the collar shall be centered over the joint and filled in with tarred gaskin, till sufficient space is left on either side of the collar to receive the mortar. This space shall be filled with cement mortar 1:2 (1 cement:2 washed coarse sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 degree to the longitudinal axis of the pipe on both sides of the collar. The joints shall be cured for at least four days.

- **Cast iron pipes:** Cast iron pipes shall be laid and jointed in conformity with the code of practice for laying of cast iron pipes IS:3114.

Cast iron pipes shall be jointed by best quality caulking lead free from impurities. In wet trenches joints shall be made with lead wool. The spigot shall be centred in the adjoining socket by tightly caulking in sufficient thurns of tarred gaskin to leave unfilled the required depth of socket for lead. Where the gaskin has been caulked tightly home, a jointing ring shall be placed round the barrel and against the faces of the socket. Molten lead shall than be poured into fill the remainder of the socket in one operation.

The lead shall then be solidly caulked with suitable tools by hammering right round the joint, to make up for the shrinkage of the molten metal on cooling and shall preferable finish 3mm behind the socket face. Lead for caulking shall conform to IS:782. The quantity of lead to be filled per joint in various sizes of cast iron pipes shall be as follows:

<table>
<thead>
<tr>
<th>Drainage pipes:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50mm (2”) pipe</td>
<td>1.1 kg/joint</td>
</tr>
<tr>
<td>80mm (3”) pipe</td>
<td>1.5 kg/joint</td>
</tr>
</tbody>
</table>
100mm (4”) pipe | 2.0 kg/joint  
150mm (6”) pipe | 3.0 kg/joint  

b) **Water Main pipes:**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Weight/joint</th>
</tr>
</thead>
</table>
| 80mm (3”) | 2.0 kg/joint  
| 100mm (4”) | 2.4 kg/joint  
| 150mm (6”) | 3.5 kg/joint |

The joints and pipes laid for water supply system shall be tested to a pressure of 5kg per sqm. The drainage pipe lines and joints shall be tested to a head of 150cms.

- **Galvanized Steel pipes:** Galvanized steel pipes shall be jointed with screwed and socket joints, using screwed fittings. Care shall be taken to remove any burr from the ends of the pipes after screwing. White lead or an equivalent joining compound of proprietary make shall be used according to the manufacturer’s instructions, with a grummet of a few strands of fine yarn while tightening. Compounds containing red lead shall not be used because of the danger of contamination of water. Any threads exposed after joining shall be painted with bituminous paint to prevent corrosion.

Pipes and joints laid for water supply system shall be tested to a pressure of 5kg per sqm.

- **Pipe Insulation:** All insulation shall be applied strictly as described below:

Before applying insulation, all pipe work and fittings shall be brushed and cleaned, all dust, dirt, mortar and oil removed. The pipes shall then be cleaned, with a chemical solution suitable for the material of the pipe where insulation is to be applied over pipes, fibre glass wool of suitable thickness shall be applied over the entire run of piping. The pipes shall first be given a coat of Zino chromate primer followed by two coats of approved synthetic enamel paint. Insulation consisting of fibre glass wool of suitable thickness shall then be applied over the piping system. Polythene sheets shall then be wrapped round the above and held in
position by galvanized chicken mesh. Cement plaster 1:3 (1cement:3 coarse washed sand) shall be applied over chicken mesh in two coats to a minimum thickness of 20mm. The contractor shall provide insulation for hot water piping system only. The thickness of insulation to be applied shall be as follows:

<table>
<thead>
<tr>
<th>Pipes, pipe fittings and valves</th>
<th>Thickness of fiber glass wool to be applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td></td>
</tr>
<tr>
<td>15mm, 20mm</td>
<td>20mm</td>
</tr>
<tr>
<td>25mm, 32mm, 40mm</td>
<td>25mm</td>
</tr>
</tbody>
</table>

The insulation shall be continuous over the entire run of piping, fitting and valves. The insulation shall be applied only after the piping systems are satisfactorily tested for the desired I working pressure. The completed insulation shall restrict the heat loss or heat gain in the piping system to the absolute minimum. The total heat gain or heat loss in the insulated piping system shall not exceed thirty percent of the heat gain or heat loss in a similar uninsulated piping system. Insulation work shall be carried out by skilled workmen specially trained in this kind of work.

- **Valves**: Valves shall be provided in accessible location on every branch from main line as shown in the drawings. In case of valves with screwed female inlet each valve shall be provided with nipple and union on either side and installed in piping system. On external lines, valves shall be installed in brick masonry chambers with a frame and cover as shown in drawings.
- **Protection of pipes**: All drainage pipes with their crown level at or above 750mm below the ground, shall be covered with 100mm thick cement concrete 1:3:P6 above the crown of the
pipe and stopped off to give a minimum thickness of 100mm all-round the pipe.
The pipes which are to be laid below 750mm depth, shall be provide with 100mm thick cement concrete 1:3:6 below the base and in haunches up to the crown of the pipe.

3. PIPING SYSTEMS-INSTALLATION, INSPECTION AND TESTING.

- Soil, waste, vent and antisiphon pipes
  Soils pipes shall be centrifugally cast iron or sand cast iron pipes, manufactured by “shree iron foundry”-Calcutta (TDS-pipes) or other approve equivalent.

  The soil pipes shall be circular with minimum diameter of 100mm. pipes shall be coated with Dr.Anghs Smith’s solution. Pipes shall be fixed by means of stout cast iron holder bats in two sections, bolted together, build into the wall wedged and neatly pointed as directed by the architect.

  All bends, branches, swan necks and other parts shall conform to the requirements and standards as described for the pipes.

  Where indicated, the soil pipe shall continued upwards without any diminution in its diameter, without any bend or angle to the height shown on the drawings.

  Joints throughout shall be made with molten lead as described under jointing of cast iron pipes. Soil pipes shall be painted as provide under painting. All vertical soil pipes shall be firmly fixed to the wall with properly fixed holder bats.

  Waste pipes and fittings shall be of cast iron, or galvanized mild steel pipes. Pipes shall be fixed, jointed and painted as described under soil pipes. every waste pipe shall discharge above grating of a properly trapped gully. The vertical waste pipe shall be continued upwards without any diminution in its diameter unless indicated or shown otherwise on drawings, without any bend or angle to such a height and position as
shown on the drawings as to afford a safe outlet for foul air. The top open end shall be covered as described under soil pipe.

The vertical waste pipe shall be firmly fixed to the wall with properly fixed holder bats.
Ventilating pipes shall be of cast iron or galvanized mild steel pipes, confirming to the requirements laid down earlier.

Anti-syphon pipes relief vents where called for on the drawings shall be of cast iron or galvanized mild steel pipes as specified earlier. The pipes shall be of the diameter as shown on the drawings. All traps on branch soil and waste pipes shall be ventilated at a point not less than 75mm, or more than 300 mm from their highest part on the side nearest to the soil pipe or waste pipe.

All connections, in between soil pipes and in between waste pipes shall be made by using pipe fittings with inspection doors for cleaning. The doors shall be provided with 3mm thick rubber insertion packing and when closed shall be air and water tight. Where soil, waste and ventilating pipes are accommodated in shafts / ducts adequate access to cleaning eyes shall be provided. Any waste pipe connection to the manhole shall be trough a gully trap with sealed cover to guard against ingress of sewer gas vermin or back flow.

- **Filtered water supply**: A filtered water supply piping system to cater for all domestic requirements shall be installed as called for on the drawings. The piping system shall consist of galvanized steel pipes and fittings of medium class. All piping inside the building shall run either concealed or embedded as shown in the drawings. No unsightly exposed run will be permitted. Outside the buildings, the piping shall be installed in trenches at least 60cm below grade. All galvanized steel piping embedded either in trenches or in concrete and masonry work shall be tightly wrapped with 1mm thick fiber glass tissue sheathing laid in bitumen. Gate valve (build into chambers where required) shall be provide das indicated on the drawings.
to regulate the flow of water. The completed water system shall
be tested to test pressures mentioned under laying of pipes for
at least two hours without any measurable loss of pressure.
The piping system shall be painted as mentioned under painting
and color coding. All CI pipes buried or embedded shall be given
two coats of bitumastic paint.

- **Hot water supply**: A hot water supply system consisting of
galvanized steel pipe and fittings of heavy class shall be
installed by the contractor. The pipes and fittings shall be
installed strictly as per manufactures instructions. Adequate
number of expansion fittings shall be provide to take care of
expansion and contraction. Air lock releasing devices and
dewatering / below off devices at suitable points shall also be
provided in the piping system. The hot water piping system
shall be satisfactorily insulated to reduce the heat loss in the
piping system to the minimum. The completed hot water piping
system shall be tested to the test pressure mentioned under
laying of pipes for 2 hours without any measurable loss of
pressure. The piping system shall be painted as described in
painting and colour coding.

- **Sewerage**: The contractor shall install sewerage system to
effectively collect, drain and dispose all soil and waste water
from various buildings and appurtenances. Inside the buildings,
the system shall consist of cast iron pipes and fittings, galvanized pipes and fittings all as indicated on drawings. External sewerage shall consist of salt glazed stoneware pipes, reinforced cement concrete, pipes and cast iron pipes as indicated on drawings. Gully traps, grease traps, manholes, intercepting chambers, etc. shall be constructed at locations shown on the drawings. The system shall be vented suitably. The work shall be executed in strict accordance with Indian standard IS: 1742-1972 “code of practice for building drainage”. The sewerage piping shall be subjected to smoke test, straightness test and leak proof test for its soundness as directed by the architect.
• **Rain water pipes**: Rain water pipes down takes shall be galvanized mild steel pipes and CI pipes as called for in the drawings. The fittings and special for the pipes shall be of the same materials as the pipe. The installation of rain water pipes shall be carried out as described in relevant clauses under “laying and jointing of pipes”

• **Identification colour code**: All piping system shall be suitably painted or otherwise colour identification according to appendix-E identification of pipes of IS: 2065-1972 (code of practice for water supply in buildings). The identification colors and letter symbols for various services shall be as follows:

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Service</th>
<th>Identification colour</th>
<th>Letter symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil, waste and vent piping and all drains</td>
<td>Black</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Water supply for drinking</td>
<td>Sea green</td>
<td>CW</td>
</tr>
<tr>
<td>3</td>
<td>Hot water</td>
<td>Orange</td>
<td>HW</td>
</tr>
<tr>
<td>4</td>
<td>All other supply lines</td>
<td>Dark blue</td>
<td>-</td>
</tr>
</tbody>
</table>

The letter symbol shall be legibly painted or affixed in an appropriate manner to be read conveniently. At locations where painting cannot be done the piping system shall be identified by fastening self-adhesive PVC tapes of appropriate color in an approved manner. The tapes varying in 50mm to 150mm wide stripe – depending on the size of pipes on which the tapes are fastened – shall be applied at regular intervals on continuous runs and at all bends, junctions and tees.
• **Painting**: The contractor shall supply all materials, labor, tools and other equipment necessary for carrying out painting work. Painting as described herein shall be applied to all surfaces requiring painting. Paint materials used in the work shall be of approved make of ready mixed variety supplied to site in manufacturers’ original containers. Thinning where necessary shall only be done as per manufacturer’s instructions. All surface to be painted shall be cleaned free of all dirt and dust before painting is started. Painting shall only be started after the receiving surfaces are in a condition fit for painting as certified by the architect. Properly qualified foreman and skilled experienced painter shall be employed to do painting work.

• **Preparation of surfaces**: All steel and iron surfaces to be painted shall be washed with mineral spirits to remove all dirt and grease. Where rust of scale is present, the surfaces shall be wire brushed to remove such rust. The cleaned surfaces shall be given one coat of approved phosphate before priming coat is applied. All galvanized metal to be painted shall be thoroughly cleaned with naphtha and treated with a solution of acetic acid, vitriol and powdered alum dissolved water.

• **Painting finishes**: The painting finishes shall consist of the operations briefly mentioned below:

  All cast iron soil, waste vent pipes, manhole covers, gratings and frames shall be painted with three coats of bitumastic paint.

  All cast iron water mains pipes shall be painted with one coat of red oxide primer followed by three coats of synthetic enamel paint.

  All non-galvanized steel surfaces shall be painted with one coat of red oxide primer followed by three coats of synthetic enamel paint.

  All galvanized surfaces shall primer coated with galvanized metal primer after washing with metal cleaner. The surfaces shall then be painted with three coats of synthetic enamel paint.
All painted finished surfaces shall be smooth throughout and retain a consistent uniform shade all through. Where in the opinion of the architect, the painting not consistent in application or appearance, the painting is shall be redone to his satisfaction by the contractor at his own cost.

- **Disinfection of piping system and storage tanks**: Before commissioning the filtered water supply system the contractor shall arrange to disinfect the entire system as described below. The filtered water storage tanks and pipes shall first be filled with water and thoroughly flushed out. The storage tanks shall then be filled with water again and disinfecting chemical consisting of chlorine added gradually while tanks are being filled to ensure through mixing. Sufficient chemical shall be used to give the water a dose of 50 parts of chlorine to one million parts of water. If ordinary bleaching powder is used, the proportions will be 150 gms of powder to 1000 litre of water. The powder shall be mixed with water to a creamy consistency before being added to the water in the storage tanks. If a proprietary brand of chemical is used, the preparations shall be as specified by the makers.

When the storage tanks are full the supply shall be stopped and all the taps on the distributing pipes opened successively working progressively away from storage tanks. Each tap shall be closed when the water discharge begins to smell of chlorine. The storage tanks shall then be filled up with water from supply pipe and added with more disinfecting chemical in the recommended proportions. The storage tank and pipe shall the remain charged at least for three hours. finally the tank and pipes shall be thoroughly flushed out before any water is used for domestic purposes.

4. **ANCILLARY STRUCTURES**
- **Manhole**: Excavation, filling back and ramming, disposal of surplus earth, preparation of bottoms and sides, etc…. Shall be carried out as described earlier under trenches for pipes.
Manholes shall be of sizes and depths as called for in the drawings.

The manholes shall be built on a base concrete 1:2:4(1 cement: 2 coarse sand: 4 aggregate) of 150mm thickness for manholes from 1500mm depth to 2500mm depth and 3000mm thickness for manholes of depth greater than 2500mm. The walls shall be of first class brick work, 240mm thick upto 1500mm depth and 360mm thick for depths greater than 1500mm built in cement mortar 1:5. The joints of brick work shall be raked and plastered internally and externally with cement plaster 1:3(1 cement: 3 coarse sand) to a thickness of 25mm. The walls of the manholes shall be conbelled inward on three sides at the top to reduce its size to that of the cover and frame to be fitted.

Provide in the bottom of the manholes, semicircular channels of the same diameter as the pipes. Above the horizontal diameter the sides of channels shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel an appropriate fall suitably rounded off in the direction of flow in the main channel shall be given. Rungs of cast iron of suitable dimensions shall be provide in all manholes over 800mm depth. These rungs shall be set at 300mm intervals in two vertical runs at 380mm apart horizontally. The top rung shall be 450mm below the manhole cover.

Unless otherwise mentioned, manholes shall be constructed to requirements of Indian standard IS:4111(part I)-1967 “code of practice for ancillary structures in sewerage system (manholes)”. All manholes shall be constructed so as to be water tight under test. All angles shall be rounded to a 75mm radius with cement plaster 25mm thick. The benching at the sides shall be carried up in such a manner as to provide no lodgement for any splashings.
in case of accidental flooding. Manhole covers and frames shall conform to the requirement of Indian standard IS:1726-1960. Manhole covers shall be of cast iron of approved make. The covers shall generally be double seal of 600x450mm or 500mm dia 56kg or 116kgs in weight. Where manholes are located in drive ways, psth and such other areas, the covers shall be 500mm dia of 255 kgs or as called for.

- **Gully traps:** Gully traps where called for at the feet of all waste pipes shall be salt glazed gully traps with 100mm outlet, complete with 300mmx300mm heavy cast iron sealed cover set into brick masonry chamber and connected to drain.

- **Grease traps:** Grease traps shall be provided on kitchen waster lines before its confluence with the main sewer lines. Grease traps shall be built in brick masonry and shall generally have the same specification of materials. The sizes and locations shall be as directed. Grease trap shall be provided with drop inlet and outlet, galvanized wrought iron sediment pan, and baffle wall. Grease trap shall be provided with 2nos. double seal manhole covers and frame of size 60cmx45cm.

- **Cath basins** shall be of size and depths as called and shall be provided in the locations as directed. Catch basins shall be provided with cast iron gratings with frame, for effective collecton and disposal of storm water.

### 5. INSTALLATION OF SANITARY FIXTURES AND FITTINGS

- **Sanitary Fixtures:** All vitreous china sanitarware shall be of best Indian make of approved manufacture confirming to IS:2556. These shall be of non porpous and fully vitreous with all the usable portions perfectly glazed and should be absolutely free from hair line crckes, pinholes and local dipressions. These shall have perfectly symmetrical, uniform and smooth curves.

- **Installation of Fixtures:** All plumbing and sanitary fixtures and fittings shall be temporarily stored in covered stores and handled carefully to prevent any damage.

The sanitary fittings shall be installed at the correct assigned positions as directed by the Engineer-in-charge, and shall fully meet with the aesthetic and symmetrical requirements as demanded. Fixtures shall be installed by skilled workmen with approriate tools according to the best practice in the trade. Manufacturer’s instructions shall be followd for the installation of
the fixtures. Fixtures in all toilets shall be standard height mounting as called for.

- **Fixtures shall be mounted rigid, plumb and true to alignment.** The outlets of water closet pans and similar appliances shall be examined to ensure that outlets ends are abutting on the receiving pipes before making the joint. It shall be ensures that the receiving pipes are clear of obstructions. When fixtures are being mounted, attention shall be paid to the possibility of movement and settlement by other causes. Overflows shall be arranged as to give visible warning and discharge. A check shall be made to ensure that necessary anchoring devices have been provided for supporting water closets, lavatory basins, sinks, flushing cisterns and other appliances. Where ever built in types of brackets are used they shall be securely fixed into the slabs and walls by approved means.

- **Protection of fixtures:** Care shall be taken at all items, particularly after fixing to protect fixture from damage. All orifices shall be temporarily plugged during progress of work to prevent obstruction. Fixtures shall be finally cleaned to the satisfaction of the Engineer-in-charge.
## LIST OF APPROVED VENDORS / MANUFACTURER’S

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Item</th>
<th>Make / Manufacture or approval equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ordinary Portland Cement 43 Grade</td>
<td>Zuari, A.C.C., Birla, UltraTech.</td>
</tr>
<tr>
<td>2.</td>
<td>White Cement</td>
<td>Birla White, JK White</td>
</tr>
<tr>
<td>4.</td>
<td>Ready mix concrete</td>
<td>RMC, Larfageg, Ultra-Tech, SVB, ACC, RDC.</td>
</tr>
<tr>
<td>5.</td>
<td>Ceramic Tiles</td>
<td>Somany, Kajaria, Johnson Tiles.</td>
</tr>
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</tr>
<tr>
<td>15.</td>
<td>M.S. Windows.</td>
<td>I.S.I. approved sections, Manufacturers with Flash Butt welding facility.</td>
</tr>
<tr>
<td>18</td>
<td>Solid &amp; hallow concrete block</td>
<td>APPCO, GEM OR EQIVALENT</td>
</tr>
<tr>
<td>19</td>
<td>Bricks</td>
<td>KBW, BRB OR EQIVALENT</td>
</tr>
<tr>
<td>20.</td>
<td>Interlocking pavers, Cement tiles</td>
<td>Basant betons, KRB etc.</td>
</tr>
<tr>
<td>21.</td>
<td>Hardware for Wooden Doors:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a). Hinges –</td>
<td>GARG (IS Mark), Janata, Mukund, Jyothi.(non IS mark)</td>
</tr>
<tr>
<td></td>
<td>(b). Tower Bolt Bracs –</td>
<td>PAG, Godrej, Harrison, Europa</td>
</tr>
<tr>
<td></td>
<td>(c). Latches &amp; internal Locks –</td>
<td>Godrej, Harrison, Laxmi.</td>
</tr>
<tr>
<td></td>
<td>(d). Brass Mortice Lock -</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Gun Metal Valves.</td>
<td>Neta, Leader Engineering Works, Butterfly, Bombay Metal Co., Annapurna Metal Works, ISI approved,</td>
</tr>
<tr>
<td>24.</td>
<td>G.I. Pipes.</td>
<td>Tata/ Zenith/ Indian Tube Co./ Jindal/ Prakash..</td>
</tr>
<tr>
<td>25.</td>
<td>C.P. Fittings.</td>
<td>1. EGO Metal works Bailahgaran Haryana (Pillar Tap), concealed stop cocks, mixing fittings, Angle (Valves).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Jaguar (continental range), Paragon,</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td>Details</td>
</tr>
<tr>
<td>-----</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Essco</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ess. Col. Metal Works Calcutta (Bottle Traps, Waste Fittings, Shower Roses, Towel Rods and Accessories)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mayur Othello Premium.</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Water Proofing Compound.</td>
<td>Cico/Roff Construction/Wackie Chemie/Fosroc/Pidilite/SIKA.</td>
</tr>
<tr>
<td>27</td>
<td>GI Fittings.</td>
<td>Calcutta/’R’ brand/Ring &amp; Cross, C.D. Jullander/K.S./Unik./Works (P)., R.M. Engineering, Bombay Metal Co., Bombay/Annapurna Metal Works,</td>
</tr>
<tr>
<td>30</td>
<td>Roof Sheeting.</td>
<td>Ambient, Sai Agencies, Inter-arch, Lloyd’s, Indal, Alfa Enterprises, Gal volume.</td>
</tr>
<tr>
<td>31</td>
<td>Structural Glazing.</td>
<td>Nikitha, Citadel, Alcopanel, Silver Streak Fab, Alucoband.</td>
</tr>
<tr>
<td>32</td>
<td>Lifts</td>
<td>OTIS / JOHNSON / KONE / THYSENKRUPP/MITSUBISHI/SCHINDLER</td>
</tr>
<tr>
<td>33</td>
<td>PVC Pipe fittings</td>
<td>Supreme, prince.</td>
</tr>
<tr>
<td>34</td>
<td>Ball Valve set</td>
<td>Kohinoor, SKI.</td>
</tr>
<tr>
<td>35</td>
<td>Sun control film</td>
<td>Garware, 3M</td>
</tr>
<tr>
<td>36</td>
<td>CP gratings</td>
<td>Chilly make.</td>
</tr>
<tr>
<td>37</td>
<td>Door closure</td>
<td>Dorma, Everite</td>
</tr>
<tr>
<td>38</td>
<td>Vinyl flooring</td>
<td>Royal house, Tusker, Armstroy, LG</td>
</tr>
<tr>
<td>39</td>
<td>Acoustic pannels</td>
<td>Anutone, Anehor, Armstrong, Promat</td>
</tr>
<tr>
<td>40</td>
<td>Tile grouts</td>
<td>Ball grout, Latecrete.</td>
</tr>
</tbody>
</table>
**Note:** Contractor shall obtain prior approval of IIMB before procurement of the Materials listed above. If the above Brands of Materials are not available, Engineer-in-charge shall allow use of other brand material duly approved by Chief manager(infrastructure), provided they confirm to the requirement of IS as per Technical Specification/Quality Plan as enclosed with the Tender Document.

### ANNEXURE – C

**TESTS TO BE CONDUCTED BY CONTRACTOR AT HIS COST**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Material(s)</th>
<th>Test</th>
<th>Recommended Frequency</th>
<th>Relevant IS code</th>
<th>Minimum Qty. of Sample required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Water</td>
<td>Chemical and Physical properties for potable water</td>
<td>One Test per source before commencement of work.</td>
<td>IS 456-2000</td>
<td>One liter</td>
</tr>
<tr>
<td>2.</td>
<td>Sand (Fine Aggregate)</td>
<td>a) Silt Content (Field Test)</td>
<td>This is a routine test and should be carried out for sand for each source.</td>
<td>IS 2386-1990</td>
<td>5 Kg.</td>
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<tr>
<td></td>
<td></td>
<td>b) Bulking of Sand (Field Test)</td>
<td>180CUM or part thereof or whenever moisture content is doubtful</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Particle size distribution (Lab Test)</td>
<td>180CUM or part thereof or whenever moisture content is doubtful</td>
<td>IS 383-1997</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>3.</td>
<td>Coarse Aggregate</td>
<td>a) Aggregate Crushing value</td>
<td>Once in beginning of stacking materials thereafter for every change of source</td>
<td>IS 2386-1990</td>
<td>10 Kg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Particle Size (Lab Test)</td>
<td>180CUM or part thereof for R.C.C work. For rest of work as desired by EIC.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Flakiness Index and Elongation Index</td>
<td>180CUM or part thereof for R.C.C work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Cement</td>
<td>a) Initial and Final setting time</td>
<td>One Test for 300 Tones or part thereof and for every change of brand of cement</td>
<td>IS 4032-1983</td>
<td>10 Kg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Compressive Strength</td>
<td></td>
<td>IS 4031-1988</td>
<td></td>
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<tr>
<td>5.</td>
<td>Steel</td>
<td>Tensile Strength</td>
<td>One Test per category for every consignment used in work</td>
<td>IS 1786</td>
<td>3 Nos. of each category 1M length</td>
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<tr>
<td></td>
<td></td>
<td>a) Ultimate Tensile Stress</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td>b) Yield Stress</td>
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<td></td>
<td></td>
<td>c) % Elongation</td>
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<tr>
<td></td>
<td></td>
<td>d) Chemical Properties</td>
<td></td>
<td></td>
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<tr>
<td>Sl. No.</td>
<td>Materials</td>
<td>Test</td>
<td>Recommended Frequency</td>
<td>Relevant Is code</td>
<td>Minimum Qty. of Sample required</td>
</tr>
<tr>
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</tr>
<tr>
<td>6.</td>
<td>Brick</td>
<td>a) Water absorption</td>
<td>One Test for every 40,000 Nos. or part thereof and for every change of Brand (Set of 5 Bricks)</td>
<td>IS 1077-1992</td>
<td>6 Nos.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Efflorescence</td>
<td></td>
<td>IS 3495-1992</td>
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<tr>
<td></td>
<td></td>
<td>c) Compressive Strength</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>d) Physical Dimensions</td>
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<tr>
<td>7.</td>
<td>Marble</td>
<td>a) Moisture Absorption</td>
<td>One Test for every 400Sq.m or part thereof for each source</td>
<td>IS 1130-1993</td>
<td>3 Nos.</td>
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<tr>
<td></td>
<td></td>
<td>b) MHO’S Scale of Hardness</td>
<td></td>
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<td>(50mm X 50mm)</td>
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<td></td>
<td></td>
<td>c) Specific gravity</td>
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<td></td>
<td></td>
<td>b) Knife</td>
<td></td>
<td>IS 5523-1983</td>
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<td></td>
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<td>c) Glue Adhesion</td>
<td></td>
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<tr>
<td>9.</td>
<td>Aluminium Doors and</td>
<td>a) Thickness of anodic coating</td>
<td>One Test for Material costing</td>
<td>As per Specification</td>
<td>1M of each</td>
</tr>
<tr>
<td>Window Fittings</td>
<td>b) Weight per Meter</td>
<td>Rs. 8,00,000.00 or part thereof</td>
<td>Category</td>
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<tr>
<td>10. Terazzo Tiles/ Mosaic Tiles</td>
<td>a) Wet Transverse Strength</td>
<td>One Test for lot of 1,00,000 Tiles or part thereof</td>
<td>IS 1237-1980</td>
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<tr>
<td></td>
<td>b) Water Absorption</td>
<td></td>
<td>6 Nos.</td>
<td></td>
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<tr>
<td></td>
<td>c) Abrasion Test</td>
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<tr>
<td>11. Glazed Tiles/ Ceramic Tiles</td>
<td>a) Water Absorption</td>
<td>One Test for every 5,000 Nos. or part thereof</td>
<td>IS 13630-1993</td>
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<tr>
<td></td>
<td>b) Crazing Test</td>
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<td>6 Nos.</td>
<td></td>
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<tr>
<td></td>
<td>c) Espalt Test</td>
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<tr>
<td>12. Enamel Paints</td>
<td>a) Drying Test</td>
<td>One Test per each lot</td>
<td>IS 2933</td>
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<tr>
<td></td>
<td>b) Consistency</td>
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<td>c) Finish</td>
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<tr>
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<td>d) Residue on Sieve</td>
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<td></td>
<td>e) Water Coating</td>
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<td>f) Weight per litre</td>
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<td></td>
<td>g) Lead Restriction</td>
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<tr>
<td>Synthetic Enamel Paints</td>
<td></td>
<td></td>
<td>IS 2932</td>
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<tr>
<td>Aluminium Paints</td>
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<td></td>
<td>IS 2339</td>
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<tr>
<td>Other Paints</td>
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<td></td>
<td>As applicable</td>
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Seal & Signature of the Firm
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<thead>
<tr>
<th>Sl. No.</th>
<th>Materials</th>
<th>Test</th>
<th>Recommended Frequency</th>
<th>Relevant Is code</th>
<th>Minimum Qty. of Sample required</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b) Slump Test (Field Test)</td>
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<tr>
<td>14.</td>
<td>Structural Steel</td>
<td>a) Physical properties</td>
<td>One Test for every 10 Ton or part thereof for each category</td>
<td>IS 2062-1999</td>
<td>Minimum length 1m in each category</td>
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<tr>
<td></td>
<td></td>
<td>b) Chemical Analysis</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>c) Ultimate Tensile Stress</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d) Weight (Field Test)</td>
<td></td>
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<tr>
<td>15.</td>
<td>Timber</td>
<td>Moisture content and classification</td>
<td>One Test</td>
<td>IS 11215-1991</td>
<td>As per Lab requirement</td>
</tr>
</tbody>
</table>

**NOTE:**

1. Contractors to note that Engineer-in-Charge may vary the frequency and testing of materials at his discretion. The above mentioned frequency is minimum number of tests required. The materials which are not used in the work need not be tested.
2. The latest revision of IS Code shall be used.
3. Engineer-in-charge may accept the test certificate from the approved manufacturer in view of above.
## ANNEXURE 1

### LIST OF APPORVED MAKES OF MATERIALS

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Timber</td>
<td>Maple Wood / Sycamore</td>
</tr>
<tr>
<td>2</td>
<td>MDF (Exterior Grade)</td>
<td>Include Duratuff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New UD</td>
</tr>
<tr>
<td>3</td>
<td>Decorative Laminates</td>
<td>Merino</td>
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<td>Century Laminate</td>
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<td>Sundek</td>
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<tr>
<td></td>
<td></td>
<td>Greenlam</td>
</tr>
<tr>
<td>4</td>
<td>Wood Veneer</td>
<td>Timex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>URO Veneer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greenlam</td>
</tr>
<tr>
<td>5</td>
<td>Glass Mirror</td>
<td>AIS</td>
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<td>St Gobain</td>
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<td>M001</td>
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<td>6</td>
<td>Synthetic Enamel</td>
<td>ICI Dulux</td>
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<td>Asian</td>
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<td>Berger10</td>
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<td>7</td>
<td>Painted Metal Surfaces</td>
<td>MRF</td>
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<tr>
<td></td>
<td></td>
<td>Berger</td>
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<td>8</td>
<td>Automotive Paint</td>
<td>Duco</td>
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<tr>
<td></td>
<td></td>
<td>Dupoint</td>
</tr>
<tr>
<td>9</td>
<td>Anti-Termite Paint</td>
<td>Woodcare</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wordguard</td>
</tr>
<tr>
<td>10</td>
<td>Melamine Polish</td>
<td>MRF</td>
</tr>
<tr>
<td>11</td>
<td>Hardware and Fitting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Brand(s)</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>a.</td>
<td>Frame for Glassdoor</td>
<td>Doyle Asia / Alloy Asia or equivalent</td>
</tr>
<tr>
<td>b.</td>
<td>Conceal Door Closure</td>
<td>Dorma / Hafele / Hettich</td>
</tr>
<tr>
<td>c.</td>
<td>Bearing Hinges for Doors</td>
<td>Dorma / Hafele / Hettich</td>
</tr>
<tr>
<td>d.</td>
<td>Cabin Door Handle Set</td>
<td>Dorma / Hafele / Hettich</td>
</tr>
<tr>
<td>e.</td>
<td>Foot Operated Door Stopper</td>
<td>Dorma / Dunex SS</td>
</tr>
<tr>
<td>f.</td>
<td>Concealed Tower Bolt</td>
<td>Union SS</td>
</tr>
<tr>
<td>g.</td>
<td>Multi-purpose Lock</td>
<td>Dorma / Hafele / Hettich</td>
</tr>
<tr>
<td>h.</td>
<td>Cabinet Hinge – Auto Closing</td>
<td>Blum Hettich Haffe</td>
</tr>
<tr>
<td>i.</td>
<td>Drawer Side System Met Abox</td>
<td>Blum Hettich Haffe</td>
</tr>
<tr>
<td>j.</td>
<td>Screws</td>
<td>Nettle Fold IS 1365, GI screws SS Star Head Screw as per manufacturer’s specifications</td>
</tr>
<tr>
<td>12</td>
<td>Silicon Sealant</td>
<td>GE Clear</td>
</tr>
<tr>
<td>13</td>
<td>Skirting</td>
<td>Doyle Asia / Oyle Asia or equivalent</td>
</tr>
<tr>
<td>14</td>
<td>Grey Cement</td>
<td>L&amp;T 43 Grade Corromandel 43 Grade</td>
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<td>15</td>
<td>White Cement</td>
<td>JK White Cement</td>
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<tr>
<td>16</td>
<td>Frost Film / Anti-Skid Film / Mirror Tape</td>
<td>3M</td>
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<td>Material / Product</td>
<td>Supplier / Details</td>
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<tr>
<td>17</td>
<td>Glass Sealant</td>
<td>Hafele</td>
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<tr>
<td>18</td>
<td>Rock Wool / Glass Wool</td>
<td>UP Twiga</td>
</tr>
<tr>
<td>19</td>
<td>Gypsum</td>
<td>Indian Gypsum IS 2095/1982</td>
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<tr>
<td>20</td>
<td>Aluminium Sections</td>
<td>Jindal</td>
</tr>
<tr>
<td>21</td>
<td>Fire Rated Paint</td>
<td>Promat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fire Flame</td>
</tr>
<tr>
<td>22</td>
<td>MS Sections</td>
<td>TATA</td>
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<tr>
<td>23</td>
<td>Solid Surfaces</td>
<td>Corian</td>
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<tr>
<td>24</td>
<td>Marble / Granite</td>
<td>Hindustan Marble Marble Centre</td>
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<td>25</td>
<td>Floor Mat</td>
<td>3M</td>
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<tr>
<td>26</td>
<td>White Board or Coloured Glass</td>
<td>Saint Gobain</td>
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<td>27</td>
<td>SS</td>
<td>Grade 1316</td>
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<td>28</td>
<td>Wall Paper</td>
<td>Nominated Vendor Walltracts (India) Pvt. Ltd.</td>
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<td>29</td>
<td>Vitrified Tiles</td>
<td>Euro</td>
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<td>HR Johnson</td>
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<td><strong>Equivalent</strong></td>
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<tr>
<td>30.a</td>
<td>Vinyl Flooring</td>
<td>Tarkett</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forbo</td>
</tr>
<tr>
<td>30.b</td>
<td>Laminated Wooden Flooring</td>
<td>Euro or Equivalent</td>
</tr>
<tr>
<td>31</td>
<td>Sliding Folding Partition</td>
<td>D &amp; M</td>
</tr>
<tr>
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<td>Dorma</td>
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<td>DorTech Agencies</td>
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<tr>
<td>32</td>
<td>Fire Doors</td>
<td>Shakti Metal</td>
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<td>33.</td>
<td>Aluminium Sections</td>
<td>MPP</td>
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<td></td>
<td>Jindal</td>
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<td>Indal</td>
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<tr>
<td>34.</td>
<td>Plumbing / Sanitary Fittings</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>UPVC Pipes and Fittings</td>
<td>Prince</td>
</tr>
<tr>
<td></td>
<td>Kisan</td>
<td></td>
</tr>
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<td></td>
<td>Supreme</td>
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<tr>
<td>b.</td>
<td>Ball Valves</td>
<td>Zoloto</td>
</tr>
<tr>
<td></td>
<td>Hawa</td>
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</tr>
<tr>
<td>c.</td>
<td>GM Non-return Valves</td>
<td>Kirloskar / Zoloto</td>
</tr>
<tr>
<td>d.</td>
<td>Hydro Pneumatic Pumps</td>
<td>Grundfos / Approved equivalent</td>
</tr>
<tr>
<td>e.</td>
<td>Pressure Guages</td>
<td>H Guru / Gluck</td>
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<tr>
<td>f.</td>
<td>Stoneware Pipes</td>
<td>MSL IS Marked</td>
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<tr>
<td></td>
<td>TSL</td>
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<tr>
<td>i.</td>
<td>Sanitary Wares</td>
<td>Parryware</td>
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<td></td>
<td>Hindware</td>
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<td></td>
<td>Approved Equivalent</td>
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<td>k.</td>
<td>Bathroom Accessories</td>
<td>Hindware</td>
</tr>
<tr>
<td></td>
<td>Approved Equivalent</td>
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<tr>
<td>l.</td>
<td>Toiletries</td>
<td>Kimberley Clarke or Approved Equivalent</td>
</tr>
<tr>
<td>m.</td>
<td>Hand Drier</td>
<td>Novatek or Approved Equivalent</td>
</tr>
<tr>
<td>n.</td>
<td>Hot Water Insulation</td>
<td>Armaflex / Vidoflex</td>
</tr>
<tr>
<td>o.</td>
<td>Geysers</td>
<td>Racold / USHA Lexus</td>
</tr>
<tr>
<td>p.</td>
<td>Urinal Sensors</td>
<td>Jaguar / AOS</td>
</tr>
<tr>
<td>q.</td>
<td>FRC Manhole Frame and Covers</td>
<td>Southern Concrete Industries</td>
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<td>-----</td>
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</tr>
<tr>
<td>r.</td>
<td>Butterfly Valves</td>
<td>AUDCO / Fluidline</td>
</tr>
<tr>
<td>s.</td>
<td>Fire Fighting Accessories</td>
<td>Newage / Jayashree</td>
</tr>
<tr>
<td>t.</td>
<td>C.I. Grating and M.H. Frames and Covers</td>
<td>NECO / Approved Equivalent</td>
</tr>
<tr>
<td>u.</td>
<td>Level Controller / Solenoid Valves</td>
<td>Midas Marketing / Approved Equivalent</td>
</tr>
<tr>
<td>v.</td>
<td>D I Pressure Pipes and Fittings</td>
<td>Electro Steel Castings</td>
</tr>
<tr>
<td>w.</td>
<td>DG Set</td>
<td>Cumins / Kirloskar / Layland / Mahindra</td>
</tr>
<tr>
<td>x.</td>
<td>Airconditioner</td>
<td>Deykan /</td>
</tr>
<tr>
<td>y.</td>
<td>UPS</td>
<td>Eton / Socomac / Schinder</td>
</tr>
<tr>
<td>z.</td>
<td>EPABX</td>
<td></td>
</tr>
</tbody>
</table>

Vinyl flooring : 1.5mm thick vinyl flooring of approved brand skirting and floor using rubber based adhesive etc

Aluminium angles : Anodized aluminium angles to the edges of platforms.

Ceramic white writing board : Approved brand white ceramic steel magnetic writing board of 9mm MDF with GI sheet backing , teakwood beadings all round for framework including applying neat french polish to the framework etc.
Lectern: Multipurpose cabinets/tables of approved shape size 60x60x90 cms height, using 19mm thick block board of approved quality for cabinets, sliding shelves, supports etc; external surfaces with 1mm thick laminate sheet of approval make, colour and design, internal surfaces neatly painted with synthetic paint 3 or more coats of approved colour and brand, necessary shutters, glass covers etc. Refer images for more details & clarity.
Acoustic wall paneling: Wall paneling using 50x25mm salwood framework 60cm C/C both ways and providing 12mm thick semi-perforated particle board panel including providing glass wool padding and hessian toping.

Pen stand: Penstands made of 19mm BWR ply with 1mm lamination on both sides, wooden supports and peach wood beadings with neat polishing including all necessary hardware material.

Bottle holders: Foldable bottle holders of "EBCO" make ABS material adjacent to writing board including all necessary hardware material.
Vertical blinds: Vertical blinds of 100mm width of approval make and shade including suitable powder coated aluminium channel, runners, bottom weights etc.
Curved tables: Curved tables 40cm wide top 75cm high using neatly powder coated 16 gauge steel tubular frames of sections 40x20mm, 25x25mm, 20x20mm with proper supports selves, modesty panel etc. table top of 19mm thick block board (BWR) and edges made to 25mm thick all round shelves below table of 12mm thick pre laminated particle board with proper framework, modesty panel of 6mm thick 45cm height, plywood. table top and modesty panels front and sides finished on both sides with 1.0mm thick laminated sheet of national/merino brand of approved colour and finish, beach wood beading 25x10mm on all round edges of table top and all other edged with neat polishing table provided with leveling screws etc.

False ceiling: True horizontal level mineral fibre tile false ceiling using hot dipped galvanised steel sections exposed surface chemically cleaned capping pre finished baked polyester paint. Main tee 25x38mm at every 1200mm C/C and rotary stitched cross tee of 25x25mm at every 600mm C/C, wall angle around the wall to form a grid using 2mm dia. GI wire and expandable steel fasteners with 8mm dia. anchor hooks laying mineral fibre acoustical tiles of armstrong or equivalent of size 600x600x15mm over the formed grid complete.
Chairs: Nylon 5-star Medium back chairs with synchronized tilt mechanism, multi point recline and locking. Gas lift for height adjustment (460-520mm) PP adjustable armrest (Sideways, front and back) upholstered in fabric on seat (460mmx480mm) back in nylon mesh (480x610) supported by 5 pronged Glass filled nylon base/castors of size 700 diameter. Seat cushion support is made of hot pressed plywood support and cushions are covered by plastic seat shall Density-min 50Kg/Cum Hardness-8.5 to 9.5 kg at 25% Mechanism-Synch mechanism with forward biased pivot location. Back inclination lockable in multi position with anti shock feature. Adjustment range is 45-90Kgs Tension control knob should be below the seat. Active, telephonic, rotating motion, Armrest Moulded self-skinned fixed PP pads with aluminum bar. Mid back Executive chair with synchronized tilting mechanism with Multiple locking systems. ABS for seat, Mesh back with extra lumber support with fine tuning for depth adjustment, with swivel & depth Adjustable arm pad, gas lift for height adjustment. Nylon base with castors. The fabric colour as approved.
Table with Partition: Modular Workstations of size 1447(L)*600(D)*1200(H)mm with a return partition of size: 600(D)*1200(H)*75mm at one side only. The partition in MS powder coated to 60-70 microns with sections of 75mm thick with 18mm legs for support as per the design given. Top tile in combination of white board Marker Tiles and other tiles of Fabric boards. Table Top made in 25 mm thick Prelam edgebanded. Frame Structure with wire management system in two levels. The positions of white board and pinup boards as per approvals, shades of fabric, powder coating colour and laminate colour as per approvals. Including PVC Keyboard tray and CPU trolley. Top rail made up of aluminium profiles and M S cable raceways of powder coated one below the table top and another at the skirting level.
WORKSTATIONS AND PARTITION

TABLE TOP SIZE
1500W1 X 1500W2 X 600D

OR

TABLE TOP SIZE
1500W1 X 1500W2 X 600D

OR

TABLE TOP SIZE
1500W1 X 1500W2 X 600D
Storage Unit of size: **975(L)*450(D)*1200(H)mm**

Prelaminated plywood 19mm thick and intermediate shelves, PVC edges beading levelling screws, CP hardware fittings etc.

Faculty Tables: Faculty tables of size: 72" x 27" x 30" (H) made of 19mm ply laminated sheets for table top, modesty panel, vertical supports including necessary cable raceways for power and LAN cable with all necessary hardware and including melamine finish of natural shade.
FACULTY TABLE SET WITH SIDE RETURN
1800/2150W X 900/1800D X750H

OR
**FACULTY TABLE SET WITH SIDE RETURN**
1800/2250W X 900/1800D X 750H

Storage /Filing Cabinets: Storage cum filing cabinets consisting of shutters in the lower portion made of 22mm AA grade free from Knots, Black lines, Discolouration, Resin Pockets etc on both the surfaces moulded opaque panels and upper portion with open shelves as required. Cabinet made of laminated ply boards 19mm thick for top, vertical supports, shelves and 12mm backing, including all necessary hardware.
FILLING CABINET WITH 03 GLASS DOORS
1200W X 400D X 2000H

OR

FILLING CABINET WITH 03 GLASS DOORS
1200W X 400D X 2000H

OR

FILLING CABINET WITH 03 GLASS DOORS
1200W X 400D X 2000H
DIRECTOR DESK

TABLE SET WITH PEDESTAL AND SIDE RETURN  OPTIONAL MODESTY COVER

1800W X 900/1800D X 750H

OR
<table>
<thead>
<tr>
<th>TABLE</th>
<th>SIDE DESK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800W X 900D X 750H</td>
<td>1200W X 450D X 750H</td>
</tr>
<tr>
<td>FIXED PEDASTAL WITH D2 DRAWERS 438W X 450D X 350H</td>
<td></td>
</tr>
<tr>
<td>SIDE RETURNS 1000W X 400D X 634H</td>
<td></td>
</tr>
</tbody>
</table>

**SECRETARY DESK**

**SECRETARY TABLE SET WITH PEDASTAL AND SIDE RETURN**
1300W1 X 1500 W2 X 600D X 750H

**OR**
CONFERENCE AND MEETING TABLES

SECRETARY TABLE
1200W X 600D X 750H

STANDARD TABLE SIZE
1500W X 600D X 750H

CONNECTION TOP
600D

METAL LEG

OR

CONFERENCE TABLE SIZE
3000W X 1200D X 750H
MEETING TABLE
1200W X 1200D X 750H

OR

MEETING TABLE
1200 Dia X 750H

OR

RECEPTION TABLES

RECEPTION TABLE SIZE
2100W X 600D X 1050H

OR
RECEPTION TABLE SIZE
2400W X 750D X 1200H

OR

RECEPTION TABLE SIZE
2400W X 750D X 1200H
OFFICERS CABIN

VIEW 1

VIEW 2
**LIGHTING:**

Lux level to be maintained at various areas is as per the list given. Lux level considered should be minimum LUX level at any point inside the given area.

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>Area</th>
<th>Recommended Lux level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class room</td>
<td>500 Lux</td>
</tr>
<tr>
<td>2</td>
<td>Library</td>
<td>500 Lux</td>
</tr>
<tr>
<td>3</td>
<td>Seminar room</td>
<td>500 Lux</td>
</tr>
<tr>
<td>4</td>
<td>Faculty office</td>
<td>500 Lux</td>
</tr>
<tr>
<td>5</td>
<td>Staff Room</td>
<td>500 Lux</td>
</tr>
<tr>
<td>6</td>
<td>Directors office</td>
<td>500 Lux</td>
</tr>
</tbody>
</table>
Where ever false ceiling is considered, the fixture should be CAT 2 , Luminaire with minimum glare and should suitable for grid false ceiling of 600 x 600 mm. The fixture should suitable for T-5 fixture or CFL lamps. The entire fixture used should have electronic ballast only. If the Lighting level cannot be achieved through 600 mm x 600 mm fixture, then suitable down lighter can be used along with above mentioned fixture,

Where ever false ceiling is not there, the recommended fixtures are 1x 28 W or 2x 28 W T-5 surface / suspended mounting fixture.

**Approved Makes:**

1. Philips  
2. Crompton Greaves  
3. Wipro

**Air conditioning works:**

The vendors should design area-wise air-conditioning requirements considering the heat load given below. The design calculation should be submitted along with the technical bid.

Specifications of Air conditioners shall be as mentioned below.

1. Class room: Air conditioners shall be cassette type . Following loads shall be considered for designing the capacity of the Air conditioners.
   
   a. Students – 75 Nos.
   b. Laptops – 70 NOs.
   c. One Desktop
   d. One Overhead projector.
   e. Lighting load.

2. All other areas , the Air conditioner shall be HI wall, three star rating with stabilizer . Area wise heat load details are furnished as below.

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>Area</th>
<th>Heat load details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Library</td>
<td>20 Persons, Two PC , 10 Lap top , Lighting load</td>
</tr>
<tr>
<td>2</td>
<td>Seminar room</td>
<td>25 Persons, OHP , Lighting load</td>
</tr>
</tbody>
</table>
Approved Makes:

1. Daiken
2. Voltas
3. Bluestar

Electrical wiring:

Following circuit specifications shall be following for lighting / Air conditioning works.

AC circuits:

1. Each AC unit shall have separate MCB protection having 10 kA fault level and C curve.
2. 4 sq.mm, Copper, multi strand wire with PVC insulation shall be used for Air conditioning power distribution. All outdoor to indoor power supply shall be using flexible cable laid inside PVC conduit.

Lighting and Power circuits

1. Circuit main wiring for lighting shall be using: 2 R x2.5 sq.mm + 1 R 1.5 sq.mm PVC insulated, Fire retardant copper multistrand wire in 3/4" conduit, 2mm thick or casing and capping. Conduit shall be fixed to wall / flooring using wood plugs, heavy gauge saddles and screws.

2. Point wiring shall be using 2 runs of 1.5 sq.mm and 1 R -1sq.mm copper multi strange wire without switch from the tapping point.

3. Casing and caping used shall be suitable to numbers of wiring running through it.

4. Conduits used shall heavy duty, 2mm thick, ¾ “ and 1” Pipes as per the requirement.

Approved Makes:

Wires: a) Poly cab  b) Finolex  c) Anchor

Switch and sockets:
Back UP Power Supply:

Diesel Generator back up shall design to cater back up power supply all lighting and Air conditioning loads. The capacity of the set shall not be less than 110 kVA. The vendor can the load details to confirm the capacity of the set.

DG set should be complete with Automatic change over panel, Fuel system, Exhaust system, necessary civil works for foundation, Acoustic enclosure and all related government approval like Electrical Inspectorate, Pollution control board are in the scope of work. In case sufficient space is not available inside the building for placement of Auto change over panel, the panel should be located outside the building with IP65 enclosure.

Approved Makes:

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>Item Description</th>
<th>Approved Makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diesel Engine</td>
<td>Kirloskar, Cummins, Mahindra</td>
</tr>
<tr>
<td>2</td>
<td>Alternator</td>
<td>Kirloskar, Stamford</td>
</tr>
<tr>
<td>3</td>
<td>LT Cables</td>
<td>Polycab, KEI, Unistar</td>
</tr>
</tbody>
</table>

UPS:

The UPS supplied should have power back up of 20 Minutes. The UPS shall be supplied with Isolation transformer. The UPS installed at Classroom, Seminar room and Directors office shall cater to both computer and lighting load. In other areas the UPS shall cater to computer load only. The battery shall be Sealed maintenance free (SMF) batteries. Vendor should make approval before the procurement. The UPS manufacturer should have agency/service dealer located at Vizag.

Approved Makes:

1. Battery: Exide, Panasonic, Amaron

EPABX:

EPABX provided shall be suitable for taking two incoming lines and shall have 32 extensions. The vendor should take make approval before the procurement.