TENDER FOR : Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A, Hosakote, Bengaluru Rural District.

CLIENTS:

INDIAN INSTITUTE OF ASTROPHYSICS

Koramangala, Bangalore - 560034.

VOLUME - I

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INDIAN INSTITUTE OF ASTROPHYSICS 2nd BLOCK, KORAMANGALA, SARJAPUR ROAD, BANGALORE-560 034

(SINGE STAGE TWO BID SYSTEM)

PUBLIC TENDER NOTICE NO: 40/IIA/CIVIL/COMP WALL PHASE II/CREST/HOSAKOTE/2020-21 DATED: 21.09.2020

The Indian Institute of Astrophysics invites sealed item rate tenders on behalf of The Director in "Two part" in the prescribed form from reputed registered Contractors in state PWD, CPWD, MES, Scientific Institutions and Private Body Competent contractors who have executed works of similar nature.

| Sl. No | Name of the work | Estimated cost in Rs. | Time for completion | EMD Rs. | Cost of tender doc Rs. |
|-----------|---|-----------------------|---------------------|-------------|------------------------|
| 1. | Construction of Coursed Rubble Stone Masonry | 235.00 | 18 Months | 4.70 lakhs | 5000.00 |
| 1. | Compound Wall (Phase | Lakhs | 10 Monuis | 4.70 lakiis | 3000.00 |
| | II) at CREST Campus, | | | | |
| | I.I.A,Hosakote,Bengaluru Rural District. | | | | |
| | | | | | |

The Tender Document can be viewed and downloaded from our website http://www.iiap.res.in/tenders.htm. and pay the tender document cost in the form of Demand Draft during submission of bids. No hard copies of the tender document will be provided. Tenderers shall submit their offers along with EMD (refundable) & Tender fee (non-refundable) prescribed therein, only in the form of Demand Draft drawn in favour of Director, Indian Institute of Astrophysics. However, your offers (both Technical & Commercial/price bids) should be separately sealed and superscribed by mentioning the tender notice no. and date with Date of opening. Both the Bids shall be submitted in a sealed envelope addressed to The Director, Indian Institute of Astrophysics, 2nd Block, Koramangala Bangalore – 560 034.

The offers should be submitted in two sealed covers one superscribed "Technical Bid" and other "Price Bid". Both covers shall be put in another sealed cover superscribing the envelope with "Tender for, Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at Crest Campus, I.I.A,Hosakote,Bengaluru Rural District, Karnataka. Notice No. and due date". The last date of submission of bid is 22.10.2020 on or before 15.00 Hours. The Technical bid will be opened at 15.30 Hours. on the same day in the presence of attending tenderers or their authorized representatives. The pre bid meeting will be held at CREST Campus, IIA, Hosakote, Bengaluru District office on 05.10.2020 at 11.00 A.M.

After opening of Technical bid, the capability and suitability of the bidders shall be evaluated and Price bid of the technically qualified bidders shall only be opened in the presence of the authorized representatives of the bidders. During evaluation, the Committee may visit the projects which are completed and details provided in the tender.

The date of opening of Price bid will be informed to the technically qualified bidders. The unopened price bids and EMD of the non qualified bidders will be returned.

ELIGIBILITY CRITERIA

The firms who fulfill the following requirements shall be eligible to submit their bids. Joint ventures are not acceptable.

- (i) Tendering Company shall be professionally managed and resourceful for taking up similar jobs.
- (ii) The experience of having successfully completed similar work during last 5 years as on 21.09.2020 should be either of the following:
 - a) One similar completed work costing not less than the amount equal to 80% of the estimated cost.

OR

b) Two similar completed works costing not less than the amount equal to 50% of the estimated cost.

OR

- c) Three similar completed works costing not less than the amount equal to 40% of the estimated cost.
- (iii) The tenderer should have executed similar construction of works at Karnataka region.

The intending Bidders shall furnish the relevant experience certificates duly signed by the competent Authority not less than the rank of Executive Engineer.

2) The tenderers should submit latest three years Audited Balance Sheet duly certified by the Chartered Accountant. And also the latest TDS Certificate indicating the Income Tax deducted by the client for the execution of similar works. Last three years Income tax assessment report issued by income tax department shall be attached. GST registration certificate along with receipt of three recent GST paid shall be enclosed.

The Director, IIA reserves the right to accept or reject any or all tenders without assigning any reason thereof.

Administrative Officer For Director

GENERAL INSTRUCTIONS TO TENDERER FOR FILLING AND SUBMISSION OF TENDER FORM

1. Name of the work: Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A,Hosakote, Bengaluru Rural District.

2. The Site:

The site is at located at CREST Campus, I.I.A, Hosakote, Bengaluru Rural District, Karnataka which is on siddlaghatta main Road, opposite Mother Diarv

3. Description of Work

The scope of work contains Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A,Hosakote,Bengaluru Rural District.

4. Schedule of Work

The date of commencement of the Work shall be from the FIFTEENETH DAY from the date of issue of letter of intent (LOI) and completion will be within **Eighteen (18)** months and as per the agreed Milestones.

5. Form of Contract:

Item Rate contract

6. Bid documents:

Tenderers are advised to go through all the documents in connection with this contract carefully. You are requested to keep this information to yourself in the interest of the project. Tender document form may be downloaded from IIA Website from 21.09.2020 website http://www.iiap.res.in/tenders.htm and submit the same along with the cost of the document in the form of DD in favour of "Director, Indian Institute of Astrophysics" payable at Bangalore

The pre bid meeting will be held at IIA, CREST Campus, Hosakote, Benagluru Rural Dist. Office on 05.10.2020 at 11.00 A.M. for clarifications and site visit. It is informed to all the bidders to present and visit the site to understand the scope of work, availability of materials etc. and to get clarifications, if any, regarding the tender document and scope of work etc.

7. Submission of Bids:

Sealed Tenders with all necessary documents shall be deposited by the tenderer at the office of the Indian Institute of Astrophysics, 2nd Block, Koramanagla, Bangalore-560034 **latest by 15.00 Hours on 22.10.2020.**

Tenderers will pack, mark and deposit the following in three separate sealed envelopes. Tender documents will be submitted in original.

- (i) Envelope 1 Should be marked as 'Envelope -1' and contain the following:
 - a) EMD in the form of DD/Pay order in favour of "Indian Institute of Astrophysics, payable at Bangalore.
 - b) Cost of the tender document in the form of DD/Pay order in favour of "Indian Institute of Astrophysics, payable at Bangalore if the document is downloaded form website.
 - c) Letter from Tenderer, accepting all terms, conditions and technical specifications of tender.
 - d) Volume 1 of tender (NIT, Tender form, General & Special Conditions of Contract etc.) duly signed & stamped.
 - c) Every Tenderer should furnish along with his tender PAN No., an income-tax and sales tax clearance certificates, assessement order received from Income Tax & brief information regarding the income-tax circle, Ward & the District in which he is assessed by income-tax, the reference No. of assessment and the assessment year, as also details of any attachments, prohibiting orders, proceedings in connection therewith. GST certificate and recent paid GST receipts shall be attached.
 - d) The Tenderer should submit a declaration disclosing all Works for which he has already entered into contract, the value of work that remains to be executed in each such contract, while submitting the tender and details of any disputes pending in respect of any such contract whether in a court or any other Forum or under discussion / negotiation with the other party to such contracts (Refer Vol. 1-Annexure A: FORMAT FOR DECLARATION OF CURRENT WORKS).
 - e) Every Tenderer should furnish along with his tender the Work Contract Tax / GST Registration Certificate.
 - f) Certified copies of Registration Certificate (issued by the Registrar of Companies in case of Company and issued by Registrar of Firms indicating names etc., of all registered partners, incase of Partnership Firm), Partnership Deed and Power of Attorney or Memorandum and Articles of Company in case of Limited / Private Limited Companies will have to be furnished along with the tender to render the tender eligible for consideration. Contract Licence issued by various organization like PWD, CPWD shall be enclosed.
 - g) ESI and PF registration issued by competent authorities
 - h) The Tenderer shall submit the site organization chart with names of project Incharge, Site Engineer, Foreman and Supervisor alongwith their qualification and work experience.
 - i) Tenderer shall furnish the detailed construction programme based on the mile stone chart provided in tender and incorporating the activities of other services contractors, keeping in view the provision under various clauses of contracts.
 - j) The Tenderer shall submit the cash flow chart.

- k) Detailed list of Plant & Machinery along with shuttering material proposed to be deployed at Project.
- 1) List of Sub Contractor proposed to be employed at the Project.
- (ii) Envelop No.2 Should be marked as Price Bid (Envelope −2) and should contain the following:
 - a) Volume -2 of Tender Priced bill of quantities duly signed and stamped by the authorised signatory
 - b) Tender drawing duly stamped and signed
- (iii) Envelope No.3: Should contain both above mentioned sealed Envelopes 1 and 2 superscribing the name of the work, last date of submission, address and contact details of the bidder address to the

The Director,
Indian Institute of Astrophysics,
2nd Block, Koramangala,
Bangalore-560034

Ph No.: 080 - 22541200/25541259/22541359

Any Queries or clarifications regarding the tender or the work shall be submitted in writing to this Institute latest by 12:00 Noon on 04.10.2020. Clarifications, if any, shall be issued to all tenderers in the form of an Addendum to the Tender (The "Addendum") which also published in the website. All the intending bidders are requested to visit the website till last day of the submission to get updates on the tender. No individual information will be provided. Any clarification may be obtained from the following address during office hours:

Contact Person:

M.V.RAMASWAMY Head-Civil Engineering Section Indian Institute of Astrophysics, 2nd Block, Koramangala, Bangalore-560034

080-22541207 Mob: 9742410480 Email: mramaswamy@iiap.res.in

8. Acceptance/ Rejection of tenders:

Tenders not accompanied with the EMD in separate envelope shall be rejected and also the tenders that are not properly filled, are mutilated, have pages missing or with incorrect, inaccurate calculations or generally not complying with the conditions will be rejected.

Tenderers should quote their rates with the totals both in figures & in words (English). The total of each page along with carried over figures of the previous page shall be given in ink and signed by the tenderer. No blank space shall be left. Amounts quoted in words shall be deemed to be correct in case of cuttings or overwriting.

In case of a tender where the prices of any items appear unrealistic, such a tender will be considered as unbalanced. The tender issuing authority reserves the right to call for the rate analysis in such items which are in his opinion, unbalanced and the tenderers is unable to provide satisfactory explanations, IIA reserves the right to disqualify such a tender and forfeiting EMD without prejudice to any other right for failure on part of the tenderer.

If the tender is made by an individual it shall be signed by him and his full name and complete address shall be given. If it is made by a partnership firm it shall be signed in the name of the firm by a partner of the firm who shall sign his own name and give the name and address of each partner of the firm and attach a copy of `Power of Attorney' with the tender authorising him to sign on behalf of the other partners

No alterations, amendments or modifications shall be made by the tenderer in the Notice Inviting Tenders, Instructions to the Contractors, Contract Form, Conditions of the Contract, Drawings and Specification and if any such alterations are made or any special conditions attached, the tender is liable to be rejected without reference to the tenderer. All the corrections in the bill of quantities (Rates or amount in words and figures) shall be authenticated by signature and stamp of the company.

Canvassing in connection with tender is strictly prohibited and tender submitted by tenderers who resort to canvassing will be liable to rejection.

The acceptance of a tender shall rest with **INDIAN INSTITUTE OF ASTROPHYSICS** as their authorised representative who does not bind itself to accept the lowest tender and reserves to itself the right to reject any or all the tenders received without assigning any reason(s) whatsoever. Non-acceptance of any tender shall not make the Owner liable for compensation or damages.

At any time prior to the Tender submission date stipulated, the Owner may, for any reason, whether on its own initiative or in response to a clarification requested by a tenderer amend the Tender documents by issuing an Addendum (The "Addendum").

The Addendum will be notified in writing to all Tenderers who have purchased and also published in the website. Tenderers shall promptly acknowledge receipt thereof to the person issuing the NIT with due signature and submit the same along with the tender.

Tenders shall be unconditional in all respects. The Tenders containing uncalled remarks or any additional conditions are liable to EMD forfeiture and rejection of bids.

9. Earnest Money Deposit: (E.M.D)

Earnest Money Deposit of Rs. 4,70,000 /- (Rupees Four Lakh Seventy Thousand Only) in the form of Demand Draft valid for atleast 90 days from the date of tender submission, should be submitted along with the Tender. The Demand Draft should be in favour of "The Director, Indian Institute of Astrophysics" payable at Bangalore should be submitted in a cover along with the Tender in a envelope 1 marked as EMD.

E.M.Ds of the unsuccessful tenderers will be returned within **90 Days** from the last date stipulated for submission of tender.

E.M.Ds shall be forfeited if the Contractor selected for the work fails to submit the prescribe performance guarantee and sign the prescribed agreement and / or fails to start the work within **FIFTEEN DAYS** of order to commence the work.

The E.M.Ds of the successful tenderer will be retained by **Indian Institute of Astrophysics** and returned to the Contractor upon his furnishing a Bank Guarantee for Performance Bond in an approved format and to the satisfaction of the Institute.

The EMD shall not bear any interest.

10. PERIOD OF VALIDITY:

The tender shall remain valid for acceptance for a period of <u>NINETY DAYS</u> from the last date for submission of the tenders. If any tenderer withdraws his tender before the said period or makes any modifications in terms and conditions of the tender, then the Project Manager / Owner shall be entitled to forfeit the said Earnest Money Deposit / Performance Bond Guarantee by encashment / enforcement of the Bank Guarantee herein before referred to.

11. INSPECTION OF SITE:

Every tenderer is expected to inspect the site of the proposed work and acquaint himself with the site conditions, working space available for material / fabrication yards, batching plant, stores, offices and any other contractor's facility, approaches, availability of labour & raw materials, geological and weather conditions etc. before quoting his rates. He must go through all the drawings, specifications and other tender documents. Any further clarifications in the drawings and documents can be had from the Architects/Institute at the above-mentioned address. Submission of the tender shall be deemed to be due compliance with this clause.

- 12. This notice inviting tenders will form part of the tender document and the Contract Agreement executed by the successful tenderer.
- 13. All the tender documents submitted by the contractor are the property of the Owner and shall remain under the Owner's ownership at all times.

PLACE: Administrative Officer, DATE: for Director,

INSTRUCTIONS FOR FILLING IN THE TENDER FORM

1. Each of the following documents referred to, as Volume 1, 2 & 3 with their respective contents shall individually and collectively constitute the Tender Document:

VOLUME 1

NOTICE **INVITING** TENDER, **TENDER** FORM, CONTRACT AGREEMENT, DRAFT FORMATS FOR BANK GUARANTEES, FORMAT FOR DECLARATION OF CURRENT WORKS (ANNEXURE - A), LIST OF **DRAWINGS** (ANNEXURE B), **GENERAL** CONDITIONS OF CONTRACT, SPECIAL CONDITIONS OF CONTRACT, SCHEDULE OF FISCAL ASPECTS, SCHEDULE OF NOMINATED SUB-CONTRACTORS. SCHEDULE OF OWNER SUPPLIED **MATERIAL** (ANNEXURE - 1), SCHEDULE OF CONTRACTOR SUPPLIED MATERIALS (ANNEXURE - 2), SPECIAL NOTES (ANNEXURE – 3) AND PROJECT MILESTONE CHART AND CASH FLOW CHART.

VOLUME 2

TECHNICAL SPECIFICATIONS WITH PREAMBLE, BILL OF QUANTITIES, LISTS OF APPROVED MAKES FOR CIVIL & STRUCTURAL WORKS.

VOLUME 3 TENDER DRAWINGS.

Technical specifications are the general instructions for carrying out the Work.

- 2. For the Bill of Quantities, in **VOLUME 2** the rates shall be written (after carefully studying the technical specifications and detailed specifications and drawings) clearly, legibly in figures and in words (English). In case of any doubts, or discrepancy the amount in words will be treated as correct. Amounts should be entered after carefully checking up the unit adopted for the item.
- 3. List of drawings accompanying the tender documents is furnished in **Volume 3**. All tender drawings form an integral part of tender and the details shown on the drawings are complementary to the Bill of Quantities and vice versa. Rates quoted must and be deemed to have taken note of all the Drawings, Technical specifications, Detailed Specifications and Bill of Quantities.
- 4. The Tenderer should certify that he has studied the Work at site and acquainted himself with the position with regard to construction, materials & labour etc. required for the work
- 5. The Tenderer should submit a declaration disclosing all Work for which he has already entered into contract, the value of work that remains to be executed in each such contract, while submitting the tender and details of any disputes pending in respect of any such contract whether in a court or any other Forum or under discussion / negotiation with the other party to such contracts (Refer Vol. 1-Annexure A: FORMAT FOR DECLARATION OF CURRENT WORKS).

- 6. Every Tenderer should furnish along with his tender PAN No., an income-tax and sales tax clearance certificates & brief information regarding the income-tax circle, Ward & the District in which he is assessed by income-tax, the reference No. of assessment and the assessment year, as also details of any attachments, prohibiting orders, proceedings in connection therewith.
- 7. Every Tenderer should furnish along with his tender the Work Contract Tax Registration Certificate.
- 8. The Tenderer are to pay the amount of earnest money as specified in the tender notice separately along with the Tender. Tenders for which earnest money deposit has not been received shall be rejected.
- 9. Certified copies of Registration Certificate (issued by the Registrar of Companies in case of Company and issued by Registrar of Firms indicating names etc., of all registered partners, incase of Partnership Firm), Partnership Deed and Power of Attorney or Memorandum and Articles of Company in case of Limited / Private Limited Companies will have to be furnished along with the tender to render the tender eligible for consideration.
- 10. All Tenderers shall recheck the quantities of the BOQ with respect to the drawings. Should the Tenderer notice any discrepancy or error in any statement made, or quantities or units shown against items, he shall immediately bring to the notice of IIA and obtain clarifications before submitting the tender. The tender shall be recorded as such in the covering letter to the tender, failing which the Owner shall have right to ask the Tenderer to execute the Work according to the statement made or quantities or units shown in the tender, without any extra payment.
- 11. All pages of tender documents shall be signed and stamped at lower right hand corner or signed wherever required, by the tenderer or by a person holding the power of attorney authorizing him to sign on behalf of the tenderer. Signatures in the tender documents shall be dated as well. All corrections and alterations in the entries of tender papers should be signed and stamped in full by the tenderers. Correction with white fluid and overwriting are not permitted.
- 12. The Tenderer should submit the following additional documents:
 - a) Complete bar chart worked out based on the required milestones and Cash flow chart.
 - b) Site organization chart giving details of all staff to be deployed including names and bio-data of managerial and engineering staff for the execution of this project.
 - c) A detailed list of plant and machinery and shuttering material proposed for deployment should be submitted along with the offer.
 - d) A list of Subcontractors (if any) should also be enclosed along with the offer.

13. NOMINATED AGENCIES / SUB-CONTRACTORS / VENDORS:

a) The nominated or any other sub-contractors / vendors related to above cited work are part and parcel of the Tenderer therefore the Tenderer shall be responsible for them and co-ordinate & provide the facilities for the nominated sub-contractors / vendors with prior approval of the Architect/Owner.

| 14 | The tender of any Tenderer not complying with any of the above instructions 1 to 13 may be rejected. |
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| | Administrative Officer, for Director, |
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TENDER FORM

To, M/s INDIAN INSTITUTE OF ASTROPHYSICS Koramangala, Bangalore – 560034.

Dear Sirs,

Sub: Tender for, Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A,Hosakote,Bengaluru Rural District.

With reference to the tender invited by you for the above-proposed work, I/We write this after having:

- a) examined the drawings, technical specifications, detailed specifications to tenders, agreement, the general conditions of contract and special conditions of contract annexed thereto (hereinafter called 'The Contract Documents') relating to construction.
- b) visited and examined the site of the proposed work and acquired the requisite information relating to or affecting the tender.

I/We undersigned hereby offer to construct the proposed work in strict accordance with the contract document for the consideration to be calculated in terms of the priced schedule of quantities.

I/We undertake to complete the whole of the works as per the attached schedule from the date of issue of intimation by you that our tender has been accepted and upon being permitted to enter site. I/We further undertake that on failure, subject to the conditions of the contract relating to extension of time, I/We shall pay agreed `Liquidated Damages' for the period during which the work shall remain incomplete.

I/We hereby deposit with you as Earnest money Rs. 4,70,000 /- (Rupees Four Lakh Seventy Thousand Only) [carrying no interest] by means of Demand Draft no., dated in favour of "The Director, Indian Institute of Astrophysics" Payable at Bangalore. and I/We agree that this sum shall be forfeited in the event of the Owner accepting my/our tender and I/We fail to take up the contract when called upon to do so.

I/We further agree to the deduction of 5% from the 'Interim Payment' and up to a maximum of 5% of the contract value towards the 'Retention Money', which will be returned as per the relevant clauses in the agreement.

I/We will furnish the Performance Guarantee Bond as per the approved format.

OUR BANKERS ARE

1.

2.

PLACE :

DATE : SIGNATURE OF TENDERER

NAME OF THE PARTNERS OF THE FIRM

OR

NAME OF THE PERSON HAVING POWER OF ATTORNEY TO SIGN THE CONTRACT

ANNEXURE A

INDIAN INSTITUTE OF ASTROPHYSICS 2ND BLOCK, KORAMANGALA, BENGALURU – 560034.

Name of Work: "Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A, Hosakote, Bengaluru Rural District."

| 40/IIA/CIVIL/COMP WALL PHASE II/ CREST/HOSAKOTE/2020-21 DATED: 21.09.2020 | | |
|---|--|--|
| Name of The Firm: | | |
| Address: | | |
| Phone No: | | |

Tender Notice No.:

Last date for submission: 22.10.2020 up to 15:00 hrs

FORMAT FOR SUBMISSION OF TECHNICAL & ORGANISATIONAL DETAILS.

| NAME OF T | HE FIRM | : |
|--------------|---|------------------------------------|
| 1. OFFICE SI | ET UP OF THE FIRM Office Address: | |
| | | |
| 1.2 | Year of Establishmen | nt: |
| 1.3 | Contact Person With Designation | Shri |
| | | Ph No |
| 1.4 | Details of registration | n if any: |
| 1.5 | Organizational setup Total staff strength be And Administration qualification and ex | oth technical with their name, age |
| 1.6 | | be enclosed)py to be enclosed) |
| 1.7 | Details of the staff a | as per the following format. |

| Sl. No | Profession/discipline | Name | Age | Qualification | Experience (total years) | Field of experience |
|-----------|-----------------------|------|-----|---------------|--------------------------|---------------------|
| | Civil | | | | | |
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2 TENDERER'S EXPERIENCE

Details of Works carried out and on hand during last five years with details such as name of work, year of completion, client name and address, cost of work, time period of construction, nature of work, etc., (It shall enclose a certificate from the owner that the service rendered by the firm has been satisfactory)

| Sl. | Name & description of work | Value of | Period of | Client persons to |
|------|----------------------------|----------|-----------|--------------------|
| No. | | work and | | whom reference may |
| 110. | | date. | and date. | be made. |
| | | date. | and date. | or made. |
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3. TOOLS AND EQUIPMENT LIST

The tenderer shall indicate herein below the equipment he has in possession and the equipment he proposes to bring to the site, in case the work is awarded to him.

| Sl. No | Type and Description of the equipment. | Numbers the bidder has in possession | Numbers he proposes to bring on to site |
|-----------|--|--------------------------------------|---|
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Tenderers hereby confirms that the quantity and type of tools he will employ for construction will not be less than those listed above and agree to bring more equipment if so warranted in the opinion of the Engineer-in-charge.

| 4. | FINA | NCIAL | |
|----|--------|---|----------|
| | Bank | Name: | |
| | | Branch: | |
| | | Account No.: | |
| | Avera | ge Annual Turnover for last 5 | Years: |
| 5. | INSURA | NCE | |
| | Accid | ent Insurance Insured with: | |
| | | Policy No.: | |
| 6. | Detail | s of Arbitration cases | : |
| 7. | intima | ther detail you would like to te in support of your technical pointment | bid : |
| _ | • | he authorized eal of the firm | |

(Note: Attach separate sheet for furnishing information in case the space in the format is insufficient)

ANNEXURE B

LIST OF DRAWINGS

| S. | TITLE | DRAWING No. |
|-----|--------------------------|-------------|
| No. | | |
| 1. | East face compound wall | |
| 2. | South Face compound wall | |

(REFER VOLUME – 3)

GENERAL CONDITIONS OF CONTRACT

1. **DEFINITIONS**:

In the Contract (as hereinafter defined) the following words and expressions shall have meanings hereby assigned to them, except where the context otherwise requires: (In alphabetical order)

1.1 **Approved/Approval:**

Approved/Approval shall mean and include approved/approval accorded by the Institute/Architect in writing.

1.2 **Approved Equal:**

Approved Equal shall mean an alternative product or service approved by the Institute/Architect as being equivalent to that specified in the Contract Documents.

1.3 Architects / Services Consultants:

IIA will supervise the work in all respect. No architect for this work.

1.4 **Basic Rate - Material:**

Basic Rate shall mean the landed cost at site including all taxes, royalties, cartage, handling etc. but excluding wastage, GST.

1.5 Contract:

The Contract shall mean and include the Contract Agreement and its supporting documents forming part thereof, executed between the Parties (Institute and the agency to whom the work is awarded) thereto for the purpose of proper execution and completion of the Work in accordance with the Contract Documents.

1.6 **Contractor:**

The Contractor shall mean and include the person or persons, firm, company or consortium who's tender has been accepted by the Owner / Project Manager and includes the Contractor's legal representatives, successors and permitted assign.

1.7 Contractor's Representative:

The Contractor's Representative shall mean the person or party duly appointed by the Contractor to act for and on its behalf on a day-to-day basis during the construction of the Work and the Project. Any action to be taken by the Contractor may be taken on the Contractor's behalf by the Contractor's Representative. The Contractor's Representative shall be considered a "key person" for purposes of Clause 11.1 of the General Terms of Contract.

1.8 **Contract Documents:**

The Contract Documents shall collectively mean and include Contract Agreement and the documents mentioned therein as forming part thereof and would also include all modifications thereof and additions thereto incorporated in and made to any of those documents during the term of the Contract.

1.9 **Contract Price / Sum:**

Shall mean the sums referred to in the Contract Documents for the Contractor's performance of the Work.

The Contract Price is inclusive of all taxes, including sales tax, entry tax, octroi, works contract tax, Turn over tax, VAT, ESI, PF contribution and all other statutory taxes and levies if any applicable to the contractors/workers etc., and the Owner shall not be responsible in any way whatsoever to pay for the same. GST shall be quoted separately which will be paid as per contract.

The Contract is neither a fixed lump sum contract nor a piece work contract, but is an item rate contract to carryout the Work according to the actual measured quantities at the rates contained in the schedule of rates and probable quantities as provided in the Priced Bill of Quantities with Detailed Specifications. The Contract Price shall not exceed as indicated in the Letter of Intent/Purchase Order/ Work Order, amounts in excess of this number, not approved in advance by the Project Manager / Owner shall be at the Contractor's expense. The Contractor has to closely monitor the quantities and cost and obtain an Approval from the Project Manager well in advance for any change outside the scope of the Work which would cause the cost of the Work to exceed the Contract Price as indicated in the Letter of Intent. Prices will be firm until the end of the contract.

No escalation in prices shall be allowed for any reason whatsoever during the period of the project.

1.10 **Consultant:**

Shall mean any person or persons duly appointed by the Owner / Project Manager / Architect to act as 'CONSULTANT' to render consultancy services in any area/field of activity connected with and arising out of the Contract under a separate agreement setting out the consultant(s) responsibilities and terms.

1.11 **Defect(s) Liability Period:**

Defect(s) Liability Period shall be the **12-month period** after Virtual Completion and any period extended as a result of rectification of the Work/change orders, between the Virtual Completion and the Final Completion of the Work, and during which period the Contractor shall be bound to replace and/or rectify and make good all defective materials, equipment and/or workmanship which arise in the Works or come to notice subsequent to the Virtual Completion of the Works and prior to the Final Completion of the Works.

1.12 **Drawings:**

'Drawings' means all drawings, details and sketches along with the technical information therein, furnished by the Architect through the Project Manager to the Contractor under the Contract and any modifications of such drawings or such other drawings as may be from time to time be furnished or approved in writing by Project Manager. All drawings, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature submitted by the Contractor shall also be referred as 'drawings'.

1.13 **Final Completion:**

Final Completion will be deemed to have been achieved when at the end of the Defects Liability Period a Final Completion Certificate has been issued by the Architect & IIA when all the requirements of the Contract have been met and complied with and when all the defective items of Work and defects have been replaced and/or rectified and made good as directed by and to the satisfaction of the Project Manager / Owner.

1.14 Force Majeure:

Force Majeure are risks due to riots (otherwise than among Contractor's employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, insurrection, military or usurped power, an act of Government, an act of God, such as lightening, unprecedented floods, tornado, and damage from aircraft.

1.15 **Headings:**

The headings in these General Conditions of Contract shall not be deemed to be part thereof or to be taken into consideration in the interpretation or construction thereof or of the Contract.

1.16 **Insolvency:**

The term "Insolvency" means any act of insolvency as defined by the Presidency Towns Insolvency Act or the Provincial Insolvency Act or any amending statute.

1.17 **Labour Rate:**

Labour: As per Local Administration labour rates notified and fixed from time to time.

1.18 **Measurement Books:**

The "measurement books" shall be defined as the books maintained during the currency of the project to record all measurements qualifying for payment. The contractor shall maintain measurement books of all work done by them. The contractor shall get the measurement books verified by the Project Manager /Architect/quantity surveyor periodically.

1.19 **Nominated Sub Contractor:**

"Nominated Sub-Contractor" refers to those specialists, tradesmen and others, whose credentials as well as quotations are evaluated and approved by the Project Manager/Owner and then nominated for executing special works or supplying special equipment or materials, for which provisional sums are included in the Contracts. Such agencies shall be deemed to have been employed by the Contractor.

1.20 **Owner/Institute:**

The Owner/Institute shall mean and include **The Director, INDIAN INSTITUTE OF ASTROPHYSICS**, having their registered office at **Koramangala, Bangalore - 560034, or** their respective successors in office, successors in interest, administrators and assigns etc.

1.21 Owner's Representative:

Owner's Representative shall mean and include the Project Manager and / or any other person duly appointed and authorized by the Owner to act for and on its behalf at the Site during the progress of construction of the Project.

1.22 **Project:**

Project shall mean and include the execution of the Work to be performed under this Contract plus works of all later phases necessary to complete the construction to make it habitable, according to the standards adopted by the Project Manager.

1.23 **Project Manager (PM):**

The Project Manager is authorized to represent and act on behalf of the Owner on a day-to-day basis during all packages of construction of the Project. All communications, approvals and decisions to be taken in connection with the Architect's Services and those of the Owner shall be communicated to and enforced by the Project Manager. In the absence of Project Manager, the representative of the owner/Institute will act as a Project Manager

1.24 **Provisional Sum:**

Provisional sum shall mean a lump sum amount included in the tender documents representing the estimated value of the work for which details are not available at the time of issue of tender

1.25 'Records and Audits':

The contractor shall keep books and records to Project Manager's satisfaction, in such a manner, as to enable the Project Manager to carry out effective financial control and to have necessary reports thereon from the internal auditors of the Contractor, with liberty to the Project Manager to seek inspection thereof to ascertain maintenance of proper records concerning the Project.

1.26 References And Cross-References To Clause And Sub-Clause Numbers:

Unless specifically stated otherwise, all references and cross-references made to clause and sub-clause numbers in these General Conditions of Contract refer to the clauses and sub-clauses of the General Conditions of Contract itself.

1.27 **SHE Plan:**

"SHE plan" means Environmental, Health and Safety Plan prepared by the Contractor for implementation at site, base on and including, without limitation to various Clauses of the Conditions of Contract pertaining to Safety, Health and environment; and approved by the Project Manager.

1.28 Singular or Plural / Typographic Errors:

Words in the singular also include the plural and vice versa, where the context so requires. Words implying persons include persons and corporations. Typographic or spelling errors shall not be cause to vitiate the contract.

1.29 **Site:**

The Site shall mean the location at Leh, Ladakh (Jammu & Kashmir State).

1.30 **Specifications:**

"Specifications" shall mean and include the specifications for the Work included in the Architect's / Consultant's Drawings, the Works Technical Specifications and Priced Bill of Quantities, and any modification thereof or addition thereto.

1.31 **Sub-contractors (Nominated or otherwise):**

"Sub-Contractors" shall mean and include the persons, firms, companies or agencies who after approval of the Project Manager, have entered into a direct Contract with the Contractor in respect of any part of the Work and any later package of the Project, and include the Sub-contractors' legal representatives, successors and permitted assignee. The Contractor shall have full responsibility for the actions and work of any Subcontractor whether contracted by the Contractor to perform portions of the Work or for any later package of the Project.

1.32 Tender:

"Tender" shall mean and include the Contractor's offer to construct and maintain the Work in strict accordance with the Contract Documents as set forth on the Tender Form

1.33 **Tender Documents:**

"Tender Documents" shall mean and include Notice Inviting Tender, Tender Form and Contract Agreement Draft, General Conditions Of Contract, Special Conditions Of Contract, Works Technical Specifications, Bill Of Quantities With Detailed Specifications, Environmental, Health & Safety (SHE) Plan, Preliminary Project Construction Schedule, Drawing – Site Location, Drawings for Works.

1.34 **Temporary Works:**

Temporary works mean all temporary works of every kind required for the execution of the works by the Contractor.

1.35 Terms "/", "and", "or", "and/or":

The terms "/", "and, "or", "and/or" used in context with the description or enumeration of two or more items or components of work of documentation or anything similar shall mean as is relevant and applicable to the text and context.

1.36 **Urgent Works:**

"Urgent works" shall mean any urgent measures which in the opinion of the Project Manager becomes necessary during the progress of the work to

obviate any risk of accident or failure or which become necessary for security for completing the overall project within the stipulated time.

1.37 Vendors:

"Vendors" shall mean and include all suppliers, contractors, sub-contractors, nominated sub-contractors and trade contractors engaged for same / later phase(s) of the Project, when such Vendors are in privity of Contract with the Project Manager / Owner.

1.38 **Virtual Completion:**

Virtual completion will be deemed to have been achieved upon a Virtual Completion Certificate being issued by the Project Manager with concurrence of the Architect and the Owner, when the Work, according to the Project Manager, Owner and Architect, have been completed in every respect in conformity with the Contract Documents and are ready and fit for the intended purpose, complete with all systems and services having been tested and commissioned.

1.39 Written Notice:

Written Notice shall be deemed to have been duly served if delivered in person to the **authorized representative** of the firm / company for whom it is intended, or if delivered at and a written delivery receipt obtained or sent by registered mail to the last business address known to them, who gives the notice.

1.40 **Work:**

"Work" shall mean and include the items of work included in this Contract Document, all materials, Plant & machinery, equipments, tools and labour necessary to complete all components of the Project in full compliance with the requirements of the Contract Document.

1.41 Working day, Day, Week and Month:

Working Day shall mean and include any day from Monday to Saturday (both days inclusive) excluding Public Holidays. Work at site shall continue over Sundays and all holidays excepting statutory Government public holidays.

"Week" shall mean 7 days without regard to the number of hours worked in any day in the week.

"Month" shall mean English Calendar month, without reference to the number of days worked during this period.

[&]quot;Day" shall mean a calendar day of 24 hours each.

2. SCOPE, EXTENT, INTENT ETC.:

2.1 **Scope:**

The general character and the scope of the Work shall be as illustrated and defined in the Drawings, Specifications, Schedule of Rates and other Contract Documents.

2.2 Extent:

The Contractor shall carry out and complete the Work under the Contract in every respect, and his work shall include the supply of all labour, equipment, materials, plant and machinery, tools, transportation, form work, scaffolding and everything else necessary for the proper execution and completion of the Work in accordance with the Contract Documents and to the directions and satisfaction of the Project Manager, Architect and Owner. The Contractor shall be fully responsible and liable for everything and all matters in connection with or arising out of or being a result or consequence of his carrying out or omitting to carry out any part of the Work. Where any parts of the Work may be executed by Sub-Contractors, such responsibility and liability of the Contractor shall cover and extend to the work of all such Sub-Contractors.

2.3 Intent:

The Contract Documents are complementary and what is called for by any one shall be binding as if called for by all. Wherever it is mentioned in the Contract Documents that the Contractor shall perform certain work or provide certain facilities, it is understood that the Contractor shall do so at his own cost. Materials or work described in words which so applied have a well-known technical or trade meaning shall be held to refer to such recognised standards as are applicable.

2.4 Instructions of Project Manager:

The Architect through the Project Manager may from time to time, issue further supplementary Drawings, written instructions, details, directions, and explanations, which shall be collectively referred to as the Instructions of Project Manager. The Contractor shall forthwith comply with and duly execute the work comprised in such Instructions of Project Manager, provided always that verbal instructions, directions and explanations given to the Contractor or his works representative by the Architect or Project Manager shall, if involving a variation, will be got confirmed in writing from the Project Manager, by the contractor.

2.5 **Approval of Project Manager:**

Approval of the Project Manager shall always mean approval in writing. The onus shall be on the Contractor to obtain all the necessary approvals in writing. Such approvals, however, shall not relieve the Contractor of any of his responsibilities under the Contract.

2.6 Increases/Decreases to scope of Work:

The Owner / Project Manager reserves the right to increase or decrease the scope of the Work on any or all items or to change the nature of the Work involved in any or all items or to completely delete any items of the Work under the Contract. The Contractor shall not be entitled to claim for loss of

anticipated profits, for mobilization of additional resources, or for any other such reason on account of these change orders.

2.7 Items of work for completion:

The Contractor is bound to carry out any items of work necessary for the completion of the Work even though such items of work may not be expressly described in the Contract Documents/ Drawings.

3. PROJECT MANAGER, OWNER'S REPRESENTATIVE, AND CONTRACTOR'S REPRESENTATIVE:

The status, duties and responsibilities of the Project Manager, Owner's Representative, and Contractor's Representative shall be as detailed below:

3.1 Role and responsibilities of the Project Manager:

- i. The Owner will be represented for the purpose of the execution of the Contract by the Project Manager. The Project Manager shall be responsible for the day-to-day supervision, quality control checks, progress monitoring, co-ordination and direction of the Work, and generally to ensure that the Work is carried out in all respects in strict conformity with the Contract Documents.
- ii. The Project Manager shall have the authority to stop the work whenever such stoppage may be necessary to ensure the proper execution of the Work. The Contractor shall provide all the necessary facilities to the Project Manager in the performance of his duties. The Contractor shall refer all matters relating to the performance of the Contract to the Project Manager.
- iii. The Project Manager shall observe sound and established engineering practices using latest standards, codes and regulations, as applicable for the purpose specified and suitable for respective uses intended.
- iv. The Project Manager shall exercise intimate, constant and continuous supervision and control over the workmanship and materials, plant, machinery, equipment etc used in the Work and may when required, get them inspected.
- v. The Project Manager shall check the measurements of the Contractor's bills and forward the same to the Architect for verification and Certification for payments.
- vi. To process the bills and Architect's Certificate for payment and release payments to the Contractor as appropriate.
- vii. Project Manager shall remain in close contact with the Architect and shall obtain co-operation and co-ordination from him for effective progress and development of the Works at site.

viii.

3.2 Decision:

The Project Manager shall make decisions with or without consultation and concurrence of the Owner and the Architect on all matters relating to the execution and progress of the Work, including the claims and queries of the Contractor. The decision, opinion, direction and interpretation of the Project Manager, with respect to any or all matters shall be final and binding on the Contractor.

3.3 Role and responsibilities of the Owner:

- i. The Owner shall be represented at the Site by the Project Manager and shall be responsible for the interaction with the Project Manager.
- ii. The Owner shall have the authority to make and communicate all decisions to the Project Manager for implementation, as called for in this Contract to be made by the Owner.

3.4 Role and responsibilities of the contractor's representative:

- i. The Contractor shall be represented at the Site by the Contractor's Representative. The Contractor's Representative shall be on Site at all times during performance of the Work and the Project Coordination Services and shall be responsible for the day-to-day interaction with the Project Manager and the Owner's Representative.
- ii. The Contractor's Representative shall have the authority to make and communicate all decisions called for in this Contract to be made by the Contractor or the Contractor's Representative. The Contractor's Representative shall be responsible for the day-to-day supervision and overseeing of the Project Coordination Services, including, without limitation, the SHE Plan implementation described in Clause 1.27 of the Definitions.

3.5 Architect's Role and Obligations:

- i. The Architect shall be responsible for undertaking the design, the specification and the production of drawings for the Work.
- ii. The Architect shall be responsible for periodic supervision of works to evaluate contractor's works and to ensure that the work is executed as per the desired quality standards, integrity, building design, safety, statutory compliance and conformance with design, conceptual and contractual intent.
- iii. The Architect shall be responsible to issue control samples and to inspect samples/ mock-ups to ensure that they are as per the desired specifications and quality standards.
- iv. The Architect shall review, verify, evaluate and provide its recommendation to the Project Manager on the shop-drawings, design calculations, product data, samples, mock-ups, extra/additional/deduction items, rate analysis, quotes, selection of sub-contractors etc. proposed by the Contractor.
- v. Where necessary the Architect shall perform plant inspection at workshops of the contractor.
- vi. The Architect shall verify all Contractor's bills, the measurements of which have been checked by the Project Manager and issue Certificates for

- payments to enable the Project Manager / Owner to process the bills and release payments to the Contractor as appropriate.
- vii. The Architect shall assist the Project Manager in joint inspection of the buildings on their completion to maintain and provide list of items to complete, defects to correct, virtual & final completion certificates to the Project Manager.
- viii. The Architect shall make and communicate all decisions to the Project Manager as called for in this Contract to be made by the Architect.

3.6 Access For Owner, Owner's Representative, Architect And Project Manager To The Works:

The Owner, Owner's Representative, Project Manager, the Architect, and their respective consultants shall at all times have access to the Work and the Site and to the workshops or other places of the Contractor where the Work is to be so prepared and in workshops or other places of Sub-Contractors and suppliers. The Contractor shall by a term in its Sub-Contracts so far as possible, secure a similar right of access to those workshops or places for the Owner, Owner's Representative, Project Manager, Architect, and their respective consultants and shall do every thing for the purposes of carrying out inspections to ascertain and ensure that work is being carried out in conformity with the Contract Documents or for any other purpose in connection with the Work under the Contract.

3.7 Contractor's responsibilities:

The Contractor shall have the following responsibilities in carrying out the Work and the Project Coordination Services, respectively:

- i. The Contractor shall, on the instruction of the Project Manager, immediately dismiss from the Work any person employed thereon by him who may, in the opinion of the Project Manager / Owner, be incompetent or who engages in unlawful or disorderly conduct, and such persons shall not be re-employed on the Work without the prior written permission of the Project Manager.
- ii. Contractor shall indemnify the Owner & Project Manager for loss suffered by the Owner & Project Manager on account of any act/omission/neglect of the Contractor's, workers, employees, Sub-Contractors etc.
- iii. The Contractor shall comply with all safety standards to the satisfaction of the Project's Manager.
- iv. The Contractor shall take full responsibility for the management & supervision of the Sub-Contractors.
- v. The Contractor shall ensure that all Sub-Contractors engaged exercise all such skill, care and technical competence as represents a high standard within their respective professions or trades as is appropriate for the satisfactory execution of their work and services.

- vi. The Contractor shall not assign this Contract or any part of it. The Owner / Project Manager and Architect reserves the right to review and approve each Sub-Contractor which the Contractor recommends at any time to engage to perform any services before such Sub-Contractor is hired or performs any service.
- vii. The Contractor shall be responsible for the care of the Work and the management and supervision of the Sub-Contractors.
- viii. The Contractor shall exercise constant and continuous supervision and control over the workmanship, materials, plant, machinery, equipment etc used in the Work and report on the status of the same to the Project Manager.
- ix. The Contractor will be responsible for obtaining all necessary permits, approvals, certificates and the like.
- x. All the obligations and responsibilities of the Contractor under the Contract shall be discharged by him subject to the satisfaction of the Owner / Project Manager.
- xi. Any activity conducted or responsibility assumed by the Owner or the Project Manager shall not relieve the Contractor of any of its obligations and responsibilities under the Contract.
- xii. The contractor shall use latest standards, codes and regulations, as applicable for the purpose specified and suitable for respective uses intended. The contractor must keep at site the latest IS codes in CD form for quick referencing.
- xiii. The contractor shall ensure that all work complies with statutory norms and regulations.

The Contractor shall co-ordinate and provide the facilities mentioned in Bill of Quantities free of charge to the agencies / Vendors and nominated Subcontractors appointed directly by the Project Manager / Owner.

4. SITE:

4.1 Contractor to satisfy himself about site conditions:

The Contractor represents that before tendering for the Work the Contractor has visited the Site and satisfied himself about the Site conditions for construction and for logistics and smooth flow of workmen and materials as well as permission from Authorities for this purpose. The Contractor has examined the Site and taken note of character of the soil and of the excavations, the correct dimensions of the Work, and facilities for obtaining any special articles called for in the Contract Documents. The Contractor has also made its own assessment and obtained all information on the Site constraints and on all matters that will affect the execution, continuation and progress, and completion of the Works. Any extra claims or extension of time made in consequence of any misunderstanding, incorrect information on any of

these points or on the grounds of insufficient description or information shall not be entertained or allowed at any stage.

4.2 Access to site by the contractor:

The access to the Site will be shown immediately on award of the Contract to the Contractor and the Site shall be shared with other Vendors and Sub-Contractors as applicable. The Contractor shall upon being given such access commence the Work and diligently proceed with the execution of the Work in accordance with the Contract Documents. Access to the Site by the Contractor shall be merely a licence for carrying out the construction of the Work under the Contract, and the Contractor shall not by his being allowed such entry on the Site, acquire any right, lien or interest either in the Work carried out by him under the Contract or anything appurtenant or attached thereto or to any part of the Site, and his claim will only be in the nature of money found due and payable to him in accordance with the certificates issued by the Project Manager / Architect under the provisions contained herein. The Work shall be free from all liens, charges or claims of whatsoever nature from any party other than the Owner / Project Manager. The Owner / Project Manager shall have a lien over all work performed by the Architect, the Contractor, Sub-Contractors and Vendors and also for the materials and equipment brought on Site by them.

4.3 Treasures, Antiquities found are property of owner:

All fossils, antiquities and other objects of interest or value, which may be found on the Site at the commencement or during the progress of the Work shall be the property of the Owner. The Contractor shall carefully take out and preserve all such fossils, antiquities and objects and shall immediately deliver the same in their discovered state into the possession of the Owner.

5. NATURE OF CONTRACT:

ITEM RATE Contract:

The Contract shall be an item rate Contract wherein the item rates are for the finished work as per the Contract Documents. The Contractor shall be entitled to payment, in Indian Rupees, of no more than the Contract Price as stated in the Letter of Intent / Work Order, in consideration of the Work performed and completion of the Work. The contract price is tentative based on the estimated quantities and is liable to change as per the actual quantities executed and approved by the Project Manager. The Contractor understands and agrees that the amount payable is assessed on a remeasurable basis in accordance with the tendered rates. However, the Contract Price may be altered on account of a change order approved in advance by the Owner / Project Manager. The Contract Price shall include payment for the supply of all labour (including payment to his Sub-Contractors), equipment, materials, plant and machinery, tools, transportation, framework, scaffolding, works under this tender and all applicable taxes excluding Service Tax but including the Work Contract Tax (WCT), VAT, duties, octroi, levies, royalties, fees, insurance premiums, contributions towards employees benefits including ESI and PF and funds, arrangement of power and water and all services and activities constituting the Scope of Work defined in the General Conditions of Contract. The Contract Price shall also include the Contractor's establishment, infrastructure, overheads & profits and all other charges, and shall generally be inclusive of every cost and expense required by the Contract to be borne by the Contractor and necessary for the proper execution and completion of the Work under the Contract, in conformity with the Contract Documents and the best engineering and construction practices and to the satisfaction of the Architect, Project Manager, and the Owner.

No escalation of the prices shall be allowed during the period of the contract for any reasons whatsoever and the prices quoted by the Contractor shall be deemed to be fixed.

6. TAXES, DUTIES ETC.:

As part of the Contract Price, the Contractor shall, in connection with the Work include sales tax, octroi, all applicable duties, works contract tax and any other taxes including sales tax on the Work, VAT, levies or royalties payable on the materials and equipment forming part of the Work, now or hereafter imposed, increased or modified from time to time and shall also include any other statutory obligations and no claims on this account shall be entertained or allowed at any stage subsequently. Tax including Work Contract Tax (WCT) shall be deducted as applicable at Source in accordance with the statutory requirements from all payments made to the Contractor, including that in respect of the Mobilization advance. Contractor shall provide Form 'C', Form '38', or any other forms and comply with all the formalities that may be required by the Central/State Government for procurement of Owner supplied material, if any, and shall be liable to file all such returns with the Government Departments as may be necessary and get them assessed at his own cost. GST will be quoted separately and paid as per the rate quote in the respective bills.

7. NOTICES, FEES, BYELAWS, REGULATIONS, ETC.:

The Contractor shall comply with all applicable laws and Government Acts including the Byelaws or regulations of Central and / or Local Authorities relating to the Work in so far as labour, construction, fabrication and installation activities are concerned, and he shall obtain from the Central and / or Local Authorities all permissions and approvals required for the plying of trucks, construction machinery etc., and also for construction of temporary offices, labour camps, stores and other temporary structures in connection with the Work, and the Contractor shall give all notices and pay all fees and charges that are and that can be demanded by law thereunder. In the Contract Price for the Work, the Contractor shall allow for such compliance and work, and for the giving of all such notices, and shall include the payment of all such fees and charges.

8. LICENCES AND PERMITS:

The Contractor shall directly obtain all licences and permits for the materials under Government control, and those required to be obtained by the Contractor for the execution of the Work. The Contract Price shall include all transportation charges and the other expenses that may be incurred in this connection.

9. ROYALTIES AND PATENT RIGHTS:

All royalties or other sums payable by the contractor in respect of the supply and use of any patented articles, processes or inventions for the carrying out of the Work as described by or referred to in the Contract Documents, shall be deemed to have been included in the Contract Price. The contractor shall keep the Owner & Project Manager indemnified against all such demands as may arise on account of payment of royalties.

10. INSURANCE:

10.1 **Insurance Policies:**

Before commencing the execution of the Work, the Contractor, without limiting his obligations and responsibilities under this Contract shall insure in the joint names of the contractor and Owner, latter being the beneficiary, against his liability for any material or physical damage, loss or injury which may occur to any property, including that of the Owner/Project Manager/Architect, Sub-Contractors, Vendors or to any person including any employee of the Owner/ Project Manager/Architect, Sub-Contractors, Vendors or a member of the general public, by or arising out of the execution of the Work or in carrying out the Contract. It shall be obligatory for the Contractor to obtain and retain for all relevant times the insurance cover (in the joint names of the contractor and Owner, latter being the beneficiary) under the following policies:

- 10.2 i) Contractor's All Risk Insurance and Extensions on first loss basis: Policy to inter alias cover the following:
 - a. Contract works for entire Contract Value plus cost of Owner supplied material (if any) valid for the completion period and any extension thereof.
 - b. Earthquake, Civil commotion, riots, war and other disturbances.
 - c. Debris removal.
 - d. Extended Maintenance Cover till completion of Defects Liability Period and any extension thereof.
 - e. Third Party Insurance including Cross Liability: To cover for any damages to third party. The limit of indemnity in respect of Any one Accident or series of accidents arising out of one event shall be Rs. 1,00,00,000/. Policy shall be valid till completion of work and any extensions thereof and shall include any damage to the properties and/or injury including death to the persons of the general public and any one else deemed to be third party.
 - **ii)** Workmen's Compensation Insurance Policy to cover Contractor's liability under Workmen's Compensation Act 1923, Minimum Wages Act 1948, Contract Labour (Regulation and Abolition) Act 1970 and other relevant Acts listed elsewhere. This shall be valid for the period up to Final Completion of the Work, and any extensions thereof plus six months handing over period.
 - **iii)** Marine cum Erection Insurance (Required only in case Contractor's scope of work involves transportation and erection of equipments & machines for incorporation in Project) Policy against damage or loss due to any reason in respect of materials, equipment and/or work done. Limit of liability shall not be less than the value of such equipment, materials and/or work done at any stage of the Contract, valid for the period of completion including Defects Liability Period and any extensions thereof.

The Contractor shall insure against all such liabilities and shall continue such insurances during the currency of the Contract including the Defects Liability Period. Premium for all insurance policies shall be paid and borne by the Contractor and shall not be reimbursable.

The Contractor shall provide to the Project Manager all policies of insurance in original. These policies shall be fully executed and shall state that the policies cannot be cancelled until completion of the Contract including defects liability period and any extensions thereof.

The Contractor shall obtain similar policies from all Sub-Contractors and thereby assume responsibility for any claims or losses to the Owner and Project Manager resulting from failure of any of the Sub-Contractors to obtain adequate insurance protection in connection with their work and shall indemnify and keep indemnified the Owner and Project Manager including their employees, officers, servants, agents and any other person moving in the premises, accordingly.

10.3 **Failure to insure:**

If the Contractor fails to comply with the terms of this Clause 10, the Project Manager may effect and / or keep current (but without obligation to do so) the insurance at the cost and expense of the Contractor and at two times the expenses incurred, deduct the expenses from any moneys that may be or become payable to the Contractor or may, at his option, refuse payment of any certificate to the Contractor until the Contractor complies with this condition.

10.4 Unlimited liability:

In addition to the liability imposed by law upon the Contractor for injury (including death) to persons or damage to property by reason of the negligence of the Contractor or his agents, which liability is not impaired or otherwise affected hereby, the Contractor hereby assumes liability for and agrees to save the Owner and Project Manager including their employees, officers, servants, agents and any other person moving in the premises harmless and indemnifies them from every expense, liability or payment by reason of any injury (including death) to persons or damage to property suffered through any act or omission of the Contractor, his employees, agents, servants, workmen, suppliers or any of his Sub-Contractors, or any person directly or indirectly employed by any of them or from the conditions of the Site or any part of the Site which is in the control of the Contractor or his employees or any of his Sub-Contractors, or any one directly or indirectly employed by either of them or arising in any way from the Work.

11. CONTRACTOR'S SITE ORGANIZATION AND RESOURCES:

11.1 Contractor's representative and supervisory staff:

The Contractor shall at his cost provide and ensure continued effective supervision of the Work with the help of the Contractor's Representative, assisted by team of qualified, experienced and competent engineers, supervisors and adequate staff, to the satisfaction of the Project Manager for the entire duration of the Work. The Contractor shall submit his proposed site organization chart for the approval of the Project Manager. The Contractor's Representative shall be on the Site at all times as the Work and the Project progresses and shall be responsible for carrying out the Work to the true meaning of the Drawings, Specifications, Conditions of Contract, Schedule of Rates, the other Contract Documents, and instructions and directions of the Project Manager. The instructions and directions given in writing to the

Contractor's Representative or to any of his assistants at the Site by the Project Manager shall be deemed to have been given to the Contractor officially. Attention is called to the importance of the Contractor requesting written instruction from the Project Manager before undertaking any Work where the Project Manager's and/or Owner's and / or Architect's direction or instructions are required. Any such Work done in advance of such instructions will be liable to be removed at the Contractor's expense and will not be paid for unless specifically approved in writing by the Project Manager, as the case may be.

All key staff employed at the Site by the Contractor shall be considered essential to the performance of the Work and the Project Co-ordination Services, and all key staff shall be subject to the approval of the Project Manager. However such approval shall not relieve the Contractor of any of his Contractual obligations. No staff including the resident engineer and other technical supervisory staff shall be removed or transferred from the Work without the prior written permission of the Project Manager. The Project Manager shall, however, have the authority to order the removal from Site of any undesirable personnel. If key staff becomes unavailable for assignment to the Work or the Project Co-ordination Services for reasons beyond the Contractor's control, the Contractor shall immediately notify the Project Manager to evaluate the impact on the project. Prior to substitution or addition of any key staff, the Contractor shall obtain the Project Manager's written consent as to the acceptability of replacements or additions to such personnel. The Contractor shall at all times be fully responsible for the acts, omissions, defaults and neglect of all of his representatives, agents, servants, workmen and suppliers and those of his Sub-Contractors.

11.2 Man-power and plant and machinery:

The Contractor shall at his own cost provide and install all equipment, materials, plant/machines. Provision of Passenger Lift, Batching Plant, Concrete Pumps, Cranes, and Material Hoists each of adequate capacity, will be required in case of bulk concreting and high-rise tower construction. Other equipments like concrete mixers (weigh batchers in case of design mixes), ladders, and scaffolding etc, necessary for the execution of the Work in conformity with the Contract Documents and to the satisfaction of the Project Manager will also be provided by the contractor at his own cost in adequate quantity. Also, all machines, tools, trucks, formwork material, man-power and every thing else necessary for the proper and satisfactory execution and completion of the Work in accordance with the Contract Documents shall be provided by the Contractor at his own cost. The Contractor shall within two weeks of the award of Contract submit a complete list of his manpower, plant and machinery for the approval of the Project Manager which approval however shall not relieve the Contractor of any of his responsibilities, obligations and liabilities under the Contract. The Contractor shall augment his manpower, plant and machinery without extra cost to the Project Manager whenever required or so directed by the Project Manager in order to conform to the approved construction programme for the achievement of milestones and Virtual Completion.

The batching plant shall be computerised (Microprocessor based) with printing facility so as to keep the printed out-put for each batch of concrete mix and for

each component (stone aggregates, sand, cement, fly ash, water, plasticiser & any other concrete admixture) for each batch of design mix concrete.

11.3 Contractor store, site offices and other facilities:

Contractor has inspected the site and has made his own assessment towards the availability of space at site for his stores, yards, offices, placement of batching plant, steel & shuttering yards, cranes, material hoists and other facilities. A mutually determined area within the constraints of the Site will be allowed to the Contractor free of cost for the purpose of storing his tools, plant, materials, Site office, cement godown, canteen, plant & machinery etc. Incase contractor is not able to accommodate his facilities within the site, or in the opinion of the Project Manager contractor's facilities are to be removed or relocated in the interest of the progress of work (contractor's and / or any other agencie's / vendor's) the contractor shall make his own arrangements elsewhere out side the site at his own cost for the same. Water tank for the purpose of construction, Site offices, toilets, workshops and storage sheds etc. shall be built by the Contractor at the Contractor's cost. Water tank/s constructed for the purpose of construction should be of such dimensions as to provide storage for at least two days consumption. Site offices shall be of such dimensions to accommodate the Contractor's own office. A separate sanitary facility shall be provided and maintained for, Engineers and workers. The same shall be cleared after construction period. The Contractor shall remove all the temporary construction constructed by him at the Site for the purpose of completing the Work after the Project is completed. Costs of all such facilities including construction & removal shall be borne by the Contractor. Construction of labour hutments will not be allowed inside on the Site. The Contractor shall at his own cost make all arrangements for space, lodging, transportation etc. for the labour. person will be allowed to stay on Site except the security and watchman except during night construction when the Work is in progress.

11.4 **Security:**

The Contractor shall at his cost provide at all times adequate number of watchmen to guard the Site, materials and equipment, to the satisfaction of the Project Manager. The Contractor shall at all times be fully responsible for the security of all materials and equipment on the Site, whether his own or those of any Sub-Contractor. Owner / Project Manager shall not be responsible for any loss due to theft, fire, accident or any other reasons, whatsoever.

11.5 **Telephone / Communication:**

The contractor shall make his own arrangement for the telephones and mobile phones at site with information to the Project Manager. The Contractor shall provide his representative and key personnel with mobile phone for round the clock communication with Project Manager. Contractor shall also at his own cost ensure two way communication either by way of providing, maintaining and running the walkie-talkie or mobile phones of adequate range at site, between the Project Manager's team members and contractor's own key personnel (from Project In-charge to function / area In-charge level) deputed at site, with whom Project Manager would required to interact on day to day basis.

11.6 **Survey Equipment:**

The Contractor shall keep & provide sufficient number of required survey equipments as at site for his own use. The contractor will provide at his own cost for the sole use of the Project Manager survey equipment as required by the Project Manager.

11.7 Sanitary Convenience:

The Contractor shall at his expense provide and erect with prior permission and details to the Project Manager all necessary sanitary conveniences including septic tank and soak pits at the Site for the staff and all workmen of his own, his Sub-Contractors, the Owner's Representative and the Project Manager. The sanitary conveniences shall be strategically located around the Site to provide ready access to all site operatives and employees. The Contractor shall maintain such convenience in a clean, hygienic, orderly condition and shall clean, disinfect and deodorize the ground after their removal, and meet all statutory requirements.

11.8 Scaffolding, staging, guard rails, barricades:

The Contractor shall at his cost provide steel scaffolding, staging, guard rails, barricades and safety barriers around all excavations, openings and at all edges, temporary stairs and other temporary measures required during construction. The supports for the scaffolding, staging guard rails, barricades and safety barriers and temporary stairs shall be strong, adequate for the particular situations, tied together with horizontal pieces and braced properly. The temporary access to the various parts of the building under construction shall be rigid and strong enough to avoid any chance of mishaps. The entire scaffolding arrangement together with the staging, guard rails, barricades and safety barriers, and temporary stairs shall be to the approval of the Project Manager which approval however shall not relieve the Contractor of any of his responsibilities, obligations and liabilities for safety and for timely completion of the Work. The use of wooden scaffolding on the Site is strictly forbidden.

11.9 **Temporary Roads:**

The Contractor shall at his cost construct and maintain temporary roads/access ways to suit Site requirements at locations mutually agreed with the Project Manager. Such roads/access ways will also be used by other Vendors working at the Site.

11.10 Safety Equipment & Personnel:

The Contractor shall provide sufficient helmets, safety boots/shoes, nets and protective clothing for use by the Project management team, his own staff and staff of its sub-contractors. The Contractor shall make available at all times when work is being undertaken, a vehicle suitable for the emergency evacuation of personnel from the site to a hospital staffed and equipped to receive injured personnel.

The contractor shall provide a fulltime, experienced and suitably qualified Safety Officer at site who shall be responsible for incorporation, implementation and enforcement of all safety measures and requirements for maintaining safe working conditions, safety of manpower and equipment,

general safety and security of Site as per the various safety codes and stipulations mentioned in contract documents.

The Contractor shall provide I-Cards (Identity Cards) to each of his worker with designated number & colour only of the card as directed by the Project Manager.

11.11 **Temporary Lighting:**

The Contractor shall make his own arrangement in respect of the provision of adequate lighting at all places where his workmen are engaged for carrying out the Work and also provide general lighting of site as a whole in a proper safe and satisfactory manner. Contractor shall ensure that all staircases, lobbies and basements are well lighted by providing at least one tube light at each landing of every staircase and also in each lift lobby. The Contractor shall provide general lighting in basement by installing at least one tube light per 100 sqm area at his own cost.

11.12 **Protection of Environment:**

The Contractor understands that the Site is free from pollutants at the time of access to the Site and commencement of the Work. The Contractor shall comply with all applicable environmental laws and regulations and shall ensure that the Site is and remains free from pollutants at the end of the Project. The Contractor shall ensure inter-alia, that neither the soil nor the ground water is polluted or contaminated by fuels or lubricants emitted by machinery operated on the Site or by other dangerous or poisonous substances which are or are deemed to be hazardous to the environment. Notwithstanding the above, the Contractor shall comply with all the directions and decisions of the Project Manager in this regard.

11.13 First Aid Equipment & Medical Facilities:

The Contractor shall establish a fully equipped and staffed (trained) first aid centre on the Site to deal with accidental injuries and workers health. Contractor shall ensure that a qualified & registered doctor is engaged to regularly visit the site for labour welfare. The Contractor shall provide such first aid and medical facility to at his own cost.

The Contractor shall make necessary arrangements with a local hospital and with local doctors so that his sick or injured persons may receive prompt medical treatment with minimum delay at any hour of the day or night.

12 LABOUR REGULATIONS:

12.1 **Regulations:**

The Contractor shall be wholly and solely responsible for full compliance with the provisions under all labour laws and /or regulations such as Payment of Wages Act 1948, Employees Liability Act 1938, Workmen's Compensation Act 1923, Employees State Insurance Act 1948, Employees Provident Fund Act 1952, Industrial Disputes Act 1947, the Maternity Benefit Act 1961, the Contract Labour (Regulation and Abolition) Act 1970 and the Factories Act 1948 or any modifications thereof or any other law relating thereto and rules there under introduced from time to time. The Contractor shall assume liability and shall indemnify the Owner & Project

Manager from every expense, liability or payment by reason of the application of any labour law, act, rules or regulations existing or to be introduced at a future date during the term of the Contract. Insurance cover towards the above shall be effected by the Contractor as called for in Clause 10. In general, in respect of all labour directly or indirectly employed in the Work for the performance of Contractor's part of the Contract, the Contractor shall comply with all the rules framed by the Government authorities concerned from time to time for protection of the health and welfare of the workers. The Contractor shall at his own cost obtain a valid licence for himself and the Owner / Principal Employer under the Contract Labour (R & A) Act 1970 and the Contract labour (Regulation and Abolition) Central Rules 1971 and under any other applicable rules before the commencement of the Work and continue to have a valid licences until the completion of the Work.

12.2 **Payment of wages:**

The Contractor shall pay to labour employed by him either directly or through Sub-Contractors wages not less than fair wages as defined in the relevant Central / Local Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act 1970 and the Contract Labour Regulation and Abolition of Central Rules 1971, wherever applicable. He shall also abide by the minimum wages and other regulations applicable to the labour engaged in the Work, as laid down by the concerned Central / local authorities (State, District or other local Authorities).

In case the contractor fails to pay fare wages as required by the authorities then the owner/ Project Manager shall be entitled to do so and receives such amounts including associated cost incurred by them in doing so from the contractor.

12.3 **Model Rules:**

The Contractor shall at his own expense comply with or cause to be complied with, Model Rules for labour welfare framed by Government or other local bodies from time to time for the protection of health and for making sanitary arrangements, Malaria control, etc. for workers employed directly or indirectly on the Work and in the workers hutment area. In case the Contractor fails to make arrangements as aforesaid, the Owner shall be entitled to do so and recover the cost thereof from the Contractor

12.4 **Safety Codes:**

In respect of all labour, directly or indirectly employed on the Work for the performance and execution of the Contractor's Work under the Contract, the Contractor shall at his own expense arrange for all the safety provisions as listed in (i) Safety codes of C.P.W.D. and Bureau of Indian Standards, (ii) The Electricity Act, (iii) The Mines Act, and Regulations, (iv) Regulations of employment & conditions of service Act 1996, Rules and Orders made there under and such other acts as applicable.

Precautions as stated in the safety clauses are of minimum necessity and shall not preclude the Contractor taking additional safety precautions as may be warranted for the particular type of work or situations. Also mere observance of these precautions shall not absolve the Contractor of his liability in case of

loss or damage to property or injury to any person including but not limited to the Contractor's labour, the Owner's, Architect's, Owner's Representative's and Project Manager's representatives or any member of the public or resulting in the death of any of these.

Protective gear such as safety helmets, boots, belts, gloves, spectacles, nets, fire extinguishers etc. shall be provided by the Contractor at his own cost to all his manpower at the Site. The Contractor shall impose such requirements on all Sub-Contractors and Vendors also. It shall be the responsibility of the Contractor to ensure that such protective gear is worn at all times by all personnel working at the Site during the term of the Project. The Owner, Project Manager and Owner's Representative shall each have the right to stop any person not wearing such protective gear from working on the Site.

In case the Contractor fails to make arrangements and provide necessary facilities as aforesaid, the Project Manager shall be entitled (but not obliged) to do so and recover the costs thereof from the Contractor. The decision of the Project Manager in this regard shall be final and binding on the Contractor.

12.5 **Safety/Site Conditions:**

- i. The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and ensure that the methods of carrying out the Work and the Project by the Contractor including his workmen, employees, Sub-Contractors and Vendors meet all the necessary safety standards and requirements of the SHE Plan. In order to fulfill this obligation the Contractor shall appoint a permanent, full time and suitably qualified safety officer for the Site.
- ii. The Contractor shall institute and implement to the satisfaction of the Project Manager a construction safety programme, including:
 - a. Preparing a Site-specific written safety programme consistent with the SHE Plan, Indian law and best practices. As a minimum, the programme shall require applicable safety equipment for all workers, use of barriers and barricades around potentially dangerous areas, protection of workers working under elevated conditions, accident reporting, medical & first aid provisions, lighting, housekeeping, sanitation etc.
 - b. Weekly safety reviews and 'risk assessments' shall be carried out in conjunction with the Project Manager and the Owner's representative in order to identify potential safety hazards and to militate against them. Contractor shall be required to maintain proper records of these inspections along with the checklists.
 - c. The Contractor will be required to provide all personnel entering the Site a safety rules card with instructions on Do's and Don'ts and verbal explanation of the safety programme.
 - d. Requiring all Sub-Contractors and other workers under the responsibility of the Contractor (including the Vendors or later

phases of the construction of the Project) to adhere to the written safety programme.

The Contractor has full responsibility for maintaining the Site in good and clean condition and removing all trash and debris on a daily basis to the satisfaction of the Project Manager. The Contractor is responsible for providing adequate sanitary facilities and maintaining them in a clean and healthy condition. If the Contractor fails to comply with the above the Project Manager will have the authority to get the same cleaned by an external agency and debit the expenses incurred on the same to the Contractor's account; but without being under any legal obligation to do so.

If, by reason of any accident, or failure, or other event occurring to, in, or in connection with the Project, or any part thereof, either during the execution of the Work, or during the Defects Liability Period, any remedial or other work is, in the opinion of Owner's Representative or the Project Manager urgently necessary for the implementation of the safety programme of the Project by the Contractor and the Contractor is unable or unwilling at once to do such work, the Project Manager shall be entitled to employ and pay other persons to carry out such work as the Project Manager may consider necessary. If the work or repair so done by the Project Manager is work which, in the opinion of the Project Manager, the Contractor is liable to do at its own cost, then all costs consequent thereon or incidental thereto shall be recoverable from the Contractor and may be deducted by the Project Manager from any of the Retention Money and any moneys due or to become due to the Contractor and the Project Manager shall notify the Contractor accordingly, provided that the Project Manager shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof.

The Contractor shall ensure that all operations by the Contractor, his workmen, employees, Sub-Contractors to complete the Project and the remedying of any defects therein shall, so far as compliance with the requirements of this Agreement permit, be carried on so as not to interfere unnecessarily or improperly with:

- The convenience of the public, or
- The access to, use and occupation of public or private roads, railways and footpaths to or of properties whether in the possession of Owner/Project Manager or of any other person.
- The Owner's /Project Manager's operation and utilization of the facility at the Site;
 and
- The Work of Vendors.

If any hazardous or obnoxious materials (as defined by Indian law) are specified for use or are being used by Sub-Contractors or Vendors, the Contractor shall keep record of such material and forthwith give written notice to the Project Manager and shall ensure that the Sub-Contractors and Vendors, as applicable, use, store and dispose of such hazardous or obnoxious materials strictly in accordance with all applicable laws.

12.6 Additional Safety Regulations:

The Contractor shall continuously maintain adequate protection for the Work against fire and other hazards and shall protect the Owner's /Project Manager's property from damage or loss during the performance of this Contract. The Contractor also shall adequately protect property adjacent to the Work.

The Contractor shall take all necessary precautions for the safety of its employees, Subcontractors and the Vendors performing the Work and later phases of the Project and shall comply with all applicable safety laws and regulations to prevent accidents or injury to persons on, about, or adjacent to the Site.

The Contractor shall be responsible for co-ordinating a safe working programme with the Project Manager. Such a programme shall include, and the Contractor shall be responsible for maintaining, the following safe working conditions and practices:

- i. All combustible material, food matter, garbage, scrap, and other debris generated during the performance of the Work shall be collected and removed from the Site on daily basis. Arrangements for scrap burning should be discussed with Project Manager.
- ii. An adequate number and type of fire extinguishers and sand buckets shall be provided at the Site for fire control and shall be kept/maintained in satisfactory and effective working condition, at all times.
- iii. Rescue operation team with availability of stretchers and transport vehicle. This team shall conduct mock drills at regular intervals. The report of which shall be submitted by the contractor to the Project Manager.
- 12.7 Each gas welding or burning, arc welding unit, tar pot, or open flame unit requires a fire extinguisher and sand buckets with it during operation.
- 12.8 The availability of fire blankets is recommended. Other equipment related conditions are as follows:
 - i. The Contractor shall use only safe equipment in good condition. The Contractor shall not use or permit to be used the Owner's / Project Manager's equipment and the Owner / Project Manager shall not use the Contractor's equipment without prior written permission of the other.
 - ii. When working in an occupied building or area, the Contractor must before commencement of work familiarize himself with the hazards of that area, such as the location of flammable substances and toxic fumes and make suitable precautionary arrangements.
 - iii. Materials and equipment intended for installation in the Work as well as the Owner's / Project Manager's equipment and materials already in place are to be protected at all times from debris, weather, or any damage. The Contractor shall take all steps necessary to ensure the preservation condition of such equipment.
 - iv. The Contractor's materials, tools, and equipment shall be stored only in areas approved by the Project Manager for this purpose.
 - v. Site access and parking by the Contractor's personnel shall be at locations designated by the Project Manager. Only the Contractor's

personnel necessary for the performance of the Work shall be permitted access to the Site. The Contractor and its employees and Sub-contractors shall adhere to all speed limits and traffic regulations at the Site.

- vi. The Contractor and its employees and subcontractors shall strictly obey all "No Smoking" restrictions.
- vii. The Contractor shall not operate or use or manipulate utilities at the Site without the Project Manager's prior written approval.
- viii. No valves shall be turned off or on, or electrical disconnect switches operated except in an emergency. Any required utility "shut downs" will be scheduled and co-ordinated with the Project Manager.
- ix. The Contractor shall make any requests for utility manipulation or "shut downs" in writing on least two (2) days' notice to the Project Manager.

12.9 Safety with regard to site and housekeeping:

The contractor shall depute a dedicated team of adequate number of worker under the responsibility of the Safety In-charge for carrying out the safety and housekeeping work at site on daily basis. Following shall be ensured by the Contractor and his safety & housekeeping team:

- i. The use of intoxicants or unlawful drugs at the Site, in any degree, shall be strictly prohibited. The Contractor shall rigorously enforce this regulation.
- ii. When overhead work is in progress in or around an occupied area, signs to denote such work prominently displaying "Overhead Work" shall be used and a barricade shall protect the area. Safety nets and appropriate catchments provisions shall be provided at suitable levels so as not to allow any material to fall on the ground.
- iii. Dusty work, such as concrete breaking or demolition, in or near occupied areas, shall proceed only after wetting down the area and taking steps necessary to prevent dust from penetrating occupied areas and creating a nuisance.
- iv. Care shall be taken not to block any door, passageway, and safety exit, fire fighting equipment, or safety equipment with materials or equipment.
- v. Materials must be piled, stacked, or stored in a neat and orderly manner. All stacking, whether inside or outside a building, shall be parallel to or at right angles to the building line or fence. The stacking of materials shall be organised on daily basis.
- vi. When noisy operations of a prolonged nature are necessary in or near an occupied area, arrangements must be made with the Project Manager for scheduling to minimize any nuisance in the occupied area.

- vii. All critical and dangerous locations / areas at site shall be marked with caution signs, indications and directions in the form of well designed and uniform signages, the design of signages shall be approved by the Project Manager.
- 12.10 If the Project Manager notifies the Contractor of non-compliance with all or any of the foregoing regulations, the Contractor shall immediately, if so directed, or in any event not more than eighteen (18) hours after receipt of such notice, make all reasonable efforts to correct such non-compliance. If the Contractor fails to do so, the Project Manager may suspend all or any part of the Work. When the Contractor has undertaken satisfactory corrective action, Project Manager shall lift the suspension of the Work. The Contractor shall not claim any extension of time to complete the Work or additional fees due to any such work suspension.
- 12.11 Notwithstanding anything herein before contained, particularly in Clause 12.4 and 12.5, the Contractor shall be liable to ensure and implement all safety measures, whether or not statutorily prescribed, to safeguard, preserve protect the life, health and welfare of every workman employed/deployed/engaged directly or indirectly by the Contractor on the Site and in relation to or connected with the Work and all Vendors employed in later phases of the Project in addition to installing, providing every prescribed safety and protective equipment, clothing etc., and the mere absence of any reference to or specification of a particular statute or rule or regulation in this Contract shall not absolve the Contractor of an obligation to comply with every such law, rule or regulation. The obligations stipulated in Clauses 12.4 and 12.5 shall not in any manner be deemed to limit or restrict any obligation or duty that any law, rule or regulation may otherwise impose upon the Contractor. The Contractor shall be liable for all consequences/liabilities arising out of his violating any of the aforesaid compensations, provisions, including fines, penalties, prosecutions, proceedings, medical expenditure and costs, rehabilitation costs and all other expenses connected therewith.

12.12 **Child Labour:**

The Contractor shall not employ any labour less than 18 years of age on the job. If female labour is engaged, the Contractor shall make necessary provisions at his own expense for safeguarding and care of their children and keeping them clear of the Site. No children shall be permitted on the Site.

12.13 Crèches:

If women workers are employed on the Work, the Contractor shall provide at his expense two rooms of -reasonable dimensions plus toilet facilities for the use of their children under the age of six years. One room shall be used as a playroom and the other as the bedroom of the children. The rooms shall be built to reasonably good specifications in consultation with the Project Manager. The rooms shall be well lit and well ventilated.

The Contractor shall provide adequate number of toys and games in the playroom and sufficient number of cots and beddings in the bedroom. The rooms shall be maintained absolutely clean, employing sweepers.

The Contractor shall provide Dai (ayah) to look after the children in the crèche. The use of the rooms earmarked as crèches shall be restricted to children, their attendants and mothers of the children.

13. CONTRIBUTION TOWARDS EMPLOYEE BENEFITS, FUNDS ETC.:

The Contractor shall include in the Contract Price all expenses necessary to meet his obligations for making contributions toward employee benefits funds (Such as provident fund, ESI benefits, old age pension and/or any other benefits/compensation legally payable) in compliance with all the statutory regulations and requirements. All records in this connection shall be properly maintained by the Contractor and produced for scrutiny by the concerned authorities and the Project Manager and the Owner whenever called for

13.1 Employees' State Insurance Scheme (ESI)

The Contractor shall be liable to pay his contribution and Employee's contribution to the State Insurance Scheme in respect of all labour employed by him or for the execution of the contract in accordance with the provision of "The Employee's State Insurance Act, 1948" as amended from time to time.

13.2 Employees Provident Fund (EPF)

The Contractor shall obtain prescribed recommendations from the Regional Provident Funds Commissioner under the Employees' Provident Fund and Misc. Provisions Act, 1952 and shall cause provident fund contribution from all eligible employees and Contractor's contribution to be deposited regularly with the prescribed authority and in token of which shall submit every month necessary receipts/ documentary evidence as may be required by the Project Manager. The contractor shall also provide its P.F. registration number/ certificate to Project Manager.

In case the contractor fails to comply with above provisions as required by the authorities then the Project Manager shall be entitled to do so and recover such amounts including the associated costs incurred by them in doing so, from the contractor.

The Contractor must fully satisfy himself as to these points and allow coverage for the same in the rates while giving his tender. Nothing extra shall be paid on these accounts.

14. SETTING OUT AND SITE SURVEYS:

The Contractor shall establish, maintain and assume responsibility for all bench marks and grid lines, and all other levels, lines, dimensions and grades that are necessary for the execution of the Work, in conformity with the Contract Documents. The Contractor shall establish his relation to the permanent benchmarks and boundary lines established at the Site. The Contractor shall verify and co-relate all the survey data available at the Site before commencing the Work and shall immediately report in writing any errors or inconsistencies to the PM. Commencement of Work by the Contractor shall be regarded as his acceptance of the correctness of all survey and setting out data available at the Site and no claims shall be entertained or allowed in respect of any errors or discrepancies found at a later date. If at any time error in this

regard appears during his progress of the Work, the Contractor shall at his own expense rectify such error to the satisfaction of the P M

The approval by the Project Manager of the setting out by the Contractor shall not relieve the Contractor of any of the responsibilities, obligations, and liabilities under the Contract.

The Contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignment for all levels and dimensions and for the correctness of every part of the Work, and he shall rectify effectively any errors or imperfections therein. All such rectifications shall be carried out by the Contractor at his own cost and to the instructions and satisfaction of the Project Manager

The Contractor shall employ qualified surveyors to carry out all the surveys and setting out works.

15. DRAWINGS, SPECIFICATIONS, INTERPRETATIONS ETC.:

For guidance of the bidder, Architectural, Structural and Finishing drawings are enclosed with these Tender Documents. These drawings are broadly indicative of the work to be carried out. These drawings are not the 'Construction Drawings' and details indicated there in are for guidance only and are liable to be modified by the Project Manager during course of actual construction. No claim what so ever shall be admissible on account of changes that may be introduced later by the Project Manager / Architect / Consultant.

Within two (2) weeks after the issue of Letter of Intent, the Contractor shall be furnished by the Project Manager and/or Owner with one copies each of the Conditions of Contract, Specifications, and Schedule of Rates, without cost to him for his own use and for the use of his Sub-Contractors until the completion of the Contract. Additional copies of Contract Documents will be supplied on payment at actual cost basis. The architect through the Project Manager shall provide three copies of working drawings to the Contractor as the Work progresses. The timing of the provision of drawings shall be mutually agreed between the Contractor, Project Manager and Architect in conformity with the construction programme and with due regard for the need to order and specify materials and equipment to the Site. Additional copies of construction status drawings will be supplied on payment at actual cost basis. Contractor shall keep atleast one copy readily available at site for inspection and use by the Project Manager or his representative and any other person authorised by them.

In general, the Drawings shall indicate the dimensions, positions and type of construction, the Specifications shall stipulate the quality and the methods and performance criteria, and the Schedule of Rates shall indicate the rates for each item of work for evaluating change orders. However, the above Contract Documents being complementary, what is called for by any one shall be binding as if called for by all. Wherever there is a discrepancy between drawings and specifications, the drawings shall be followed. In interpreting the specifications, the following order of decreasing importance shall be followed:

BOQ Technical Specifications Drawing

Matters not contained in the specifications and in case of any ambiguities in written specifications of the contract, the works shall be executed as per relevant BIS codes and CPWD specifications in that order of preference. If such codes have not been framed, the decision of the Architect shall be final.

Any work indicated on the Drawings and not mentioned in the Specifications or vice versa, shall be deemed as though fully set forth in each. Work not specifically detailed, called for, marked or specified shall be the same as similar parts that are detailed, marked or specified.

From time to time during the progress of the Work, the Contractor will be issued with revisions of Drawings and written instructions by the Project Manager in connection with and necessary for the proper execution and completion of the Work. All such revisions of Drawings and written instructions shall be part of the Contract Documents and the Contractor shall be bound to carry out the work that is shown and detailed on all such Drawings and shall be bound to follow and comply with all such instructions.

The Project Manager will issue all Drawings and their subsequent revisions via listing on transmittals / Register to the Contractor. The Contractor shall maintain a Drawing register listing all Drawings and their latest revisions. All superseded Drawings shall be so stamped and withdrawn from circulation at the Site and returned to the Project Manager. It shall be the responsibility of the Contractor to ascertain and ensure that all the Work is carried out in accordance with the latest revisions of the Drawings issued to him. Should the Contractor fail to do this, all the rectifications and remedial work that may be required to conform to the latest revisions of the Drawings shall be at the Contractor's expense.

Wherever it is mentioned in the Conditions of Contract, Specifications, and other Contract Documents that the Contractor shall perform certain work or provide certain facilities, it is understood that the Contractor shall do so at his own cost, unless otherwise provided in the Documents.

No deviations shall be made by the Contractor, in the execution of the Work from the Drawings, Specifications, and other Contract Documents. Only the Project Manager shall issue interpretations and clarifications.

The Contractor shall immediately in writing bring any errors or inconsistencies in the Drawings and Specifications to the attention of the Project Manager for interpretation or correction before proceeding with the affected portion of the Work, and no claims or losses alleged to have been caused by such discrepancies shall be entertained or allowed at any stage. Local conditions, which may affect the Work, shall likewise be brought to the Project Manager's attention at once. If at any time it is discovered that work, which has been done or is being done is not in accordance with the approved Drawings and Specifications, the Contractor shall correct the work immediately. Correction of such work shall be at the expense of the Contractor and shall not form a basis for any claims for payment or extension of time. The Contractor shall carry out all the rectification work only after obtaining approval for the same from the Project Manager

No scaling of any Drawing shall be done to obtain the dimensions. Figured dimensions on the Drawings shall be used for carrying out the Work. Drawings with large-scale details shall take precedence over small scale Drawings. Where any Drawings and details have not been provided but are necessary for the execution of the Work, it shall be the responsibility of the Contractor to seek these drawings and details in writing from the Project Manager at least four weeks prior to the latest date by which the Contractor needs these drawings and details to suit the programmed execution of the Work. No extension of time shall be allowed for any delays caused due to the Contractor's failure to seek such details.

Drawings, Schedule of Rates, Specifications, and other Contract Documents, and all copies thereof furnished by the Project Manager shall become the Owner's property. They shall not be used on any other work and shall be returned to the Owner at his request or at the completion of the Contract.

16. WATER AND ELECTRICITY:

Applicable as per the Special Conditions of Contract Clause no. 28.

17. ASSIGNMENT AND SUB-LETTING:

The Contractor shall not assign this Contract. The Contractor may, however, sub-contract any part of the Work with the prior written consent of the Project Manager. Any permission to sub-contract parts of the Work shall not relieve the Contractor from any of his responsibilities, obligations, and liabilities under this Contract.

18. SUB-CONTRACTORS:

As soon as practicable, but at **least four weeks** before awarding any Sub-Contract, the Contractor shall submit to the Architect and Project Manager in writing the names of the Sub-Contractors along with their profiles and work experience proposed for any part of the Work, for the approval of the Project Manager. The Contractor shall employ such Sub-Contractors only after he has received confirmation in writing of such approval from the Project Manager. Such approval, however, shall not relieve the Contractor of any of his responsibilities, obligations and liabilities under the Contract. The Contractor shall be responsible for the acts, defaults and neglect of all Sub-Contractors and their agents, servants and workmen. The Contractor shall not employ any Sub-Contractor to whom the Project Manager objects and/or does not approve.

19. SEPARATE CONTRACTS:

The Owner reserves the right to let other contracts in connection with the Project. The Contractor shall afford other contractors reasonable opportunity for their access to the Site, for the storage of their materials, and for the execution of their work, or if specified give assistance to such contractors for such purposes as are specified. The Contractor shall properly connect and co-ordinate his Work with that of the other contractors that may be employed or engaged by the Owner / PM and shall co-ordinate, communication among the PM, Architect, the Contractor, its Sub-Contractors and the Vendors and provide the facilities and oversee construction schedule, construction co-ordination and Site Safety for the Project. If any part of

the Contractor's Work depends for proper execution or results upon the work of any other contractor, the Contractor shall inspect and promptly report in writing to the Project Manager any defects in such work that render it unsuitable for such proper execution and results. The Contractor's failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for receiving the work of the Contractor. Contractor may note that other contractors including civil contractors are already working on other Phases / Parts of the Project for making necessary arrangements to facilitate his own work

20. CO-ORDINATION OF WORK:

At the commencement of the Work, and from time to time, the Contractor shall cooperate with other contractors, Sub-Contractors, persons engaged on separate contracts in connection with the Project, Vendors, the Project Manager, the Owner and the Architect for the purpose of the co-ordination and execution of various parts / phases of the Project. The Contractor shall determine and ascertain from the Vendors and persons engaged on separate contracts, in connection with the Project, the extent of all chasings, cutting and forming of all openings, holes, details of all inserts, sleeves, etc. that are required to accommodate the various services.

The Contractor shall determine and ascertain the routes of all services and positions of all floor and wall openings, outlets, traps, the details of all inserts, equipment and services and shall carry out the construction and making good of all "builder's work" in accordance with and as shown, described and/or measured in the drawings, Specifications, and other Contract Documents. Also, the Contractor shall ensure that all required services, inserts, sleeves, embedment etc. are in place/ position before he proceeds with his work. Should the Contractor fail to comply with these requirements and the consequence of such failure necessitates the breaking, re-doing and making good of any work, then the cost of all such breaking, re-doing and making good of any work shall be to the account of the Contractor and shall be borne by him. No breaking and cutting of completed work shall be done unless specifically authorised in writing by the Project Manager. No work shall be done over broken or patched work without first ascertaining that the broken surface is adequately prepared and reinforced to receive and hold further work, as determined by the Project Manager.

In order to ensure proper co-ordination is being undertaken, weekly meetings, chaired by the Project Manager, will be held with the various contractors and Architect, at which co-ordination will be discussed and minutes of actions proposed circulated.

21. USE OF CONTRACTOR'S FACILITY BY OTHERS:

Contractor shall allow the use of his access ways, scaffolding, temporary staging, lighting, and sources of temporary power and water, to other Contractors, Subcontractors and Vendors etc., where necessary for their legitimate work, without let or hindrance, but in a coordinated manner. Should there be conflict, then direction of the Project Manager shall be final and all parties shall be bound by it. For use of water by other contractor / sub contractor and vendors they shall be allowed to draw only from the source of water free of cost. All extension required thereof shall be done at respective contractors, sub contractors at vendors cost. For electricity similar methodology shall be adopted however the cost of electricity consumption shall be chargeable to other contractors, sub contractors / vendors etc. on prevailing rates of local state electricity board.

22. OVERTIME WORK:

- If it is necessary for the Contractor or any Sub-Contractor to work on other than working days or outside the normal working hours in order to keep up to the time schedule and meet the Construction Programme, the Contractor shall obtain the prior approval of the Project Manager in writing, which approval shall not be unreasonably withheld. The additional cost of wages and any other costs incurred as a result of overtime or any shift work (except supervision expenses incurred by the Project Manager) shall be borne by the Contractor.
- Where work is being carried out in or around an operating plant / office or occupied building /premises and is liable to cause disturbance or interruption in working of the Plant / Office or inconvenience to the occupants of the premises, the Contractor shall work only at specified places and times as mutually arranged between the Contractor and the Project Manager so as not to cause any disturbance. Due to this the Contractor may be required to work during off-hours, Sundays and holidays. The Contractor shall not be entitled for any extra payment for doing work in the manner described above.

23. MATERIALS, WORKMANSHIP, STORAGE, INSPECTIONS ETC.:

23.1(A) Owner Supplied Material: -

- 23.1.1 The Owner will not supply any material. Sole responsibility rests with the contractor for procurement of all other materials required for completion of work within the stipulated time.
- 23.1.2 Materials specified as to be issued by the Owner, if any, will be supplied to the Contractor by the Owner from his stores or the dealer or the dealer's warehouse or railway siding or from any other specified place.
- 23.1.3 It shall be the responsibility of the contractor to take delivery of the materials and arrange for its loading, transport and unloading at the site of work, at his own cost. The materials shall be issued during working hours only.
- 23.1.4 The Contractor shall bear all incidental charges for the storage and safe custody of materials as directed by the Project Manager, at site after these have been issued to him
- 23.1.5 The materials shall be issued in standard sizes as obtained from the manufacturers.
- 23.1.6 It shall be the duty of the contractor to inspect the materials supplied to him at the time of taking delivery and satisfy himself that they are in good condition. After the materials have been delivered, it shall be the responsibility of the Contractor to keep them in good condition and if the materials are damaged or lost, at any time, they shall be repaired

- and/or replaced by the contractor at his own cost, according to the directions of the Project Manager.
- 23.1.7 The Owner shall not be liable for delay in supply or non-supply of any materials, if any, which he has undertaken to supply where such failure or delay is due to natural calamities, transport and procurement difficulties and any circumstances beyond the control of the Owner. In no case, shall the Contractor be entitled to claim any compensation or loss suffered by him on this account.
- 23.1.8 It shall be the responsibility of the Contractor to arrange in time all the materials required for the works. If, however, in the opinion of the Project Manager / Owner, the execution of the work is likely to be delayed due to the contractor's inability to make arrangements for supply of materials which normally he has to arrange for, the project Manager / Owner shall have the right, at his own discretion to arrange for issue of such materials from the market or elsewhere and the Contractor will be bound to take such materials at the rate decided by the Owner. This however, does not in any way absolve the Contractor from responsibility of making arrangements for the supply of such material in part or full, should such a situation occur nor shall this constitute a reason for the delay in the execution of the work.
- 23.1.9 The Contractor shall, if desired by the Project Manager / Owner, be required to execute an indemnity bond in the prescribed form for safe custody and accounting of all materials issued by the Owner.
- 23.1.10A day to day account of the materials issued by the Owner shall be maintained by the Contractor, indicating the daily receipt, consumption and balance in hand, in a manner prescribed by the Project Manager.
- 23.1.11 The Contractor shall see that only the required quantities of materials are got issued. The contractor shall not be entitled to cartage and incidental charges for returning the surplus materials, if any, to a place as directed by the Project Manger.
- 23.1.12 Materials supplied by the Owner, if any, shall not be used for any other purpose other than that issued for.
- 23.1.13 Accounting and reconciliation of materials supplied by owner shall be done as per procedure given in Annexure 2.

23.1(B)Contractor Supplied material

23.1.1 All the materials including reinforcement steel & cement shall be procured by the contractor. Basic rates for selected materials and fixtures in the tender are provided to enable the contractor to quote the item rates accordingly. Quoted rate to include labour, basic cost of material, cost of accessories, taxes, payment to suppliers, transportation, handling, storage, safety, wastage, accounting and reconciliation and to provide Form 'C' & '38' and any other

documents/formalities for purchase of materials, cost of electricity, water, WCT, VAT and contractor's overheads and profits etc.

- 23.1.2 In case the Contractor fails / refuses to procure and provide any material, the Project Manager in the interest of the work may resort to procure and provide such materials at the risk and cost of the Contractor. Under such circumstances a procurement charge @ 15% of the respective item rates shall be imposed on the Contractor and recovered from his bills / any outstanding payments. Clauses 23.1.2 to 23.1.13 shall mutatis mutandis apply to such materials.
- 23.1.3 The materials shall be fully accounted for by the Contractor as required hereinafter. In accounting for the materials, allowances, as indicated in the Annexure 1 & 2 against each item, will be made to cover all wastages and losses that may have been incurred in the process of handling, storing, cutting, fabrication, fixing and installing. The contractor shall submit statement of account and reconciliation of material lying in Contractor's stores along with each Running Account Bill and consolidated statement of reconciliation along with Final Bill.
- 23.1.4 The Contractor shall, at all times when requested, satisfy the Project Manager by the production of records or books or submissions of returns that the materials are being used for the purpose for which they are procured and the Contractor shall at all times keep the records updated to enable the Project Manager to apply such checks as he may desire to impose. The Contractor shall, at all times, permit the Project Manager to inspect his godown. The Contractor shall not, without prior written permission of the Project Manager, utilise or dispose of the materials for any purpose other than intended in the Contract.

23.2 Materials and workmanship:

The Contractor shall be responsible for the establishment of a full and comprehensive quality control system for the Work. The system shall include, but not be limited to, the means of controlling the testing and receipt of materials, the inspection of the Work, the filing and ordering of drawings and correspondence and the duties and responsibilities of staff members.

All materials and equipment to be incorporated in the Work shall be new. The materials, equipment, and workmanship shall be of the best quality of the specified type, in conformity with Contract Documents and the best engineering and construction practices, and to the complete satisfaction of the Project Manager. This requirement shall be strictly enforced at all times and stages of the Work and no request for change whatsoever shall be entertained on the grounds of anything to the contrary being the prevailing practice. The Contractor shall immediately remove from the Work any materials, equipment and/or workmanship which, in the opinion of the Project Manager, are defective or unsuitable or not in conformity with the Contract Documents and best engineering and construction practices, and the Contractor shall replace such rejected materials, equipment and/or workmanship with proper, specified, required and approved materials, equipment and/or workmanship, all at his own cost within a period of seven (7) days from the date of issuance of such notice.

The Contractor shall, whenever required to do so by the Project Manager, immediately submit satisfactory evidence and necessary test results as to the kind and quality of the materials and equipment.

23.3 Special makes or brands:

Where special makes or brands are called for, they are mentioned as a standard. Others of equivalent quality may be used provided that Project Manager considers the substituted materials as being equivalent to the brand specified, and prior approval for the use of such substituted materials is obtained in writing from the Project Manager. Unless substitutions are approved by the Project Manager in writing in advance, no deviations from the Specifications and other Contract Documents shall be permitted, the Contractor shall indicate and submit written evidence of those materials or equipment called for in the Specifications and other Contract Documents that are not obtainable for incorporation in the Work within the time limit of the Contract. Failure to indicate this in writing within one month of the signing of the Contract will be deemed sufficient cause for denial of any request for an extension of time and /or additional cost because of such circumstances.

Alternative equivalent brands if suggested by the Contractor during construction may be considered if approved brand is not available in market, provided the suggested brand fully meets the requirements and is acceptable to the Project Manager. The contractor has to furnish the rate analysis of all such items and get its prior approval from Project Manager before execution.

23.4 Proper scheduling and delivery of materials:

All materials and equipment shall be scheduled and delivered so as to ensure a speedy and uninterrupted progress of the Work, and the same shall be properly stored. Within fifteen days of signing of the Contract, the Contractor shall submit the material procurement schedule for approval of Project Manager for all materials to be procured by the Contractor and required to be supplied by the Project Manager / Owner.

It shall be the responsibility of the Contractor to give the quarterly requirement for the Owner supplied material in writing to the Project Manager at least four weeks prior to the latest date by which the Contractor needs these materials to suit the programmed execution of the Work. No extension of time shall be allowed for any delays caused due to the Contractor's failure to raise such requisitions.

23.5 **List of Materials:**

Within fifteen days of the signing of the Contract, the Contractor shall submit for the approval of the Project Manager a complete list of all materials and equipment the Contractor and his Sub-Contractors propose to use in the Work, of definite brands or makes, which differ in any respect from those specified, or the particular brand where more than one is specified as standard. The Contractor shall also list materials to be supplied by the Owner and the items not specifically mentioned in the Contract Documents but which are reasonably inferred and are necessary for the proper execution and completion of the Work.

23.6 Storage of materials and equipment at site

The Contractor shall, at his own cost, provide adequate storage sheds and yards at the Site, at locations pre-approved by the Project Manager, for all materials and equipment that are to be incorporated in the Work. This shall be for all the materials and equipment, supplied by the Contractor or any Sub-Contractor or supplied by the Owner / Project Manager. In addition to being watertight and weatherproof, the storage facilities shall be of such a manner that all the materials and equipments are adequately protected in every way from any deterioration or contamination or damage whatsoever, to the complete satisfaction of the Project Manager. The method of storing of all the materials and equipment shall be in conformity with the Specifications and/or to the directions and instructions of the Project Manager. At no time shall any material or equipment be stored in open or in contact with the ground. Should any of the materials or equipment deteriorate or be contaminated or damaged in any way due to improper storage or for any other reason then such materials and equipment shall not be incorporated in the Work and shall be removed forthwith from the Site and the replacement of all such materials and equipment shall be entirely at the cost and expense of the Contractor. The Contractor shall be responsible for also providing, at his own cost, proper and adequate security for all the materials and equipment stored at the Site so as to prevent any theft, pilferage etc., and the Contractor shall be responsible and liable for all the matters in connection with such security or the lack thereof. Where, after permission has been sought and obtained from the Project Manager, any material or equipment is kept on any portion of the structure, this shall be done in such a manner as to prevent any overloading whatsoever of the structure, to the complete satisfaction of the Project Manager. associated with any damage to any portion of the structure in this respect shall be to the account of the Contractor and shall be borne by him.

Should delays be caused on account of removal and replacement of any materials or equipment or on account of any lack of security, the Contractor shall not be entitled to any extension of time or increase in the Contract Price.

Wherever applicable the storage of materials shall be in accordance with the relevant Indian Standard Specifications.

Cement storage capacity of the Contractor shall be of minimum 5,000 bags to store substantial quantity of cement, keeping in view the tight schedule of the Work. Sand and aggregates shall be stored over hard concrete base or paved brick platforms. Reinforcement bars shall be stored diameter-wise over raised sleepers and protected from rain in suitable manner as approved by the Project Manager. Similarly, structural steel sections shall also be stored in the yard in a proper orderly manner.

23.7 Right Type of Workmen, Plant and Machinery, Jigs, Tools, etc.:

The Contractor shall employ the right type of workmen, plant and machinery, jigs, tools etc. to fabricate and/or install all materials and equipment. They shall be fabricated and/or installed without any damage and in accordance with the manufacturer's instructions and manuals, and to the satisfaction of the Project Manager.

23.8 **Inspection:**

All materials, equipment, and workmanship shall be subject to inspection, examination and testing by the Project Manager at all times and stages during construction, manufacture and/or installation and they shall have the right to reject and order the removal and replacement of any defective material. equipment and / or workmanship or require its correction and rectification. The Contractor shall not proceed with any operation or sequence or trade of the Work until the previous operation or sequence or trade has been inspected and approved by the Project Manager. No embedded items or any other work shall be covered up unless these have been inspected and approved by the Project Manager. The onus shall be on the Contractor to get such inspections carried out and obtain such approvals. Should the Contractor fail to comply with these requirements, then all additional or redoing of work necessitated as a consequence thereof shall be at the Contractor's cost and expense. inspection or approval shall relieve the Contractor of any of his responsibilities. obligations and liabilities under the Contract. No defective workmanship shall be repaired or patched up in any way without inspection and direction of the Project Manager.

Rejected workmanship shall be immediately corrected and rectified and rejected materials and equipment shall be removed and replaced with proper, specified and required materials and equipment, by the Contractor to the approval and satisfaction of the Project Manager. The cost of all such correction and rectification and such removal and replacement shall be to the account of the Contractor and shall be borne by him, and also, the Contractor shall be responsible for all delays in this regard. The Contractor shall promptly segregate and remove the rejected materials and equipment from the Site and shall not reuse them in the Work. If the Contractor fails to proceed at once with the correction and rectification of rejected workmanship and/or the removal and replacement of rejected materials and equipment, the Project Manager shall have the right to employ other persons / agencies to correct and rectify such workmanship and/or remove and replace such materials and equipment, and recover the cost thereof from the Contractor, or the Project Manager may terminate the right of the Contractor to proceed further with the Work.

The Contractor shall furnish promptly and without any charge, all facilities, access, labour, materials, plant and tools required and necessary for enabling the Project Manager, to carry out inspections and tests in a safe and convenient manner. The Contractor shall ascertain and ensure that the facilities and access provided for the carrying out of all inspections are completely safe in every respect and the Contractor shall be fully responsible and liable for all matters in connection with such safety.

23.9 **Testing:**

All the tests on materials (including owner supplied), equipment, and workmanship that shall be necessary in connection with the execution of the Work, as decided by the Project Manager and as called for in the Contract Documents, shall be carried out at the cost of the Contractor at the place of work or of manufacture or fabrication or at the Site or at an approved testing laboratory or at all or any such places. The Contractor shall provide all assistance, instruments, machines, labour and materials as are required for the

examining, measuring and testing as described above, which shall be got calibrated from approved laboratory at the specified frequency to ensure accuracy of results, the testing and all expenses connected with the tests as described above shall be borne by the Contractor.

23.10 **Certificates:**

The Contractor shall furnish, at his own cost, test certificates, calibration certificates for the various materials and equipment as called for by the Project Manager. Such test certificates should be for the particular consignment/lot/piece as decided by the Project Manager. The details in respect of the test and calibration certificates shall be as decided by the Project Manager for the relevant items.

24. SAMPLES, SHOP DRAWINGS:

After the award of the Contract, the Contractor shall furnish for the approval of the Project Manager, all samples of materials and shop drawings called for in Contract Documents or required by the Project Manager. The samples and shop drawings shall be delivered as directed by the Project Manager. The Contractor shall construct prototypes of works as laid down in the Contract Documents or as instructed by the Project Manager / Architect, such prototypes or samples, of works, after approval by the Project Manager shall serve as the standards to be achieved in the final construction. No extra payment shall be due to the Contractor for submission of material sample and preparation of shop drawings and prototypes. A schedule giving dates of the submission of samples and shop drawings shall be included in the time schedule. Samples / materials approved by the Project Manager, shall be kept at Site under safe custody of Contractor and on completion of the Work handed over to the Project Manager.

25. CONSTRUCTION PROGRAMME, SCHEDULES AND PROGRESS REPORTS:

25.1 **Construction Programme:**

- i. Every contractor should furnish along with his tender an overall construction programme utilizing a known CPM software package like Microsoft Project, latest version. The construction programme shall clearly show all the sequential activities of work required to be carried out from the commencement of the Work up to the Virtual Completion. Work associated with each of the packages, i.e., civil, water supply and sanitation, fire fighting and electrical works etc., shall be clearly identifiable.
- ii. The construction programme shall be based on the required milestones as per the enclosed bar chart.
- iii. The Tenderers proposed Construction programme and Payment Milestones should elaborate in detail on relevant Milestones as per the enclosed bar chart.
- iv. Every week, or sooner if required by the Project Manager, the approved programme charts shall be reviewed in relation to the actual progress of the Work, and shall be updated as necessary. If at any time it appears to the

Project Manager that the actual progress of the Work does not conform to the approved programme, the Contractor shall produce, at its expense and without reimbursement therefore, a revised programme showing the modifications to the approved programme and the additional input of resources by the Contractor necessary to ensure completion of the Work within the time stipulated for completion.

v. The submission to and approval by the Project Manager of such programmes or the furnishing of such particulars shall not relieve the Contractor of any of his responsibilities, obligations and liabilities under the Contract.

25.2 **Construction Schedules**:

Along with the construction programme described in Clause 25.1, the Contractor shall also submit the following schedules:

- i. Manpower Schedule.
- ii. Cash-flow Schedule.
- iii. Plant and Equipment Schedule
- iv. Materials Schedule (including status and mobilization programme)
- v. Material samples Schedule
- vi. Shop drawings Schedule (including status and delivery)

25.3 **Daily site reports:**

The Contractor shall throughout the contract period, submit daily site reports on an approved / prescribed proforma to the Project Manager. The reports will include, but not be limited to:

- i. Record of the Site progress
- ii. Number of employees on the Site
- iii. Number of men employed on individual trades
- iv. Plant and machinery at site (including an indication as to whether the plant is working or standing)
- v. Notification of accidents, if any
- vi. Events influencing the progress of the Work
- 25.4 **Site Order Book** the contractor shall maintain the site order book for the day to day records of deficiencies / rectifications required etc.
- 25.5 The records should include all staff employed by the Contractor as Sub-contractors.

25.6 Site Register:

- The Contractor shall maintain a site register that records the name and time of arrival and departure, at Site, of any visitors.
- Reason for Hindrance for delay of work with details like number of days etc. shall be recorded with the knowledge of the Project Manager/Architect/Owner which shall need to be produced during the consideration of pray for extension of time.
- Concrete Pour Register the contractor shall maintain the concrete pour register for taking the instructions from the Project Manager / Owners.

25.7 **Progress Reports:**

At the end of each month the Contractor shall submit a monthly progress report in a prescribed / agreed format with the Project Manager. The reports shall include 2 sets of progress photographs taken from pre-determined locations, which illustrate the progression of the Work.

26. BUREAU OF INDIAN STANDARDS:

- 26.1 A reference made to any Indian Standards Specifications in the Contract Documents shall imply reference to the latest version of that Standard, including such revisions/amendments as may be issued, during the currency of the Contract, by the Bureau of Indian Standards and the corresponding clause/s therein shall hold valid in place of those referred to. The Contractor shall keep copies at the Site of all latest publications of relevant BIS Codes and Indian Standards Specifications applicable to the Work at the Site and as listed in the Specifications for quick referencing.
- 26.2 Amendments to BIS codes announced after finalization of the Contract shall be followed.

27. TOLERANCES:

- 27.1 The Contractor shall exercise every care to ensure that all structural members are plumb and true to line, level and dimensions called for on the Drawings, for the purposes of structural requirements as well as in order to receive finishes, equipment and similar items. The details of the finishing items are based upon allowing tolerances as per the most stringent requirements laid down in the Contract Documents/Indian Standard Specifications/Best Trade practices and the limits of tolerances shall be in strict conformity with such Documents and Standards. Any variations beyond such limits shall require, in accordance with the directions and to the approval of the Project Manager, rectifications in the structural members and/or wall openings or the remaking or replacing of the finishing elements and / or equipment, fabricated to fit into the openings or spaces shown on the Drawings. All such rectifications or remaking or replacing of work, shall immediately be carried out by the Contractor at his own cost and expense, and he shall be responsible for all delays in this regard. All such costs and expenses shall be recovered from the Contractor and shall be deducted by the Owner / Project Manager from any money that may be payable or that may become payable to the Contractor.
- 27.2 In case of separate Contracts the Contractor or Sub-Contractor whose work does not conform to the dimensions and limits of tolerances specified in the Contract Documents and/or the Indian Standard Specifications shall be liable for all costs and expenses incurred for rectifications and/or replacements of any other Contractor's and/or Sub-Contractor's work required, in accordance with the directions of the Project Manager, for the proper installation of the finishing elements and/or equipment, and/or for structural purposes. The Project Manager 's decision in this respect shall be final and binding on the Contractors and Sub-Contractors, and all such costs and expenses shall be

recovered from the pertinent Contractors and Sub-Contractors and shall be deducted by the Owner / Project Manager from any money that may be payable or that may become payable under the Contract to such pertinent Contractors and Sub-Contractors for and on behalf of the Contractor.

28. PROTECTIONS OF WORKS:

28.1 **Protection of works:**

The Contractor shall take full responsibility for the proper care and protection of the Work from commencement of work until completion and handing over of the Work to the Project Manager at no additional cost. The Contractor shall protect and preserve the Work in every way from any damage, fire or accident, including by providing temporary roofs, boxing or other construction as required by the Project Manager. This protection shall be provided for all property on the Site as well as adjacent to the Site. The Contractor shall adequately protect, to the satisfaction of the Project Manager, all the items of finishing work to prevent any chipping, cracking, breaking of edges or any damage of any kind whatsoever and to prevent such work from getting marked or stained or dirty. Should the Contractor fail to protect the Work or any part thereof and should any damage be caused to the same, the Contractor shall be responsible for all replacement and rectification, as directed by the Project Manager, and all costs and expenses in connection with such replacement and rectification shall be to the account of the Contractor and shall be borne by him.

- 28.2 The Contractor shall in connection with the Work provide and maintain at his own cost all lights, security guards, fencing and anything else necessary for the protection of the Work and for the safety of the public and everyone associated with the Work, all to the approval and satisfaction of the Project Manager.
- 28.3 All operations necessary for the execution of the Work shall be carried out so as not to interfere with the convenience of the public, or with the traffic, or the access to, use and occupation of public or private roads and footpaths or of properties whether in the possession of the Owner or of any other person. The Contractor shall save harmless and indemnify the Owner & Project Manager in respect of all claims, proceedings, damages, costs, charges, and expenses whatsoever arising out of or in relation to any such matters.

29. CLEANING OF WORKS AND CLEARING OF SITE:

- 29.1 The Contractor shall maintain the Site, adjoining areas within 20 meters all around site and all Work thereon in neat, clean and tidy-conditions at all times. The Contractor shall remove all rubbish and debris from the Site and adjoining areas on daily basis and as directed by the Project Manager. Suitable steel skips shall be provided at strategic locations around the Site to receive waste and packaging materials.
- 29.2 Just prior to the Virtual Completion of the Work, or whenever so directed by the Project Manager, the Contractor shall carry out all the work necessary to ensure that the Site & 20 meter area all around site is clear and the Work are clean in every respect, the surplus materials, debris, sheds and all other temporary structures are removed from the Site, all plant and machinery of the

Contractor are removed from site, the areas under floors are cleared of rubbish, the gutters and drains are cleared, the doors and sashes are eased, the locks and fastenings are oiled, all electrical, plumbing and other services are tested and commissioned, the keys are clearly labelled and handed to the Project Manager, so that at the time of Virtual Completion the whole Site and the Work are left fit for immediate occupation and use, to the approval and satisfaction of the Project Manager and the Owner.

29.3 Should the Contractor fail to comply with the cleaning requirements, whether progressively or before completion, or fail to clear the Site and 20 meter area all around site as directed and required, then the Project Manager, after giving due notice in writing to the Contractor, shall have the right to employ other persons or agencies to carry out the cleaning and/or clearing work and all costs incurred on such work shall be recovered from the Contractor and shall be deducted by the Owner / Project Manager from any money that may be payable or that may become payable to the Contractor.

30. METHOD OF MEASUREMENT:

All Works shall be measured for making payments to the Contractor. To evaluate Work under this Contract and instructed as per work order/change orders issued by the Project Manager, the standard method of measurement in accordance with the Standards laid down by Bureau of Indian Standards (IS: 1200) shall be followed. However if definite methods of measurements are stipulated in the Schedule of Rates or Specifications, then the same shall supersede BIS methods and shall be followed. In the event of any dispute with regard to the method of measurement of any work, the decision of the Project Manager shall be final and binding and no extra claims shall be entertained or allowed at any stage in this regard.

31. COVERING UP:

The Contractor shall give at least 24 hours clear notice in writing to the Project Manager before covering up any of the Work in foundations or any other such areas in order that inspection of the Work may be carried out for maintaining proper quality control. In the event of the Contractor failing to provide such notice he shall, at his own expense, uncover such Work as required to allow the inspection to be taken and thereafter shall reinstate the Work to the satisfaction of the Project Manager.

32. PAYMENTS AND SECURED ADVANCE:

Payments for executed work:

32.1 Billing:

The Contractor shall prepare measured bills as directed by the Project Manager (detailed measurement, abstract sheet, purchase bills, and other supporting documents) once per month and submit the same to the Project Manager in quadruplicate for checking and issue of interim certificate. Contractor shall also provide soft copy of the bills prepared on latest version of MS office software.

32.2 **Payment of Bills:**

Running Account Bills:

The Contractor has to submit the Running Account Bills once in a month along with detailed measurements in serially machine numbered register, abstract sheets, deviation statement for ongoing and completed work, purchase bills, materials reconciliation statement and any specific instructions which may be given in this regard by the Project Manager shall also be adhered to by the Contractor.

32.3 **Running Bill Certification:**

- i. The Contractor shall prepare and submit running bills to the Project Manager once a month throughout the Construction period. Provided that amount of said billing exceeds the minimum value for the running bill stipulated in the Schedule of Fiscal Aspects annexed to these General and Special Conditions of Contract.
- ii. Running bills shall be presented along with soft copy in a format to be agreed in advance with the Project Manager and shall be supported by, detailed measurements item by item.
- iii. Retention Money and Mobilisation Advance shall be applied to interim billings as mentioned elsewhere in the general conditions of contract.
- iv. Cost of materials if any issued by the Owner / Project Manager shall be recovered from the running bills at rates specified in the Contract Documents.
- v. Within 7 days of the receipt of Contractor's running bill for payment, the Project Manager shall check and point out corrections, if any to be made in the bill. The Contractor shall correct the bill and resubmit the same to the Project Manager.
- vi. Within 20 days of receipt of the corrected bill from the Contractor, the Project Manager shall check the bill and certify the bill for payment.
- vii. The payment of running bills shall be made by the Owner /Project Manager within 10 days from receipt of the Project Manager's approval certificate for payment.
- viii. All running bills shall be accompanied with detailed material reconciliation statements for cement, steel and other Owner supplied materials.
- ix. Any running / interim Certificate of Payment given by the Architect / Project Manager relating to the work done or the materials delivered shall be adhoc in nature and may be modified or corrected by any subsequent interim Certificate or the Final Certificate of payment. No certification by the Project Manager / Architect supporting an interim payment shall itself be conclusive evidence that any work or materials to which it relates is/are in accordance with the Contract.

x. The Project Manager/owner may release payment @ 75% of the bill amount as assessed by him, for interim payment, if deem fit necessary as an On Account Payment against the Running Bills. This payment shall be released within 7 days from the receipt of complete Bill. Balance payment for the bill shall be released as per the relevant Tender Conditions.

32.4 **Retention Money:**

Deduction towards Retention Money shall be made at 5% of the value of Work as certified by the Project Manager during each running bill subject to a maximum of 5% of the contract value. 50% Retention money will be released after issue of Virtual Completion Certificate on submission of bank guarantee of the same amount and valid for the defects liability period including any extensions thereof.

The balance 50% of retention money shall be returned after issue of Final Completion Certificate on completion of Defects Liability Period including any extensions thereof, provided that the building is then free of defects and the Contractor has rectified all defects identified by the Project Managers, Architects and Owner. The Retention Money shall not carry interest.

32.5 Final Bill:

- i. The final bill shall be submitted by the Contractor within one month of the date fixed for Virtual Completion of the Work or of the date of the Virtual Completion Certificate furnished by the Project Manager, whichever is later.
- ii. The final bill will be checked by the Project Manager within 60 working days from the date the bill is received by the Project Manager (provided the Contractor has complied with all formalities as described in various clauses of the Contract) and thereafter the same would be forwarded to the Architect for verification and certification.
- iii. The Architect shall certify the bill with in 30 days on receipt from the Project Manager.
- iv. The payment of the final bill shall be made to the Contractor by the Owner /Project Manager within 30 days from receipt of the Project Manager's/Architect approval certificate for payment.
- v. No further claim shall be made by the Contractor in respect thereof even after submission of the final bill and the same shall be deemed to have been fully waived and absolutely extinguished.
- vi. The final billing shall be accompanied by all substantiating documentation as required for running bills with the addition of the following items that shall be supplied by the Contractor:
 - a. All written guarantees / warranties and spares required by the Contract documents.

- b. Operation and Maintenance manuals and instructions for equipment and apparatus.
- c. One (1) reproducible and two (2) blue prints of all requisite As Built drawings along with the soft copy thereof on latest version of AutoCAD software.

32.6 Certificate for payment format: (To be finalized later with Project Manager)

Value of Work done for Interim Certificate 'A'

Total A

Deductions:

Retention 5% on 'A' subject to a maximum of 5% of 'B'

Contract value.

Value of Material issued by the Owner

(Actually used by the Contractor in the

work completed up to 'C'

that period)

Mobilization advance recovery on pro rata basis 'D'

from R A Bill in such a manner that full advance

recovered when 80% work done

Previous Payments made 'E'
Any other Deductions including WCT 'F'
Total Deductions: 'G'

Net Bill Value A(-)G=H GST to the Net bill Value as per contract H + (HxGST%)

32.7 Withholding of payments

The Project Manager may withhold payment or, on account of subsequently discovered evidence, nullify the whole or a part of any payment certificate to such extent as may be necessary to protect the Owner / Project Manager from loss on account of including but not limited to the following:

- i. Defective work not remedied by the Contractor.
- ii. Failure of the Contractor to make payments properly and regularly to his own workers, to his Sub-Contractors, to his suppliers.
- iii. Damage by the Contractor to the work of other Contractors, Sub-Contractors or Vendors.
- iv. A reasonable doubt that the Contract cannot be completed for the balance unpaid amount.
- v. A reasonable doubt that the Contractor intends to leave work items incomplete.
- vi. Failure of the Contractor to execute the Work in conformity with the Contract Documents.
- vii. Failure of the Contractor to meet or keep-up with the approved Construction Programme.
- viii. Failure of the Contractor to comply with and fulfill all contractual obligations and liabilities stipulated in the Contract Documents.
- 32.8 **Secured Advance** 75% value of material cost shall be paid towards Secured Advance for items other than perishable such as secured advance

against an indemnity bond for such amount and insurance against such materials.

33. RECTIFICATION OF IMPROPER WORK NOTICED:

If it shall appear to the Project Manager during the progress of the Work that any work has been executed with unsound, imperfect or unskilful workmanship or with materials of any inferior description or that any materials or articles provided by the Contractor for the execution of the Work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the Contract, the Contractor shall, on demand in writing from the Project Manager specifying the work, materials or articles complained of, notwithstanding that the same may have been passed and certified, forthwith rectify or remove and reconstruct the work so specified in whole, or in part as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own proper charge and cost and in the event of his failing to do so within a period so specified by the Project Manager in his demand aforesaid, the Project Manager may rectify or remove and re-execute the work or remove and replace with others, the materials or articles complained of as the case may be at the risk and expense in all respects of the Contractor, and deduct the expenses from the Retention Money or any sums that may be due at any time thereafter may become due to the Contractor or from his performance bond.

34. CHANGE ORDERS:

- 34.1 The Owner / Project Manager reserves the right to alter the Scope of Work (See Clause 2.6) and consequently the Contract Price shall be suitably adjusted for such changes by reference to the rates in the Schedule of Rate. All change orders shall be issued by the Project Manager and the onus shall be on the Contractor to obtain such prior written consent of the Project Manager.
- 34.2 If the rates for the extra, additional, altered or substituted items of work are not specifically provided in the Schedule of Rates then such rates shall be derived by interpretation /interpolation from the rates that are specified for a similar class of work in the Contract. The Project Manager's interpretation as to what is a similar class of work and his decision on the method in which the rate is to be derived shall be final and binding on the Contractor.
- 34.3 If the rates for the extra, additional, altered or substituted items of work cannot be determined in the manner specified above, then the rates for such work shall be determined on the basis of actual /theoretical consumption of materials, and actual /theoretical use of labour, as detailed below; consideration of actual or theoretical consumption shall be at sole discretion of the Project Manager.
 - i. Cost of materials actually used by the Contractor and /or by theoretical analysis of consumption of materials at work, at no more than prevailing market rates, actually incorporated in the Work.
 - ii. Cost of labour actually used at the Site and /or by theoretical analysis of labour utilization on the Work at prevailing rates of labour.
 - iii. 15% of the costs in respect of (i) and (ii) above, towards Contractor's establishment, water & electricity charges, tool & plants, all other costs, overhead & profit plus as applicable . Said 15% component (Contractor's

- overheads and profit) shall not be allowed on Owner supplied items, if any. Instead, 2% will be paid on the cost of the Owner supplied items as Contractor's handling charges.Rate analysis of the extra items will be similar to CPWD analysis of rates.
- iv. For this purpose the Contractor shall submit to the Project Manager detailed analysis of the rate proposed by the Contractor supported by relevant vouchers along with the estimated quantity of work item involved.
- v. In case contractor executes any extra additional, altered or substituted items of work through the agency identified and negotiated by the Project Manager Co-ordination charges to main contractor shall be 5% plus WCT as applicable only over the rates analyzed for the specialized agency for such items. However, this shall not be applicable on items mentioned in Annexure-1 & 2 for Owner & Contractor supplied materials, which shall be treated as mentioned elsewhere in this tender.
- 34.4 If the Contractor and the Project Manager cannot agree on a rate as determined in accordance with this sub-clause, then the Project Manager may determine a reasonable rate which shall be final and binding on the Contractor or, at the Owner's /Project Manager's option, may order and direct the work to be carried out by such other persons or agencies as it may think fit, and such other persons or agencies shall not, in any manner be prevented or obstructed in their work or from entering upon the Work by the Contractor for the purpose of carrying out such work. The Contractor shall not be entitled to any payment whatsoever in connection with such work carried out by such other persons or agencies.

Before any extra work is undertaken by the Contractor, he shall ensure that he has received from the Project Manager a specific Change Order on a mutually agreed proforma, signed and approved by the Project Manager. No additional payments shall be made to the Contractor without prior agreement and receipt of the necessary signed Change Order. Each Change Order shall clearly state the value of the additional work agreed to and signed for by the Project Manager.

The Contractor shall at monthly intervals submit to the Project Manager an account giving particulars, as full and detailed as possible, of additional work ordered in writing by the Project Manager and which the Contractor has executed during the preceding month. In case any Change Order instructed by the Project Manager causes a delay in the completion of the Work causing the Contractor to overrun the time fixed for completion of the Work, the contractor shall notify the Project Manager in writing about such expected delay, before /issuance of such change order by the project manager. If necessary and if requested by the contractor with in 3 days of the receipt of the change order in writing, the PM shall organize with due dispatch, a joint review on the question of expected delay, to be held and had amongst the Contractor, Project Manager and the Owner with or without the assistance of the Architect and the issue of such expected delay would be immediately resolved through such joint review to facilitate extension of time for completion of the Work.

35. DEDUCTIONS FOR UNCORRECTED WORK:

- 35.1 If the Project Manager deems it inexpedient to get corrected or rectified any work of the Contractor which is defective or damaged or of substandard quality or is generally not in accordance with the Contract Documents, then an equitable and appropriate deduction shall be made thereof from the Contract Price, and the Project Manager's decision in this respect shall be final and binding on the Contractor.
- Furthermore if, by reason of any accident, or failure, or other event 35.2 occurring to, in or in connection with the Work, or any part thereof, either during the execution of the Work or during the Defects Liability Period, any remedial or other work or repair shall, in the opinion of the Project Manager, be urgently necessary for the safety of the Work, or any part thereof, and the Contractor is unable or unwilling to immediately and at once do such work or repair, the Project Manager may employ and pay other persons or agencies to carry out such work or repair as the Project Manager may consider necessary. If the work or repair so done by other persons or agencies is work which, in the opinion of the Project Manager, the Contractor was liable to do at his own expense under the Contract, then all expenses incurred by the Owner / Project Manager in connection with such work or repair shall be recovered from the Contractor and shall be deducted by the Owner / Project Manager from any money that may be payable or that may become payable to the Contractor or from the Contractor's performance bond.
- 35.3 The defective or uncorrected work of the Contractor at any stage (during or after completion of work) may adversely affect or damage the work of other Vendors. Contractor shall at his own cost immediately rectify, correct or replace both his defective work as well as the work of the other Vendors so damaged, with in the time period stipulated by the Project Manager, so as not to effect the progress and quality of other Vendor's work. In case the Contractor fails to do the necessary corrections to the satisfaction of Project Manager or unduly delays the correction work, then the Project Manager shall be at liberty to get the correction work done and if the correction work is not possible, then any extra work necessary to cover the defect or damage, done through same / any other Vendor at Contractor's cost.

Actual costs including any incidentals thereof incurred by the Project Manager on such corrections / extra works shall be recovered from the payments or any amounts due to the Contractor.

36. TIME FOR COMPLETION:

36.1 Time: "the essence of the contract":

The time allowed for carrying out the Work as entered in the tender shall be strictly observed by the Contractor and shall be deemed to be of the essence of the Contract and shall be reckoned from the date of award of the Contract. The Work shall proceed with due diligence until Final Completion. The Contractor shall prepare a Construction Programme with time schedule keeping in view the completion period stipulated for specific portions of the Work and also the overall completion time and submit the same for the approval of the Project Manager. The Contractor shall comply with the time schedule as approved by

the Project Manager. In the event of the Contractor failing to comply with the overall and individual milestones contained in the time schedules, he shall be liable to pay liquidated damages as provided for in this Contract.

36.2 Completion Period:

The date of commencement of the Work shall be as mentioned in the Schedule of Fiscal Aspects.

The Milestone dates shall be as per the schedule provided by the contractor. In case the Contractor fails to meet the above stipulated completion period, Contractor shall be liable to pay to the Owner / Project Manager, the liquidated damages as specified in Clause 43 of General Conditions of Contract.

In addition to his own work in the overall time period, the Contractor shall provide for the works of other Sub-contractors and Vendors, including those employed directly by the Owner / Project Manager.

- 36.3 Causes of delay for which claims for extension of time may be considered; The Contractor shall be entitled to claim for extension of time, subject to the Conditions herein, should he be delayed or impeded in the execution of the Work by reason of the following:
 - i. Force Majeure;
 - ii. Delay in the receipt of 'construction status' drawings from the Architect provided that, in the opinion of the Project Manager, the Contractor has made every effort and endeavour to minimize the effect of such delays.
 - iii. Any change orders directed by the Project Manager, which in the opinion of the Project Manager entail the requirement of additional time for completion of the Work.
- In respect of items 36.2. (a), (b) and (c) above, the Contractor shall submit in writing to the Project Manager his intention to claim for an extension of time within seven (7) working days of any of the above mentioned reasons or events causing a delay. Any claim of extension of time in respect of item (c) shall be notified by the Contractor before such change order is actually issued. The Contractor shall thereafter detail and submit his claim for the extension of time within fourteen (14) working days of such delay having occurred. If the Contractor does not comply with both these conditions for each and every delay caused by any of the above-mentioned reasons or events then he shall not be entitled to any extension of time.
- 36.5 The Project Manager shall study and verify the particulars of the claim for extension of time submitted by the Contractor and shall then reject or amend or accept the claim. He will extend the time by notifying the Contractor in writing for completion of the Work by such period as he shall think adequate with the prior approval of the Owner and the time for completion of the Work so extended shall for all purposes of the Contract be deemed the time specified for completion of the Work. The decision of the Project Manager in this regard shall be final and binding on the Contractor. No extension of time shall be granted separately for any concurrent or parallel activities, and only a delay, caused by any of the above-mentioned reasons or events, in a critical

activity, which has a direct effect on the overall completion of the Work, shall form a basis for granting extension of time.

36.6 Should any deletions or changes in the scope of the Work reduce the time required to complete the Work under the Contract, then the time savings accruing from such deletions may be considered by the Project Manager in offsetting the durations awarded for an extension of time.

37. NO FINANCIAL OR OTHER COMPENSATION FOR DELAYS:

The Contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or in executing or in completing the Work, whatever might be the cause of the delay if such delay is on account of the Contractor.

38. SUFFICIENCY OF TENDER:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the Works and of the rates and prices stated in the priced bill of quantities and the schedule of rates and prices, if any. The tender rates and prices shall cover all his obligations under the Contract and all matters and things necessary, for the proper completion and maintenance of the Work.

39. PROPRIETY & OCCUPATION OF EXECUTED WORK:

All executed work, whether in part or in whole shall be the exclusive property of the Owner / Project Manager. The Contractor or any of his Sub-Contractors or their employees or workmen or servants or agents shall not be entitled to the use of any such work except for the purpose of carrying out subsequent work that is required to be carried out under the Contract or to complete the Project. The Owner / Project Manager shall have the right to occupy and take over the Work or any part thereof at any time during the progress of the Work or upon their completion, irrespective of any pending claims or disputes that the Contractor may have against the Owner. Such occupation shall not relieve the Contractor of any of its obligations under the Contract.

40. INDEMNITY:

- 40.1 The Contractor shall indemnify, defend and hold and keep indemnified, the Owner / Project Manager, including their employees, officers, representatives, servants, agents, suppliers, vendors and any other persons claiming through or under them from and against all actions, suits, claims costs, liabilities and demands brought or made against the Owner / Project Manager in respect of:
 - i) any matter or thing done or omitted to be done by the Contractor or any of his Sub-Contractor(s) or their employees, workmen, representatives, agents, servants or suppliers in the execution of or in connection with the Work; or
 - ii) any matter or thing done or omitted to be done by the Contractor or any of his Sub-Contractor's about performance under this Contract; or
 - iii) against any loss or damage to the Owner / Project Manager in consequence of any action or suit being brought against the Contractor or any of his Sub-Contractor(s) or their employees, workmen,

representatives, agents, servants or suppliers for anything done or omitted to be done in execution of the Work and the Project Coordination Services under this Contract; including but not limited to a) meeting the Project milestones, b) non-compliance with the applicable laws and regulations of the government and local authorities, c) not obtaining the relevant licenses and permits, d) infringing any patents rights specifically regarding use, storage and disposal of hazardous materials.

The obligations of the Contractor under this clause shall survive the termination of this Contract.

- iv) The Contractor shall ensure that the Sub-Contractors indemnify, defend and hold, and keep indemnified the Owner / Project Manager, including their employees, officers, representatives, servants, agents, suppliers, vendors and any other persons claiming through or under them harmless from all actions, suits, claims, costs, fines, judgements and liabilities in respect of:
 - a) any matter or thing done or omitted to be done by the Sub-Contractors or their employees, workmen, representatives, agents, servants and suppliers in execution of or in connection with the Work; or
 - b) any matter or thing done or omitted to be done by the Sub-Contractors or their employees, workmen, representatives, agents, servants and suppliers arising out of or in any way alleged to be in connection with Sub-Contractors' performance under this Contract;

including but not limited to a) not meeting the Project milestones, b) non-compliance with the applicable laws and regulations of the government and local authorities, c) not obtaining the relevant licenses and permits, d) infringing any patents rights and specifically regarding the storage, use or disposal by the Sub-Contractors of hazardous materials in, on or under the Site or at any location whatsoever in connection with the Project in any way.

The Sub-Contractors' responsibility under this indemnification shall also include any and all hazardous materials introduced to the Site by their agents, representatives, employees, workmen, servants and suppliers. The obligations of Sub-Contractors under this clause survive the termination or expiry of this Contract.

41. CORRECTION OF WORK BEFORE VIRTUAL COMPLETION OF WORKS:

41.1 The Project Manager, Owner's Representative and the Architect shall jointly conduct an extensive inspection just prior to the Virtual Completion of the Work and shall prepare a list of materials, equipment, and workmanship which are defective or damaged or of substandard quality or improperly executed or generally unacceptable due to not being in conformity with the requirements

stipulated in the Contract Documents. The Contractor to the satisfaction of the Project Manager, Owner and the Architect shall promptly remove, replace, reexecute, rectify and make good, to conform to the requirements stipulated in the Contract Documents, all such materials, equipment, and/or workmanship included or itemised in the said list and the Contractor shall bear and pay for all expenses in connection therewith and consequent thereon and incidental thereto, including the cost for all remedial work on the work of other contractors destroyed or damaged by such removal, replacement, re-execution, rectification and making good. If the Contractor fails to remove, replace, reexecute, rectify and make good the rejected materials, equipment, and/or workmanship within a reasonable time, fixed by written notice, the Owner / Project Manager may employ and pay other persons or agencies to carry out such removal, replacement, re-execution, rectification and making good and all expenses incurred in connection therewith, including all damages, losses and expenses consequent thereon and incidental thereto shall be recovered from the Contractor and shall be deducted by the Owner / Project Manager from any money that may be payable or that may become payable to the Contractor. It is clarified that all materials weather owner supplied or not shall be procured by the Contractor at his own cost for construction of work.

42. VIRTUAL COMPLETION OF WORKS:

- 42.1 The Works shall be considered as Virtually Complete only upon fulfillment of the procedure laid down in Clause 36 above, and only after the Work has been completed in every respect in conformity with the Contract Documents and after all the systems and services have been tested and commissioned, and after the Site has been cleared and the Work cleaned in accordance with Clause 28 & 29 and when the Project Manager & Architect has certified in writing that the Work is Virtually Complete. The Defects Liability Period shall commence from the date of such Certificate of Virtual Completion.
- 42.2 Should, before Virtual Completion, the Owner / Project Manager decide to occupy any portion of the Work or use any part of any equipment, the same shall not constitute an acceptance of any part of the Work or of any equipment, unless so stated in writing by the Project Manager.
- 42.3 Prior to the issue of the Virtual Completion Certificate, the Contractor shall submit and hand-over to the Owner / Project Manager the keys to all locks, all operation and maintenance manuals for systems and services, material reconciliation statements, warrantees, as built drawings, any spares called for in the Contract, and every thing else necessary for the proper use and maintenance of the Work complete with all systems and services.
- 42.4 It is clarified that all materials whether owner supplied or not shall be procured by the contractor at his own cost for carrying out correction work. No charges shall be paid on this account.

43. LIQUIDATED DAMAGES / PROGRAMME CHART / MILESTONES:

The Contractor should study the enclosed milestones prepared by the Project Manager/Architect and adhere to the milestones. If the milestones are not achieved by the Contractor the Contractor shall pay the Owner 0.5% (point Five percent) of the Contract Price per week of delay, limited to Five percent (5%) of the Contract Price (inclusive of amounts, increases or decreases, in respect of change orders), by way of

liquidated damages for each week that the milestones work is incomplete in any way whatsoever after the date assigned for completion of the milestone work. However, release of interim Liquidated Damages can be considered in case the very next Milestone is achieved on time. Extension of time for any milestone if allowed has to be obtained in writing from the Project Manager well in advance of completion dates.

44. PENALTY / FINE:

- 44.1 If the Project Manager notifies the Contractor of non-compliance with safety codes as in Clause no. 12.4 and 12.5 and the labour laws etc. Contractor shall immediately if so directed or in any event not more than 10 hours after receipt of such notice, make all reasonable effort to correct such non-compliance and to ensure that there is no reoccurrence of such non-compliance.
- 44.2 If the Contractor fails to do so, the Project Manager shall levy fine of Rs.500 per head per day for not complying with safety codes & labour laws etc.

45. GUARANTEES:

- 45.1 The Contractor understands and agrees that the Owner / Project Manager is expressly relying and will continue to rely on the skill and judgment of the Contractor in executing the Work and remedying any defects in the Work. The Contract represents and warrants that:-
 - The Contractor shall perform the Work in a timely manner, in strict accordance with the Contract Documents, and consistent with generally accepted professional, construction and construction-supervision practices and standards provided by an experienced and competent professional contractor and construction supervisor rendered under the same or similar circumstances.
 - ii. The Contractor is and will be responsible to the Owner / Project Manager for the acts and omissions of all Sub-Contractors and their respective employees, agents and invitees and all the persons performing any of the Work.
- 45.2 Besides the guarantees required and specified elsewhere in the Contract Documents, the Contractor shall in general guarantee all work executed by the Contractor and the Sub-Contractors for Defects Liability Period from the date of issue of the Virtual Completion Certificate. Those parts of the Work or equipment or installations, for which extended guarantee periods are stipulated elsewhere in the Contract Documents, shall be guaranteed for such periods that are so stipulated. The duration of the Defects Liability Period, unless specified otherwise, shall be the extent of length of such guarantee periods.
- 45.3 The Contractor represents, warrants and guarantees to the Owner / Project Manager, inter alias that:
 - i. The construction of the Project shall be approved and capable of use, operation, performance and maintenance for accomplishing the purpose for which it has been built and acquired.

- ii. The Work shall comply with the Specifications, Drawings, and other Contract Documents.
- iii. The Work shall, for Defect Liability Period from the date of issue of the Virtual Completion Certificate, be free from all defects and the Project shall be of structural soundness, durability, ease of maintenance, weather tightness etc.
- iv. The materials, workmanship, fabrication and construction shall be of the specified and agreed quality and all materials shall be new.
- v. The Work performed for the Owner / Project Manager shall be free from all liens, charges, claims of whatsoever nature from any party other than the Owner & Project Manager.
- Where, during such guarantee periods as mentioned above, any material or equipment or workmanship or generally any item of work fails to comply or perform in conformity with the requirements stipulated in the Contract Documents or in accordance with the criteria and provisions of the guarantee, the Contractor shall be responsible for and shall bear and pay all costs and expenses for replacing and/or rectifying and making good such materials, equipment, workmanship, and items of work and, in addition, the Contractor shall be also responsible for and shall bear and pay all costs and expenses in connection with any damages and/or losses suffered as a consequence of such failure.
- 45.5 All guarantees required under the Contract shall be in the format approved by the Project Manager and submitted to the Project Manager by the Contractor when requesting certification of the final bill.

46. DEFECTS LIABILITY:

The Defect Liability Period shall be applicable as mentioned in the schedule of Fiscal Aspects.

46.1 Maintenance by contractor during defects liability period:

All defective items of work and defects noticed and brought to the attention of the Contractor during the Defects Liability Period shall be promptly and expeditiously attended to and replaced and/or rectified and made good by the Contractor at his own cost, to the complete satisfaction of the Owner & Project Manager.

46.2 Replacement and/or rectification and making good by contractors of all defective materials, equipment and/or workmanship during defects liability period:

The Contractor shall replace and/or rectify and make good, at his own cost, and to the satisfaction of the Owner & Project Manager, all defective items of work and defects arising, in the opinion of the Project Manager, from materials, equipment, and/or workmanship not performing or being in accordance with the Drawings or Specifications or the instructions of the Project Manager or other Contract Documents or the best engineering and construction practices, and which may appear or come to notice within Defects Liability Period after

Virtual Completion of the Work. Any item, material or matter repaired or replaced shall receive a new Defects Liability Period of like duration beginning upon the date the repaired or replaced item, material or matter is returned for use to the Owner / Project Manager, provided that the aggregate guarantee period shall not exceed 24 months. The Contractor shall be also liable for all costs associated with damages and/or losses which are a consequence of such defective items of work and defects, and such costs shall be recouped by Project Manager from the Contractor and shall be recovered from the Retention Money held and/or from the Contractor's final bill (if the final bill has not been certified and paid for at the time), or the same would otherwise be recovered from the Contractor.

Such defective items of work and defects as mentioned above shall, upon instruction and direction in writing of the Project Manager and within such time as shall be specified therein, be replaced and/or rectified and made good by the Contractor at his own cost. In case of default or failure by the Contractor to replace and/or rectify and make good such defective items of work and defects, the Owner / Project Manager may employ and pay other persons or agencies to replace and/or rectify and make good such defective items of work and defects, and all costs, damages, losses and expenses therefor, consequent thereon and incidental thereto shall be to the account of the Contractor and such costs, damages, losses, and expenses shall be recouped by the Owner / Project Manager from the Contractor and shall be recovered from the Retention Money held and/or from the Contractor's final bill (if the final bill has not been certified and paid for at the time). Should the Retention Money held (and the amount in respect of the final bill if it has not been certified and paid for at the time) be insufficient to meet such costs, damages, losses and expenses, as determined by the Project Manager, then the Contractor shall be legally bound to pay he balance amount due under the claim to the Owner / Project Manager within one month of receiving notification to that effect from the Project Manager. In the event of failure on the part of the Contractor to pay the balance amount due within one month as stated above, the Owner / Project Manager shall be entitled to invoke the performance bond and the Contractor shall raise no objection in this regard. In respect of those parts of the Work for which longer guarantee periods are stipulated elsewhere in the Contract Documents, the Defects Liability Period for such parts of the Works shall be until the end of the respective guarantee period that is stipulated for each such part. No payment shall be made to the contractor on this account.

All the material whether Owner supplied or not shall be supplied by the Contractor at his own cost for undertaking any correction/rectification/replacement of defective/damaged or uncorrected works.

46.3 Taking over of the works by the Floor Occupant / Project Manager

The Contractor shall be responsible to maintain all his works till completion of the Defects Liability Period and to handover the floor to the Project Manager. In this regards the works would be jointly inspected by a team comprising of representatives of Contractor and the Project Manager, for noting any discrepancy, defect, shortcomings. Within the time period specified by the Project Manager the Contractor shall rectify, correct or replace the defective

works so noted during the joint inspection, at his own cost to the satisfaction of the Project Manager. On acceptance of the contractor's work, the contractor shall prepare the inventory of his works, and hand over the floor & the inventory to the Project Manager.

During carrying out the rectification, correction or replacement works as mentioned above the Contractor shall take all necessary precautions to safeguard the existing finishing and works of other Vendors against any damage. In case the works of other Vendors are damaged by the Contractor while undertaking the rectification / replacement work, the Contractor shall rectify / replace the works so damaged at his own cost to the satisfaction of the Project Manager.

On failure of the contractor to rectify, correct or replace the defective works or on undue delay on part of the contractor for the same, the Project Manager shall be at liberty to undertake the correction works by itself or through any Vendor at the Contractor's cost. All such costs including any incidentals thereof incurred by the Project Manager shall be recovered from the Contractor's payments or from any amounts due to the Contractor.

Taking over of the works prior to completion of the Defects Liability Period by the Project Manager shall not discharge the contractor of his responsibilities for the balance Defects Liability Period and the Defects Liability Period shall remain in force till completion of Defects Liability Period as mentioned in Schedule of Fiscal Aspects.

On removal of all the defects, handing over to the Project Manager and successful completion of the Defects Liability Period by the Contractor, the Project Manager shall issue the Final Completion Certificate to the contractor and the Defects Liability Period shall deemed to be complete.

47. FINAL COMPLETION OF THE WORK:

The Work shall be considered as finally complete at the end of the Defects Liability Period subject to the Contractor having replaced and/or rectified and made good all the defective items of work and defects and hand over the floors in accordance with clause above, to the satisfaction of the Project Manager, and provided that the Contractor has performed all his obligations and fulfilled all his liabilities under the Contract, and when the Project Manager & Architect has certified in writing that the Work are finally complete. Such Final Completion in respect of those parts of the Work, for which extended guarantee periods are stipulated elsewhere in the Contract Documents, shall be achieved at the end of such stipulated guarantee periods.

48. FORCE MAJEURE:

48.1 The right of the Contractor to proceed with the Work shall not be terminated because of any delay, subject to the time limits set forth in this clause, in the execution of the Work due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor, or the Sub-Contractors, defined under Force Majeure, as Acts of God or that of the public enemy,

restraints of Governing States, fires and floods. The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: a) any strike, work-to-rule action, go-slow or similar labour difficulty (b) late delivery of equipment or material (unless caused by Force Majeure event), (c) economic hardship and (d) changes in applicable laws.

48.2 If the Contractor is wholly prevented from the performance of the Contract for a period in excess of thirty (30) consecutive days because of a Force Majeure, the Project Manager may terminate this Contract by fifteen (15) days written notice delivered to the Contractor, and if the period of the Force Majeure exceeds one hundred and twenty (120) consecutive days, the Contractor may terminate this Contract by fifteen (15) days written notice to the Project Manager. In the event this Contract is so terminated, the Contractor shall be paid for the costs of the Work actually executed up to the date of termination. Such costs shall not include loss of profits or for any other expenses of the Contractor or Sub-Contractors such as salaries or wages of the employees or workers, hire charges for plant and machinery, expenses towards maintenance of establishment, demobilization, break charges or any other expense. Failure to agree on an equitable settlement shall be deemed to be a dispute.

49. TERMINATION OR SUSPENSION OF THE CONTRACT BY THE OWNER / PROJECT MANAGER:

- 49.1 The Owner / Project Manager, may without, prejudice to any other right or remedy and after giving the Contractor seven days notice in writing, terminate the employment of the Contractor and take charge of all materials, equipment, tools, and plant and machinery thereon and use these as the Owner's property for the completion of the Project. Such decision for termination of the Contract would be taken by the Project Manager based on the fact if, in their opinion, sufficient cause exists to justify such action, on the happening of all or any of the following events:
 - i. if the Contractor shall be adjudged bankrupt; or
 - ii. if he should make a general assignment for the benefit of his creditors; or
 - iii. if a receiver shall be appointed on account of his insolvency/bankruptcy; or
 - iv. if he should persistently or repeatedly refuse to carry out the Works diligently; or
 - v. if he should fail to provide enough properly skilled workmen or proper materials or equipment or plant and machinery or tools or anything else necessary for the progress of the Work in accordance with the approved Construction Programme and not able to achieve the milestone provided in the said programme; or
 - vi. if he should fail to make prompt payments to Sub-Contractors or to suppliers for materials or equipment or to his workers; or
 - vii. if he should persistently disregard laws or ordinances or instructions of the Owner / Project Manager; or
 - viii. if he should be guilty of a violation or breach of any provision of the Contract; or
 - ix. if he has abandoned the Contract; or

- x. if he has failed to commence the Work within the time specified or if he has suspended the Work.
- 49.2 In the event of the termination of the Contract as mentioned in Clause 49.1 above, the Contractor shall not be entitled to receive any further payment until the Project is completed. If the amount due to the Contractor for the Work carried out by him as per the Contract terms exceeds the expenses incurred by the Owner / Project Manager, including for additional management and administrative services, for completing the Project and in respect of the actual expenses suffered by the Owner / Project Manager due to the Contractor's default, then such excess shall be paid to the Contractor within three months of the final completion of the Project. If such expenses for completing the Project and in respect of the damages and/or losses suffered exceed such amount due, then the Contractor shall pay the difference to the Owner / Project Manager within one month of receiving the notice to that effect from the Owner / Project Manager. The expenses incurred by the Owner / Project Manager for completing the Work and in respect of the actual expenses suffered by him due to the Contractor's default, shall be certified by the Project Manager and his decision on this matter shall be final and binding on the Parties.
- 49.3 Without prejudice to any claims that the Owner / Project Manager may have against the Contractor, the Owner / Project Manager at their own sole discretion, for the sake of convenience and without assigning any reason may terminate the Contract at any time, by giving the Contractor at least seven days' prior written notice to that effect.
- 49.4 In the event of the termination of the Contract as mentioned in Clause 49.3 above, the Owner / Project Manager shall pay the Contractor for such portions of the Work as are due and properly invoiced under the provisions for final payment in Clause 32 for Work performed prior to termination of the Contract.
 - Provided however, that in any event, the total payments made to the Contractor under this clause shall not exceed the Contract Price (for the relevant items / Works actually carried out and done by the Contractor) and that prior to full payment, the Contractor shall comply with the requirements for the release of claims and other documentation as appropriate and provided for under the provisions for final payment in Clause 32. The Owner's / Project Manager's sole liability to the Contractor for termination pursuant to Clause 49.3 above, shall not entitle the Contractor to any further payments (beyond what is provided for in this Clause), including without limitation, loss of anticipated profits.
- 49.5 The Owner or the Project Manager, at any time, time to time and for any reason may suspend any part of or the whole of the Work by giving at least 24-hours' written notice to that effect to the Contractor, specifying the part of the Work to be suspended and the effective date of such suspension. The Contractor shall cease work on said part of the Works on and from the effective date of such suspension. The Contractor shall continue to perform any unsuspended part of the Work. The Owner / Project Manager may, at any time, authorize resumption of the suspended part of the Work by notifying the Contractor of the part of the Work to be resumed and the effective date (which shall not be less than 24 hours from such notification) of withdrawal of

suspension. The Contractor agrees and undertakes to resume the suspended Work properly on receipt of such notice.

49.6 Incase the suspension period does not exceed one Week, the Owner/Project Manager shall not be liable for reimbursement of any expense to the Contractor for the Cost of Labour borne and expended by the Contractor for keeping any manpower idle who were actually working on the suspended work. In case the suspension period exceeds one week upto a period of next three weeks the Project Manager/Owner shall only reimburse the actual cost on such portion of idling of labour whose services have not actually been utilized by the Contractor on any other work during the said period. The Number of workmen who were actually working on the suspended work shall be identified by both the Parties at or before the time of suspension of the work and utilization or non-utilisation of such manpower by the Contractor shall be reported to the Project Manager on daily basis. It is further clarified that the Owner/Project Manager shall not at all be responsible for non-utilisation of the whole or any part of plant, machinery and equipments by the Contractor during the suspension period. In case the suspension period is notified by the Project Manager to exceed a period of one Month then the Project Manager/Owner shall not be liable for payment of any compensation to the Contractor on any count whatsoever and it shall be the prerogative of the Contractor as to in what manner the Contractor utilizes his manpower.

50. TERMINATION OF THE CONTRACT BY THE CONTRACTOR:

In case the Work remains suspended for a continuous period of more than Six (6) Months by or at the instance of the Owner / Project Manager or on account of any court orders not arising out of any misconduct of the Contractor, or because of any vis-majure causes, the Contractor shall be entitled to Terminate this Contract by serving One Month's notice in writing and thereupon to have the accounts settled with the Owner / Project Manager.

51. INTELLECTUAL PROPERTY RIGHTS:

- It is hereby acknowledged and agreed that the Owner / Project Manager has 51.1 commissioned the Work in connection with the Project and accordingly ownership of all intellectual property rights, including but not limited to property rights in the design and in all Drawings, Specifications and documents prepared by the Architects, the Contractor and any Sub-Contractors or Vendors belongs and shall be assigned solely to the Owner who shall be entitled to deal with the designs, Drawings, Specifications and documents in whole or in part, in any manner in the Owner's sole discretion, directly or through the Project The Contractor hereby disclaims any right whatsoever on these intellectual property rights in which cases the Owner shall be duly informed in that regard. This intellectual property right entitlement shall extend to any maintenance, repair and renewal, reinstatement and enlargement of the Project. The Contractor shall ensure that any provisions of this type necessary to protect the intellectual property rights of the Owner / Project Manager are included in all its contracts with Sub-Contractors.
- All communications, whether written or oral, including but not limited to this Contract, its Annexures, Drawings, data sheets, Specifications, bills of

material, sketches, calculations, designs and all other materials shall be treated as confidential and shall be the exclusive property of the Owner unless otherwise agreed in writing and must be given to the Owner upon request, but in any event all such materials shall be delivered to the Owner / Project Manager upon termination/expiry of this Contract.

- 51.3 The Contractor agrees that it and its employees, agents, Sub- Contractors and consultants shall not (without the prior written consent of the Owner) during the term of this Contract or thereafter, disclose, make commercial or other use of, give or sell to any person, firm or corporation, any information received directly or indirectly from the Owner or Project Manager/ Architect or acquired or developed in the course of the Work, Project or this Contract, including by way of example only, ideas, inventions, methods, designs, formulae, systems, improvements, prices, discounts, business affairs, trade secrets, products, product specifications, manufacturing processes, data and know-how and technical information of any kind whatsoever unless such information has been publicly disclosed by authorised officials of the Owner / Project Manager. The Contractor agrees that prior to assigning any employee or agent or hiring any Sub -Contractor or consultant to work on this Project, such employee, agent, Sub-Contractor or consultant shall be required to execute a document containing in substance and form, a confidentiality provision similar to this provision.
- 51.4 The Contractor shall not, without the Project Manager's prior consent:
 - i. Take any photographs or videos of the Project (or any part thereof) for use otherwise than in connection with carrying out and completion of the Project;
 - ii. Write for publication, or cause, information or comment or pictures about the Project;
 - iii. Supply to any third person such as actual and prospective clients, contractors, publishers, other interested parties and the like, the designs and any articles or information relating to the Project; and
 - iv. Give interviews to the press including television, radio print and the like regarding the Project or the Contractor's involvement in the Work.
- 51.5 Notwithstanding the foregoing, this provision shall not limit the obligation of the Contractor to take photographs and/or videos on a regular basis for the purpose of providing the progress reports required by this Contract.
- 51.6 The Contractor, Sub-Contractors and their respective employees, representatives, agents, servants, workmen and suppliers shall not, during or after the termination/expiry of this Contract, disclose any information pertaining to this Contract or the Project to any person without the prior written consent of the Owner / Project Manager except when called upon to do so by a valid and lawful direction or order of a statutory or Government authority or an order of a court of law or where any of the parties require production of this document and related information for establishing their respective legal rights.

52. SETTLEMENT OF DISPUTES / ARBITRATION:

- All disputes and differences of any kind whatsoever arising out of or in 52.1 connection with this Contract as also with regard to the implementation, meaning, interpretation or implications of the various clauses of the Contract and those of the Contract Documents or in respect of any other matter or thing arising out of or relating to the development and construction of the Project whether during the progress of the work or after their completion shall be communicated by the Contractor in writing to the Project Manager and all possible efforts would be made by the Parties to sort out and resolve all such matters of controversy, disputes and differences, amicably with due dispatch and effective priority. In case, the Contractor and the Project Manager were unable to resolve such issues amicably latest within 10 working days from the date of receipt of such communication by the Project Manager. In such eventuality the Owner / Project Manager shall take their decision thereon without any undue delay and preferably within next 10 working days and there upon they shall notify in writing such decision to the Contractor with in next 5 working days.
- Decisions, directions and clarifications pertaining to measurements, drawings and certificates, quality of work etc. taken by the **Director of M/s INDIAN INSTITUTE OF ASTROPHYSICS** shall be final and binding on the Parties. The Decisions so taken with respect to any matter the decision for which is specially provided for by these or other special conditions to be given and made by the Project Manager / their Director, IIA with or without the concurrence of the Owner or of the Architect are exempted matters for the purpose of Arbitration proceedings and shall not be set aside on account of non-observance of any formality, any omission, delay or error in proceeding in or about the same or on any other ground or for any reason. They shall be specifically excluded from the scope of arbitration proceedings hereinafter referred to.
- 52.3 Subject as aforesaid in Clauses 52.1 and 52.2, all disputes and differences whatsoever, which shall at any time hereafter arise between the Parties hereto, touching or concerning this Agreement or its interpretation or effect or as to the rights, duties, obligations and liabilities of the Parties hereto or either of them under of by virtue of this Agreement or otherwise as to any other matter in any way connected with or arising out of or in relation to the subject matter of this Agreement shall be referred to the Arbitration in accordance with the provisions of Arbitration and Conciliation Act 1996. The Parties agree that the reference of the disputes and differences between the Parties would be made to the Sole Arbitrator, to be appointed by the Management Review Committee (MRC) constituted by the Owner and the Project Manager.

The jurisdiction and arbitration venue shall be at **BANGALORE**. The procedure for the arbitration shall be determined by the Arbitrator. Costs of such arbitration shall be equally shared between the Owner and the Contractor. The Parties undertake to abide and remain bound by the award of the Arbitrator so rendered.

- 52.4 The Contractor shall not, except with the consent in writing of the Owner and Project Manager, in any way delay the carrying out of the Work by reason of such matter, question or dispute being referred to arbitration. On the contrary the Contractor shall proceed with the work with all due diligence and shall, until the decision of the arbitrator is given, abide by the decision of the Project Manager. The award of the arbitrator shall not relieve the Contractor of his obligations to adhere strictly to the Owner's / Project Manager's instructions with regard to the actual carrying out of the Work save and except as the Award may specifically affect such instructions.
- 52.5 This tender shall be subject to the jurisdiction of the courts at **BANGALORE**.

53. GOVERNING LAW:

The governing law of the Contract shall be Indian law.

54. STANDARDS OF CONDUCT:

- 54.1 The Contractor, in performing its obligations under this Contract, shall establish and maintain appropriate business standards, procedures and control, including those necessary to avoid any real or apparent impropriety or adverse impact on the interests of the Owner / Project Manager. The Owner / Project Manager will in no event reimburse the Contractor for any costs incurred for purposes inconsistent with such policies.
- 54.2 Compliance with Laws, Rules and Regulations:
 Contractor represents, warrants, certificates and covenants that in connection with performance under this contract that:
 - i. It shall, and the Work to be provided hereunder shall, comply with all applicable Local, National, and Central Laws, rules and regulations, including but not limited to those governing building constructions, environmental, safety of persons and property, ESI, workmen compensation, PF and applicable industrial/labour laws, and land development laws, rules and regulations.
 - ii. No services provided hereunder will be produced using forced, indentured or convict labour or using the labour of persons in violation of the minimum working age law in the country where the Work are rendered;
 - iii. It shall comply with all laws regarding improper or illegal payments, gifts or gratuities; and Contractor agrees not to pay, promise to pay or authorize the payment of any money or anything of value, directly or indirectly, to any person or entity for the purpose of illegally or improperly inducing a decision or obtaining or retaining business or any advantage in connection with this Contract;
 - iv. It has not paid or provided and shall not pay, any gratuity for the benefit of any agent, representative or employee of the Owner / Project Manager other than in accordance with the Owner's / Project Manager's applicable policies; and
 - v. It has not, and shall not, engage in any sharing or exchange of prices, costs or other competitive information or take any other collusive conduct with any third party supplier or bidder in connection with the preparation or

- submission of any bid or proposal to the Owner / Project Manager or the negotiation of this Contract.
- vi. It will also comply with all rules and regulations of the Owner / Project Manager which may be in effect at the Facility site regarding employment, passes, badges, smoking, fire prevention, safety and conduct or property. On behalf of the Owner / Project Manager, Contractor shall request and monitor that such is observed by any Contractor, subcontractors, vendors and each of their employees.

55. WARRANTY AS TO DOCUMENTS SUBMITTED TO OWNER; AUDIT:

The Contractor represents that all Documents, including invoice, vouchers, financials to settlements, billings and other reports submitted or to be submitted by the Contractor to the Owner / Project Manager in support of an application payment are true, correct, complete and accurate in all respects. Upon request of the Owner / Project Manager, the Contractor agrees to cooperate fully with the Owner / Project Manager in the conduct of a billing and technical audit by an independent agency of the billings by the Contractor for the Work.

The Contractor accepts that the contract / work shall be subject to the technical audit by an independent technical auditor appointed by the Owner / Project Manager to audit the quality and quantities of the works done by the contractor, and agrees to render all necessary assistance to such agencies / professionals, whose reports / assessments shall be final and binding. Contractor shall fulfill the requirements as per the auditor's assessments at his own cost with in the time stipulated by the Project Manager.

56. CHANGES IN CONTRACTOR'S CONSTITUTION:

- Where the contractor is a Partnership, prior approval in writing shall be obtained from the Project Manager before any change is made in the Constitution of the partnership.
- 56.2 Where the Contractor is an individual or a Hindu Undivided Family business, such written approval from the Project Manager shall likewise be obtained before Contractor enters into any partnership agreement in which the partnership would have the right to carry out the work previously to be undertaken by the Contractor.
- If such written prior approval is not obtained by the Contractor, the contract shall be deemed to have been assigned in the contravention of Clause 17 of these General Conditions of Contract and same action taken and consequences ensue, as provided for under Clause 49 of these General Conditions of Contract.

57. GROUNDS FOR WITHHOLDING PAYMENTS:

The Owner / Project Manager may withhold the whole or part of any compensation due to the Contractor to the extent necessary to protect the Owner from any loss on account of any breach of Contractor's obligations under the Contract. When the cause for withholding is rectified, such amounts then due and owing shall be paid or credited to the Contractor.

58. CONTRACT SIGNING:

After acceptance of tender, the tenderer shall sign the necessary contract papers / documents with in 10 days of the intimation. Expenses for the agreement including the cost of the stamp papers etc. shall be borne by the contractor.

SPECIAL CONDITIONS OF CONTRACT (S.C.C.)

1. **GENERAL**:

The Special Conditions of Contract are an extension of and are to be read in conjunction with the General Conditions of Contract. Should there be any contradictory requirements in the two, the requirement as per the Special Conditions of Contract shall prevail.

2. DRAWINGS:

- i. Contract / Tender Drawings duly signed by the Architect / Consultants are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the direction of the Project Manager and with the prior approval of the Project Manager.
- ii. Architectural drawings shall take precedence over Structural drawings, which in turn shall take precedence over services drawings in regard to all dimensions.
- iii. The Contractor shall verify all dimensions at the Site and bring to the notice of the Project Manager discrepancies if any, the Project Manager's decision in this respect shall be final.

3. WORK TO BE CARRIED OUT BY LICENSED PERSONS/FIRMS:

Technically competent persons or firms holding valid licenses shall only carry out any special service installations included in the scope of the Work.

4. INSPECTION AND TESTING OF MATERIALS:

The Contractor shall, if so required, produce manufacturers' test certificates for any particular batch of materials supplied by him. The tests carried out shall be as per relevant Indian Standards and shall be carried out at Government approved test facility specified by the Project Manager.

For checking setting out and testing materials at the Site the Contractor shall provide the following minimum testing equipment:

- i. Theodolites / Total Station
- ii. Automatic levels
- iii. Steel tapes
- iv. Weighing machines
- v. Spirit levels, plumb bobs
- vi. Micro meters
- vii. Thermometers
- viii. Hydraulic testing machines
- ix. Smoke test machines
- x. Complete concrete testing lab equipment
- xi. Moisture meters
- xii. Complete sets of sieves
- xiii. Oven.

All such equipment shall be calibrated at specified frequency for accuracy at a Testing Facility approved by the Project Manager and calibration certificates will be submitted to the Project Manager.

5. REFERENCE DRAWINGS:

The Contractor shall maintain on site one set of all Drawings issued to him for reference.

6. SHOP DRAWINGS:

- 6.1 The Contractor shall submit, during the currency of the project, to the Project Manager four (4) copies of all shop drawings for his approval. Shop drawings shall be submitted generally for the following:
 - i. Construction and installation details for shuttering and formworks
 - ii. Structural Steelwork, especially joint details.
 - iii. For specific areas requiring detailing as called for by the Project Manager / Architect.
 - iv. Manufacturer's and/or Contractor's fabrication drawings for equipment supplied by Contractor.
- 6.2 All the shop drawings shall be prepared on computer through AutoCAD software. Within 7 days after the issue of award of the contract and initial set of working drawings, the contractor shall furnish to the Project Manager, for the approval of the Architect/Consultant, four sets of detailed shop drawings of all equipment and materials as required by the Architect/ Project Manager.

Each item of equipment/material proposed shall be a standard catalogue product of an established manufacturer strictly from the List of Approved Makes and Manufacturers listed in Volume 2 Annexure B.

- 6.3 Shop drawings shall be submitted for approval sufficiently in advance of planned delivery and installation of any materials to allow Architect/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved programme.
- Manufacturers' drawings, catalogues, pamphlets, equipment characteristics data, performance charts and other documents submitted for approval shall be in four sets. Each item in each set shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.
- 6.5 Samples of all finishing materials like Tiles (vitrified and ceramic), Indian marble & granite, paints, door shutters, door locks & other hardware etc. other than materials so specified shall be submitted to the Project Manager prior to procurement. These will be submitted in triplicate for approval and retention by Project Manager and Architect and shall be kept in their site office for reference and verification till the completion of the Project.

- 6.6 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contractor.
- 6.7 Where the contractor proposes to use an item of equipment, other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, piping, wiring or any other part of the mechanical, electrical or architectural layouts; he shall inform the Project Manager well in advance and no delays resulting from such re-design shall be admissible. He shall also submit all related information as may be required for such redesign to the Architect/ Project Manager.
- 6.8 Where the work of the contractor has to be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Project Manager, the contractor shall prepare composite working drawings and sections at a suitable scale not less than 1:50, clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the Owner / Project Manager.
- 6.9 Within four weeks of approval of all the relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement, and itemized price list of recommended (by manufacturers) imported and local spare parts and tools covering all equipment and materials in this contract. The Project Manager shall make recommendation to Owner for acceptance of anticipated variation in contract amounts and also advise the Owner to initiate action for procurement of spare parts and tools at the completion of project.

7. COMPLETION DRAWINGS & STANDARD MEASUREMENT BOOK (SMB):

On completion of the Work, the Contractor shall submit three (3) complete sets of the site produced drawings and marked up prints of "AS BUILT" drawings verified and approved by the Architect to the Project Manager. These drawings shall include and show all the changes / deviations made from the working drawings during the course of construction and also the other details as called for by the Project Manager. During the execution of the Works a set of drawings shall be retained in the Contractor's Site Offices for the exclusive purpose of recording changes made to the Work as the construction proceeds. The drawings shall be prepared on computer through AutoCAD Software and provided to the Project Manager on CD.

Along with the completion drawings the Contractor shall also prepare and submit to the Project Manager the Standard Measurement Book (SMB) in the form of a bound book and a soft copy of the same. SMB shall incorporate the standard measurements of the items as per the completion / as built drawings in modules finalized in consultation with the Project Manager.

8. TESTING OF INSTALLATIONS:

All water retaining structures and the basement shall be tested as specified for the waterproof qualities, in the presence of the Project Manager. The Contractor shall also perform all such tests as may be necessary and required by the Project Manager to ensure quality of the executed works and by local authorities to meet Municipal and other bye-laws, regulations in force. The Contractor shall provide all labour, equipment, and materials etc., required for the performance of the tests.

9. SITE INFORMATION:

All information, levels and dimensions given in the tender drawings relating to Site conditions are given in good faith; the Contractor shall, however, make his own independent inquiries and verify the same. Any claims for extras on account of any deviations or incorrectness of above referred information, levels etc., shall be considered as inadmissible.

The Contractor shall obtain all information relating to local regulations, by-laws and all regulations applicable to the work or applicable profession. Any claims in this regard shall be inadmissible.

10. SITE INSTRUCTION FILE:

The Contractor shall maintain a Site instruction file at the Site office. All instructions received from the Project Manager relating to the Work shall be retained in the file.

11. PHOTOGRAPHS:

Besides submitting progress charts, reports, etc., the Contractor shall submit progress photographs as directed by Project Manager, every four weeks in triplicate along with negatives.

12. PROFESSIONAL INTEGRITY AND TEAM SPIRIT:

It is the intent of the Owner and the Project Manager that this Project will be executed in a spirit of teamwork and full professional integrity. The Contractor shall fully cooperate with all agencies concerned to fulfill this objective.

13. QUALITY ASSURANCE AND CONTROL PROGRAMME:

The Contractor shall establish an effective quality control system at the Site and implement the same through an independent team consisting of the Contractor's Representative and qualified and experienced engineers and technical personnel to enforce quality control on all items of the Work and the Project at all stages.

14. CONTRACT DRAWINGS:

Drawings forming part of the Contract are listed in Annexure B. Further supplementary Drawings furnished by the Project Manager from time to time shall also be deemed to form part of the Contract.

15. ENTRY TO THE SITE:

The Project Manager, at his discretion has the right to issue passes to control the admission of the Contractor, his agents, employees and work people to the Site of the Work or any part thereof. Passes shall be returned at any time on demand by the Project Manager.

16. FIRE PRECAUTIONS:

The Contractor shall take all precautions and preventive measures against fire hazards at the Site and shall assume full responsibility for the same.

17. PERFORMANCE BOND:

The Contractor shall furnish a performance bond in the form of a bank guarantee from a Nationalised bank approved by the Project Manager, for the value and validity as mentioned in the Schedule of Fiscal Aspects, within Ten (10) days from the date of LOI / Work Order issued to the Contractor. The Bank Guarantee shall be in the approved format.

18. DRILLING, CUTTING ETC.:

All cutting and drilling of walls or other elements of the building for the proper entry/installation of inserts, boxes, equipment, etc. shall be carried out using electrically operated tools only. Manual drilling, cutting, chiseling, etc. shall not be permitted. No structural member shall be cut or chased without the written permission of the Project Manager. Cutting and drilling of structural members shall be carried out using vibration free diamond wire sawing and diamond drilling only with prior permission from the Project Manager. The costs for procurement and using such equipment are deemed to be included in the Contract and no extra costs will be paid.

19. APPROVAL BY STATUTORY BODIES:

The Owner will handle commencement Certificate, No Objection Certificate and Occupation Certificate if applicable for the permanent building works under this Contract.

The contractor shall be responsible for providing required notices to authorities and to obtain and retain with him at his own cost all other approvals from the statutory bodies pertaining to works under this tender and temporary structures to be constructed at site, labour, ESI, PF, Tax Deptts. etc. and any other approval required to facilitate performance of Contractor's work under the Contract till completion.

Refusal by statutory authorities to issue completion / occupation certificate or any other approvals due to the Contractor's failure to construct the building in accordance with the sanctioned plans and/or specifications shall render the Contractor liable for damages and in addition, render him liable to obtain such certificates at his cost.

20. LABOUR WAGES:

The Contractor shall have no claim whatsoever, if on account of any rules and regulations or otherwise, he is required to pay wages in excess of fair wages called for under Clause 12.2 of General Conditions.

21. MOBILISATION ADVANCE:

21.1 Mobilisation Advance for Works:

The Owner / Project Manager will pay Mobilisation advance up to 5% (Five percent) of the value of the Contract. 10 (Ten) Lacs of the said advance shall be paid on production of a Bank Guarantee of equal amount from a Nationalised bank after signing of the Contract. Balance amount to be paid against mobilization of material (i.e. shuttering, scaffolding, machinery, establishment of office / infrastructure) of same value against BG. BG to be valid up to Thirty (30) days after the scheduled date of Virtual Completion or the extended date till the full Mobilisation Advance is recovered. The Bank Guarantee shall be in the approved format. The Mobilisation Advance shall be recovered by the Owner /Project Manger from the Contractor's Bills as prescribed for in Schedule of Fiscal Aspects.

22. OWNER'S, PROJECT MANAGER'S OFFICE & FACILITIES

The Contractor shall supply, erect and satisfactorily maintain in good repair until final completion of the Project, at no additional cost, the following facilities:

- i. Furnished Project office for Owner, Project Manager, Architects as per the attached drawing (for an area of approx. 750 sft.).
- ii. Free water, stabilised power and lighting as required for the duration of the Project.
- iii. Sanitation facilities for the duration of the Project.
- iv. Janitorial and Housekeeping of project office on daily basis.
- v. 3 nos. Air Conditioners/heaters & complete furniture, storages, marker boards etc. as required.

The Contractor shall provide at all times for the duration of the Contract survey instruments for the exclusive use of Architect/Project Manager/Owner/Owner's Representative for carrying out of their duties in connection with the Contract.

Such instruments which must be approved by the Architect, shall include but not limited to the following:

- One theodolite & tripod capable of reading to 20 seconds / Total Stations
- One level with horizontal circle and tripod.
- Two metric levelling staffs not less than 3.5mtr high.
- One 100 metre rust less steel band, one 30 metre rust less steel tape & two 30 metre linen tapes.
- An adequate number of ranging rods drop arrows, wooden setting-out pegs, etc.

The Contractor shall be solely responsible for all such instruments and equipment's and shall ensure that they are at all times in good repair and adjustment.

23. TESTING FACILITIES AT SITE:

- 23.1 The Contractor shall provide facilities/equipment to test the quality of material being used.
- The Contractor shall provide the minimum but not limited to the following facilities / equipment and trained staff at site at his own cost.
 - Compression Testing Machine for concrete and bricks
 - Slump testing apparatus.
 - Sieve sets for testing of fine and coarse aggregate balance
 - Cube moulds
 - Balance
 - Ovens
 - Weighing Machine
- 23.3 The Contractor shall get other tests carried out at his own cost at approved laboratory as per the directions of the Project Manager.

24. REPORTS & CHECKLISTS BY CONTRACTOR:

- 24.1 Contractor has to note that Project Manager follows the ISO procedures and all reports, returns & checklists shall conform to ISO standards & procedures as informed to the Contractor by the Project Manager for time to time. With in 15 days of award of contract the contractor shall submit the draft formats for various reports and Checklists for the approval of the Project Manager. During progress of the Work the Contractor shall prepare and submit to the Project Manager various checklists, for having checked various Works at different stages of progress and reports as per the approved formats and at specified frequency.
- 24.2 The Contractor shall file daily category-wise labour return. The report shall indicate scheduled requirement against actual strength.
- 24.2 The Contractor shall prepare weekly reports of planned and actual progress of the Work and the subsequent week's scheduled Work. These will also include material procurement status.
 - These reports shall be submitted to Project Manager and Owner's Representative and shall be reviewed in weekly co-ordination meeting.
- 24.3 The Contractor shall submit monthly report along with monthly bills.
- 24.4 Further progress charts and schedules shall be prepared by the Contractor as directed by the Project Manager.
- 24.5 Contractor shall submit a safety procedure manual or Company policy on safety. Complying with the SHE Plan and outlining its implementation by the Contractor and including:
 - i. Quality Assurance and Control System (Sample format).
 - ii. Realistic construction programme/schedule.
- 24.6 Contractor shall maintain and make available all the records pertaining to reports, returns and checklist to the Project Manager during audits (internal as well as external) and make necessary corrections, additions and actions based upon the findings / observations of the audits.

25. NAME BOARD AND PUBLICITY:

The contractor is not entitled to do any publicity on account of the project. Contractor shall not put any hoarding, publish any advertisement, put any banner or circulate any pamphlet or adopt any other publicity method save and except with prior written approval of the Project Manager.

A name board may be made and displayed by the Contractor at his own cost at the Site at some approved place. The drawing of the Name Board shall be got approved from the Project Manager. The contents of the board shall be as follows:-

- i. Name of the Project.
- ii. Name of the Owner/Owners.
- iii. Project Manager/ Architect / Consultants with their addresses.
- iv. Contracting Agency.
- v. Other Contracting Agencies.

Care should be taken to see that the height of letters especially for the Architects should not be more than 2" to abide by the code of professional conduct prescribed by the Indian Institute Of Architects. The colour, texture etc., of the board shall be as per the Architect's instructions.

26. SITE BARRICADING:

Site barricading with painted GI sheet at site shall be maintained by the Contractor at his own cost till completion of the Project. Contractor for safety reason provide the GI sheet barricading around the excavated pits and his work area, which shall be put in proper line and level and shall be painted as per the instructions of the Project Manager. Contractor shall at his own cost provide lockable gates at all the openings in the site barricading, boundary wall, access roads that may be required from time to time during progress of work. Contractor shall be required to provide appropriate barricading within the site to ensure safety of men and material, at his own cost.

27. RATE ONLY ITEMS, NON-TENDERED / EXTRA ITEMS AND QUANTITIES EXCEEDING THE TENDERED QUANTITIES:

The contractor shall immediately and before procurement and execution of the work obtain a written approval of the variation order from the Project Manager for the rate only item, non-tendered /extra items and quantities exceeding the tendered quantities. No payments will be entertained without the Project Manager's written approval of the change / variation order. The onus shall be on the Contractor to obtain such prior written variation order from the Project Manager.

28. WATER AND ELECTRICITY:

Contractor shall make his own arrangement for electricity and water for construction purposes.

- 28.1 There is no water arrangement at site from which the Contractor may draw water for construction purpose. The contractor shall arrange the water good for construction & personal use at his own cost and shall be responsible for all further connections, pumps, pipes, storage facilities and all other things necessary to distribute and use services from this distribution point..
- 28.2 The electricity required for Construction Work shall be arranged by the Contractor from the authorities and/ or generators at his own cost.

Contractor shall be responsible for all distribution points as may be required for the Work. The Contractor shall also make arrangement for alternative standby services at his own cost in the form of additional Generators of adequate capacity (day & night) so that there is no delay in progress of Work as per construction schedule submitted by him and approved by the Project Manager. The Contractor shall also share electricity from his Generators and electric connection with other Contractors, Sub-contractors, Vendors & Project Manager etc. and share proportionate cost (excluding the Project Manager for whom the electric supply is free) with them at tariff prevalent as per State Electricity Board. The point of supply shall be at Generator / Electric supply Board. The cost of energy meter shall be borne by the allied contractors. Contractors shall ensure adequate capacity of generators to support such load sharing with other vendors.

- 28.3 The Contractor shall prepare schematic distribution diagrams of distribution of electricity and water for construction purposes incorporating all safeties and get them approved by the Project Manager, the distribution at site shall be in accordance to the approved schematic. The contractor shall ensure incorporation and strict implementation of all safety parameters, equipments, instruments and directions given by the Project Manager from time to time in this regard.
- 28.4 The contractor shall install the temporary distribution lines for water and electricity ensuring that work of other agencies / vendors is not interrupted or hampered. Incase during the course of construction these lines foul or interrupt or hamper the work of other agencies / vendors, the contractor shall remove and relocate the service lines and relocate the same at his own cost with in the time stipulated by the Project Manager.
- 28.5 If the Institute provides the water and electricity, the cost for such facility will be borne by the contractor at 1% of the bill value for water and electricity or as per actual consumption which will be decided before providing the facility by the owner.

All statutory Fees, & miscellaneous expenses and costs for electric power and Water connection for construction purposes shall be borne by the Contractor. However the statutory fees if refundable shall be reimbursed by the Owner on production of proper receipts.

29. ASSOCIATED CIVIL WORKS:

All civil works required for the storage of materials or the installation of equipments any other required for the contractor's functioning shall be the responsibility of the contractor.

30. GUARANTEE TO PERFORM:

The contractor shall carry out the work in accordance with the drawings, specifications, schedule and other documents forming part of the contract.

The contractor shall be fully responsible for the performance of the works executed by him. All waterproofing works and termite proofing works executed by the contractor, shall be guaranteed for a minimum period of ten years from the date of final completion of Project. The guarantees on the approved format shall be submitted to the Project Manager along with the as-built documentation at the end of the project. These guarantees will be executed & extended by the contractor and not by the sub agencies to the Project Manager.

31. ESCALATION:

No escalation on Contract price / rates shall be applicable during the tenancy of the Contract period including extensions thereof.

32. DEWATERING AND FLOODING CONTROL:

- 32.1 The Contractor is deemed to have allowed for any and all temporary dewatering, during the execution of his Work. Such work shall include but not necessarily be limited to the safe disposal of the resulting water; removal, replacement and/or recompaction of the water logged soils/surfaces; backfilling plugging of all temporary sumps, ditches, temporary materials and devices.
- 32.2 Contractor shall be deemed to have allowed for all costs associated with removal of flood waters and any associated sludge debris etc. from the basement level or any other part of the building so effected in the event of flooding due to heavy rains during his construction activities and after basement, superstructure work is completed until such time as Contractor has completed and handed over all his works under the Contract.

33. **PROTECTION / PRESERVATION OF TREES:**

Contractor shall take all measures necessary to ensure the protection and preservation of existing trees within / outside the boundary of the site. Contractor shall be responsible of any damage / casualty to the trees happing as a result of his working at site and for any action, claim, penalty or expenses imposed by the forest / any other department. No claim / payment shall be payable to the contractor on this account.

1. SCHEDULE OF FISCAL ASPECTS

| Ref. Clause | Clause Description | Summary |
|----------------|-------------------------------------|---|
| NIT – 9 | Earnest Money | Rs. 4,70,000/-(Rupees four Lakhs Seventy thousand only) as a bank guarantee/DD valid upto 90 days from the date of submission of Tender. |
| GCC-6 | Tax Deduction at Source | Tax including Work Contract Tax (WCT) shall be deducted as applicable at Source in accordance with the statutory requirements from all payments made to the Contractor, including that in respect of the Mobilization advance, if paid. GST will be paid separately as per contract |
| GCC - 10 | Insurance | Workman compensation, third party insurance, CAR policy shall be taken by own. Policies in original will be submitted with the Project Manager with in one month of start of the Project. |
| GCC - 32.3 | Running / Interim Bills | One bill per month. The minimum amount of the bills raised shall not be less than Rs. 35.00 Lacs. |
| GCC - 32.3 | Running Bills certification | With in 15 working days after receipt of Contractor's bill complete in all respect incorporating Project Manager's observations (if any). |
| GCC - 32.4 | Retention Money | 5% of the value of work done in each interim bill to a maximum of 5% of the contract value. |
| GCC - 32.4 | Release of Retention | 50% Retention money will be released after issue of Virtual completion certificate and on submission of bank guarantee of the same amount valid for Defects Liability Period Including extensions. The rest after issue of Final Completion Certificate on completion of Defects Liability Period including any extension thereof. |
| GCC - 32.5 | Final bill Payment | Within 45 working days after receipt of Contractor's final Bill complete in all respect incorporating Project Manager's observations (if any). |
| GCC - 32.8 | Secured Advance Against Material | 75% value of material cost shall be paid towards secured advance for items other than perishable such as secured advance against indemnity bond for such amount. |

| 36.2 | Commencement of work | The work shall commence within 15 days from the date of issue of LOI. |
|---------------|--------------------------|--|
| GCC – 36.2 | Period of Completion | Eighteen (18) Months after 15 days of issue of LOI including all seasons. |
| GCC - 43 | Liquidated Damages | 0.5% of the contract value per week of delay in completion of each milestone work, limited to a maximum of 5% of the contract value. |
| GCC - 46 | Defects Liability Period | 12 Months from the date of Virtual Completion. Where extended Guarantee periods are stipulated in the Contract Documents for particular parts of the Works, the Contractor shall furnish appropriate guarantees in approved formats for same before issuance of the Final Completion Certificate. |
| SCC - 17 | Performance Bond | To be submitted with in 10 days from date of LOI / Work Order. For the value of 5% of the contract value in the form of scheduled bank guarantee to be submitted at the start of the project and valid till 90 days after virtual completion of the project, in approved format. |
| SCC - 21 | Mobilisation Advance | Mobilization Advance - 5% advance against mobilization shall be paid in following manner (a) Rs. 10 lacs against BG of equal amount after signing of the agreement and issue of LOI. (b) Balance amount to be paid against mobilization of material of the same value against BG to be valid upto 30 days after the virtual completion: i. Shuttering / scaffolding cost. ii. Machinery Batching Plant iii. Establishment of office infrastructure. |
| | | Recovery of Mobilization Advance - The mobilization advance given to the contractor shall be recovered in 10 (Ten) equal installments starting from 2 nd R.A. Bill being submitted by the Contractor. |
| | Others | The contractor shall also submit within fifteen days of the award of work, a detailed schedule along with dates for material delivery for the project, a list of machinery and equipment to be used on the site along with site utilization plan showing the placement of equipment, machinery, material stacking areas, temporary stores / sheds, workshops and site offices etc., a list of tests to be conducted at and off site, a cash flow statement for the project. Samples of stones and all finishing materials must be submitted atleast 3 months or basis lead time required for procurement ahead of their scheduled use at site to the project manager |

| for approval. Any deviations from the list of approved makes and vendors must be brought to the notice of the Project Manager and a substitute got approved well in advance of the actual execution. |
|--|
| All subcontractors and specialized agencies must be got approved from the Project Manager. |

Annexure 1

1. Schedule of Owner supplied Materials:

Owner shall not supply any material. The sole responsibility rests with Contractor for procurement of all other materials required for completion of work within stipulated time.

| S. No. | Particulars | Basic Rate | Permissible Limit for wastage for reconciliation | Penal Recovery Rates |
|-----------|-------------|------------|--|----------------------------|
| | | | | |
| | | | | |

Contractor has to furnish the detailed construction programme and cash flow chart incorporating the activities, services, keeping in view the provisions under various clauses of contracts.

VOLUME - II

Tender for Construction of Coursed Rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A, Hosakote, Bengaluru Rural District.

VOLUME – II: TECHNICAL SPECIFICATION & BILL OF QUANTITIES

CLIENTS:

INDIAN INSTITUTE OF ASTROPHYSICS

Koramangala, Bangalore - 560034.

TECHNICAL SPECIFICATION

<u>FOR</u>

CIVIL, STRUCTURAL & FINISHING WORKS

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1.0 GENERAL

1.1 Scope

This specification applies to the Civil, Structural, Finishing and External Development Works and building works to be executed by the Contractor. It is to be read in conjunction with and subject to the general conditions of contract and in conjunction with the drawings, the schedule of rates and such other documents as may from time to time be agreed upon as comprising part of this contract. Where these specifications are not clear, relevant BIS codes and CPWD specifications shall be followed with prior permission of Project Manager.

1.2 Clearing

The contractor shall clear the site of all rubbish and old buildings, remove all grass and low vegetation and remove all bush wood, trees, stumps of trees, and other vegetation only after consultation with the Project Manager as to which bushes and trees shall be saved. All disused foundations, drains or other obstructions met with during excavation shall be dug out and cleared.

1.3 Site Levels

The contractor shall carry out the survey of the site and shall establish sufficient number of grids and level marks to the satisfaction of the Project Manager, who shall decide on the basis of this information, the general level of the plot and the plinth.

1.4 **Bench-marks**

Prior to commencement of construction, the contractor shall in consultation with the Project Manager, establish several site datum bench-marks, their number depending on the extent of the site. The bench-marks shall be sited and constructed so as to be undisturbed throughout the period of construction.

1.5 Site investigation

The Project Manager might have got the soil investigation done and if so, the report will be handed over to the contractor for their scrutiny. The contractor shall however inspect the site and study the findings from the trial pits or bores in order to assess the problems involved in and methods to be adopted for excavation and earthwork. The contractor shall ascertain for himself all information concerning the sub-soil conditions, Ground water table periods and intensity of rainfall, flooding of the site and all data concerning excavation and earthwork. Any extra work required on this account, nothing will be paid extra.

1.6 **Setting out the work**

The contractor shall set out the works and during the progress of the building shall amend at his own cost any errors arising from inaccurate setting out.

During the execution of the work contractor must cross check his work with the drawings. The contractor shall be responsible for all the errors in this connection and shall have to rectify all defects and/or errors at his own cost, failing which the Project Manager reserves the right to get the same rectified at the risk and cost of the contractor.

1.7 Cleaning up and handing over

Upon completion of the work all the areas should be cleaned. All floors, doors, windows, surface, etc. shall be cleaned down in a manner which will render the work acceptable to the Project Manager. All rubbish due to any reason, shall be removed daily from the site and an area of up to ten metres on the outer boundaries of the premises will be cleaned by the contractor as a part of the contract. Upon completion of the project, the contractor shall turn over to the Project Manager the following:

- a) Written guarantee and certificates.
- b) Maintenance manuals, if any, and
- c) Keys.

1.8 **Samples**

The contractor shall submit to the Project Manager samples of all materials for approval and no work shall commence before such samples are duly approved. Samples of precast concrete panels, masonry units, building insulation, finished hardware, metal window and door frames, terrazzo flooring, kota stone, marble etc. and every other work requiring samples in the opinion of the Project Manager shall be supplied to the Project Manager, and these samples will be retained as standards of materials and workmanship. The cost of the samples shall be borne by the contractor.

Throughout this specification, types of material may be specified by manufacturers' name in order to establish standard of quality, price and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the tenderers may assume the price of 'approved equivalent' except that the burden is upon the contractor to prove such equality, in writing.

A detailed programme shall be submitted by the Contractor for the material approvals, within four weeks of the Project Manager's order to commence. The detailed programme shall include but not limited to:

Date/s of submitting the various material samples. Date/s by which the Project Manager's approval is required. Date/s of placing orders on the Manufacturers/Suppliers. Date/s of arrival of the approved material/s on to the site.

Date/s of the completion of the `Mock-ups', wherever required, and the Date/s by which the Project Manager's inspection of such `Mock-ups' should be completed and the Date/s by which the Project Manager should fully approve the said Mock-ups.

1.9 **Tests**

All materials and methods of tests shall conform to the latest rules, regulation and/or specifications of the following authorities where specified herein as applicable. Bureau of Indian Standards (BIS), British Standards Code of Practice (BS) in case no equivalent BIS is available. The Project Manager will have the option to have any of the materials tested and if the test results show that the materials do not conform to the specifications, such materials shall be rejected. A reasonable number of representative tests will be deemed to be included in the rates tendered.

1.10 Mode of Measurements

All measurements will be taken in accordance with IS 1200 latest issue unless otherwise specified.

1.11 Cost of activities under Para 1.1 to 1.9, the contractor should include in their quoted rate as well as contract scope of work may be considered.

2.0 SITE DEVELOPMENT AND EARTH WORK

2.1 General

This specification deals with the clearance of the Site of Works and preparation of the same to commence the proposed construction activities. Wherever applicable, this is deemed to include all preliminary works like Dismantling/Demolition, Site Clearance, General Levelling etc.

The contractor shall visit the site, inspect the same and decide for himself the nature of the ground and the sub-soil to be excavated. No claim on account of extras will be entertained in consequences of any misunderstanding or incorrect information or ignorance of the existing conditions.

2.2 **Dismantling/Demolition**

Existing Buildings and structures within the boundary of the site, and as indicated in the drawings or as instructed by the Project Manager, shall be carefully and gradually dismantled or demolished, as the case may be.

- i) The contractor shall furnish to the Project Manager, a detailed scheme as well as a programme of these works, at least one week prior to the commencement of the actual demolition works and get the latter's approval of the same.
- ii) On approval of the above programme and scheme, the contractor shall serve notices to concerned authorities, owners, etc. as and wherever applicable, informing them of the proposed demolition and get their approval of the same, prior to the demolition/dismantling.
- iii) The whole of the building/structures that are to be demolished, shall be evacuated and cleared off any valuable life and/or property to the satisfaction of the Project Manager. Where required, the employer shall provide alternative arrangements to house those who have been evacuated.
- iv) The site of demolition shall be well cordoned off from the other areas to the satisfaction of the Project Manager, with all-necessary warning and signals, erected in the vicinity by the Contractor.
- v) Such of those parts of the building/structures that are likely to fetch some returns from the market and/or those parts which are likely to be reused elsewhere, shall be first carefully removed from the existing buildings and then stored away properly to the complete satisfaction of the Project Manager. Such parts shall include items like woodwork, built in furniture, electrical fittings, sanitary wares etc. and all others that are listed out by the Project Manager. All such valuable / reusable material shall be the property of the Project Manager / Owner.
- vi) The demolition work shall then commence preferably from the top and proceed downwards, gradually. In case of buildings comprising more than one floor, the demolition shall commence from top and shall be dismantled floor by floor in such a way that all the debris are collected in the next lower floor. Dismantling of external walls/cladding shall be done from outside inwards. The dismantling of the next lower floor shall commence only after the clearance of all debris collected in that floor from the floor above, is completed.

All dismantling/demolition works shall include excavation of the ground, wherever necessary, to dismantle the existing foundations, and back filling, including

compacting to the satisfaction of the Project Manager. The material used for back filling shall be as per specifications and as approved by the Project Manager.

All dismantling/demolition works shall be carried out in such a manner, so as not to cause any damage, whatsoever, to the properties or persons in the vicinity of the site. If such damages occur, the contractor shall be liable for full reinstatement, of all such damages, at his own cost.

All services, like electrical, water supply and sanitary lines/ connections, to the existing buildings or structures that are to be dismantled and/or demolished, shall be properly cut off at points as per the instructions of the Project Manager. If any such service lines are feeding adjacent plots/ sites/premises as well as within the premises, the contractor shall inform the Project Manager, well in advance, and shall follow up with the Authorities concerned, to provide necessary reconnections to the users of these service lines.

Wherever applicable, the contractor shall apply for the various permits, for executing such works as may be required, from the relevant authorities.

Disposal of demolished/dismantled materials

Demolished/dismantled materials shall **NOT** be stacked or dumped in such a manner, as to present a hazard to vehicles or pedestrians or properties or to cause blockage in drainage channels etc. In case Contractor fails to clear the malba from the site the same shall be cleared by the Owner at Contractor's risk and cost.

The contractor shall obtain necessary permission from the local Government Authorities, pay the necessary deposits, for the location and the manner in which the debris to be disposed and then carry out the disposal, as directed by the Project Manager.

Demolished/Dismantled debris shall be dumped/stacked in an area, primarily within the site, if required, subject to the approval of the Project Manager and shall cart away and dispose off, within the shortest possible time, as directed by the Project Manager.

All dismantling works shall be carried out by crow bar, chiselling or by Jack - hammering BUT IN NO CASE BLASTING OPERATION IS PERMITTED AT SITE.

All debris shall be transported from the site on daily basis during prescribed hours as approved by local authorities for transportation.

All dismantling works shall be carried out during daytime.

2.3 Classification of Soils

The earth shall be classified under the following categories and measured separately for each category:

2.3.1 Hard dense soil

Generally any soil which requires the close application of picks or jumpers or scarifiers and rippers to loosen the same such as:

- 1. Stiff clay, hard shale or compact moorum requiring grafting tool and/or pick and shovel.
- 2. Shingle and river or nallah bed boulders.
- 3. Lime concrete, stone masonry in lime or cement mortar below ground level.

- 4. Soft, conglomerate or soft laterite when the stone can be detached from the matrix with picks and shovel.
- 5. Existing WBM roads, pavements etc.

2.3.2 Ordinary/Soft/Decomposed rock (not requiring blasting)

Rock or boulders, which may be quarried or split with crowbars or wedges/picks; such as lime stone, sand stone, hard laterite, hard conglomerate or other soft or disintegrated rock.

2.3.3 Hard rock (requiring blasting):

Rock which is in solid beds, which can only be removed either by wedging or chiselling, shall be treated as hard rock. An isolated boulder or detached rock, measuring one cubic meter or more, shall also be treated as hard rock, if the same cannot be removed without wedging or chiselling.

(If required, approved chemical may be used for loosening the materials). Blasting is totally prohibited and will not be allowed under any circumstances.

2.3.4 Authority for classification of Soils/Rocks

The classification of excavation shall be decided by the Project Manager and his decision shall be final and binding on the contractor.

2.3.5 **Blasting**

Blasting shall not be permitted under any circumstances. Alternately chemicals can be used to split rock. The tenderer/contractor shall submit with his tender, the method which he intends to adopt for execution of the work of rock excavation. A list of specialised tools and plants to be used for rock excavation shall be enclosed.

2.3.6 **Trimming of Slopes**

All slopes shall be trimmed by hand or mechanically true to line and profile and consolidated to the Project Manager's satisfaction. Any rock or boulders appearing on the face or likely to be unstable, shall be removed and the void thereof filled with approved material and compacted.

2.3.7 **Shoring/Earth work support**

The contractor shall shore and strut the sides of excavation to the satisfaction of the Project Manager. Should there be any slips or settlement, not withstanding the shoring, the contractor shall make good the same at his own expense, with concrete or other approved material, as directed by the Project Manager. Shoring shall be removed gradually side by side with backfilling to prevent any settlement and under no circumstances, until such time as the foundation concrete has hardened enough, to take any loads brought on by the removal. Under special circumstances, shoring shall be left in place, if so directed by the Project Manager. No extra payment shall be made for shoring. The rate for the same shall be included in the excavation items.

2.3.8 **Dewatering**

All excavation shall be kept free from water from any source. The contractor shall provide and clear away on completion, all drains, pumps and other equipment, for this purpose. The contractor shall be responsible for preventing any subsidence of adjoining ground due to pumping. Dewatering would be required to be continued till casting of ground floor (upper basement roof) slab.

Contractor shall keep site dewatered till all construction works in basement and all other areas are completed, including waterproofing. The dewatering (well point system) would be required to be continued till casting of ground floor (upper basement roof) slab and as advised by the Structural Consultant / Project Manager.

No extra amount shall be claimed by the contractor on this account and his quoted rates shall be deemed to have been included for total dewatering.

2.3.9 Contractor to keep excavation clear

Should any sand, mud, weed, rubbish or other materials be deposited on excavated area, by sandstorm, rain, flood, landslips or from any cause, whatsoever, such materials shall be removed by the contractor at his own expense.

2.3.10 Back filling

All materials used as fill shall be to the Project Manager's approval and shall be well consolidated in layers not more than 200 mm thick. Final compacting must be done just before concrete is to be laid.

All fill materials shall be compacted at a moisture content appropriate to the material being used. The compacted filling shall achieve a density, which shall not be less than 95% of the maximum dry density obtained. Filling shall be free of any wood, organic matter or any other deleterious material.

Sand, soil, gravel etc. from the excavation may be used for backfilling of pits and trenches or for making up levels subject to approval of the Project Manager and subject to selection of proper materials. The contractor shall take instructions of the Project Manager regarding the location in which each type of excavated material is to be used according to its quality.

In case the excavated materials are not approved for backfilling, either totally or in part or if their quantity falls short of the quantity required for filling, suitable materials shall be brought to site from an approved source.

2.3.11 **Disposal of surplus**

Surplus excavated materials and all excavated materials rejected for backfilling, shall be carted away from the site by the Contractor.

2.3.12 Measurements

- i) Existing Ground Level shall be taken jointly and recorded before commencing the excavation work. Depth of excavation in cutting shall be computed from these spot levels. The G. L. shall be recorded, at maximum 5 mts interval. Average of these reading shall be taken as the average ground level for the pits.
- ii) Bottom width excavation shall be measured as given in foundation drawings and details showing the width of the bedding concrete only and hence side clearance if any will not measured separately. The contractor should cover this in his rate.
- Diagonal ridges, cross ridges, or dead man shall be left in position shown by the Project Manager to enable accurate measurements being taken on the completion of one work. Where the ground is not uniform or where the site is required to be levelled, levels shall be taken before the start of the work and after the completion of the work and the quantity of excavation in cutting computed from these levels. These ridges or deadman shall be removed by the Contractor at his own cost after the measurements.
- iv) Where soil, soft rock, and hard rock are mixed, the measurements for the entire excavation shall be computed from the levels & dimensions as described in (i) & (ii) above.

- v) Excavated materials from `HARD ROCK' and SOFT ROCK shall be stacked separately, measurement reduced by 50% to allow for voids to arrive at the quantity payable under 'hard rock' and 'soft rock' respectively.
- vi) The difference between the entire excavation (worked out from the levels) and the such of the quantities payable under 'hard rock' and 'soft rock' shall be paid for as excavation in all kind of soil.
- vii) Wherever rock excavation is encountered, contractor will be paid only up to required level, and any extra excavation if carried out due to any reason, no payment shall be done for the extra quantity.

2.4 Excavation in all Soils

Excavation and/or removal of any other material on the site, shall be carried out accurately to the lines, levels and dimensions shown in the drawings or as ordered by the Project Manager, so as to allow proper and efficient concrete work and other work in clean and dry condition. The method of excavation shall be at the discretion of the Project Manager but should the dimensions of any excavation exceed those shown on the drawings or ordered by the Project Manager or should the sides collapse, the contractor shall fill such extra space with concrete or other approved material, at his own expenses.

All founding levels will be inspected by the Project Manager and suitability for bearing of the bottom shall be determined before the concrete is placed. Records of all foundation levels shall be submitted by the contractor to the Project Manager.

The final 150 mm depth of excavation shall be taken out by hand unless otherwise permitted by the Project Manager. Extra depth of excavation, if any, beyond those shown in the drawings or ordered by the Project Manager, shall be filled up with Grade 10 concrete for which payment shall not be made to the contractor.

The contractor shall excavate any soft patches or rock outcrops below the founding level and refill with M-10 concrete. The founding stratum shall be trimmed to required level and rammed to the satisfaction of the Project Manager before concrete is placed.

Foundations within any one building shall not rest on soil strata with differential bearing capacities. Strip foundations shall not be stepped along the length of the foundations. When excavating for individual footings at different levels care shall be taken not to disturb the bearing stratum of the higher foundations. The excavation bottom shall be watered as directed by the Project Manager before the foundations are laid.

2.5 **Pre-construction Anti-termite treatment**

i) Chemicals

The chemicals used for the soil treatment shall be any one or a combination of the following with concentration shown against each in adequous emulsion:

Chemicals (EC's) Concentration
Chlorpyriphos / Landane 20% EC By weight

Chemicals are available in concentrated form in the market and concentration is indicated on the sealed containers. To achieve the percentage of concentration specified above, chemical should be diluted with water in required quantity before it is used. Graduated containers shall be used for dilution of chemical with water in the required proportion to achieve the desired percentage of concentration. e.g. to dilute chemical of 30% concentration add 59 parts of water to one part of chemical to achieve 0.5% concentration.

Chemical shall be brought to site of work in sealed original containers. The material shall be brought in at a time in adequate quantity to suffice for the whole or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and the Project Manager. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from Project Manager.

Hand operated pressure pump shall be used to carry out spraying operations to facilitate proper penetration of chemicals in the earth. To have proper check for uniform spraying of chemical, graduated containers shall be used. Proper check should be kept that the specified quantity of chemical is used for the required area during the operation.

ii) Time of application

Soil treatment should start when foundation trenches and pits are ready to take mass concrete in foundations. Laying of mass concrete should start when the chemical emulsion has been absorbed by the soil and the surface is quite dry. Treatment should not be carried out when it is raining or soil is wet with rain or sub-soil water. The foregoing applies also in the case of treatment to the filled earth surface with the plinth before laying the sub grade for the floor.

The treated soil barrier shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

iii) Treatment for basement & foundation

The bottom surface and sides at the excavation made shall be treated with the chemical emulsion mentioned above at 5 litre per sqm of surface area.

iv) Treatment to backfill earth

After the retaining walls of the basement come up, the back fill in immediate contact with the foundation structure shall be treated with the chemical emulsion at the rate of 7.5 Ltrs. per Sq.m. of the vertical surface of the sub-structure for each side. The earth is usually returned in layers and the treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the concrete surface of the columns and walls so that the earth in contact with these surface is well treated with the chemical.

v) Treatment of top surface of plinth / basement filling

The top surface of the consolidated earth within the walls shall be treated with the chemical emulsion at the rate of 5 Ltrs. per sq.m. of the surface before the sand bed or sub-grade is laid. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm deep at 150 mm centres both ways may be made with 12 mm dia MS rod on the surface to facilitate absorption of the emulsion.

vi) Treatment at junction of walls and floor

Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surfaces from the ground level (where it has stopped with the treatment described in (iv) above up to the level of the filled earth surface. To achieve this, a small channel 3 x 3 cm shall be made at all the junctions of wall and columns with the floor (before laying the subgrade) and rod holes to be made in the channel up to the ground level 15 cm. apart and the rod moved back ward and forward to break up the earth and chemical emulsion poured along the channel at the rate of 7.5 Ltrs. per Sq.m. of the vertical wall or column surface of the sub structure so as to soak the soil right to the bottom. The soil should be tamped back in to place after this operation.

vii) Treatment to soil along external perimeter of building

After the building is complete, the earth along the external perimeter of the building should be roded at intervals of 15 cm. and to a depth of 30 cm. The rods should be moved back ward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 Ltrs. per Sq.m. of vertical surfaces. After the treatment, the earth should be tamped back in to place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on the completion of such grading. In the event of filling being more than 30 cm. the external perimeter treatment shall extend to the full depth of filling up to the ground level so as to ensure continuity of the chemical barrier.

viii) Treatment for walls retaining soil above floor level

Retaining walls like the basement walls or outer walls above the floor level retaining soil need to be protected by providing chemical barrier by treatment of retained soil in the immediate vicinity of the wall, so as to prevent entry of termites through the voids in masonry, cracks and crevices etc. above the floor level. The soil retained by the walls shall be treated at the rate of 7.5 Ltrs. per sq.m. of the vertical surface so as to effect a continuous outer chemical barrier in continuation of the one formed under (iii).

ix) Treatment of soil surrounding pipes, wastes and conduits

When pipes, wastes and conduits enter the soil inside the area of the foundation, the soil surrounding the point of entry must be loosened around each such pipe waste or conduits for a distance of 15 cm. and up to a depth of 7.5 cm before the treatment is commenced. When they enter the soil external to the foundations, they shall be similarly treated unless they stand clear of the walls of the building by about 7.5 cm. for a distance of over 30 cm.

x) Treatment for expansion joints

Expansion joints at ground floor level are one of the biggest hazards for termite infestation. The soil beneath these joints should receive special attention when the treatment under (V) is carried out. This treatment should be supplemented by treating through the expansion joint after the sub-grade has been laid, at the rate of 2 Litre per linear metre.

xi) Safety precautions

All chemicals used for anti termite treatment are poisonous and hazardous to health. These chemicals can have an adverse effect upon health when absorbed through the skin, in haled as vapours or spray mists or swallowed. Person using or handling these chemicals should be warned of these dangers and advised that absorption through the skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully the safety precautions given below:

These chemicals are usually brought to site in the form of emulsifiable concentrates. The containers should be clearly labelled and should be stored carefully so that children and pet cannot get at them. They should be kept securely closed.

Particular care should be taken to prevent skin contact with concentrates. Prolonged exposure to dilute emulsions should also be avoided. Workers should wear clean clothing and should wash thoroughly with soap and water, especially before eating and smoking. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water. If chemicals splash in to the eyes they shall be flushed with plenty of soap and water and immediate medical attention should be sought.

The concentrates are oil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed during mixing.

Care should be taken in the application of chemicals to see that they are not allowed to contaminate wells or springs, which serve as sources of drinking water.

xii) Spraying equipment

A pressure pump shall be used to carry out spraying operations to facilitate proper penetration of chemicals in to the earth.

3.0 CONCRETE WORKS (PLAIN AND RCC)

3.1 All concrete included in the works shall comply with the General requirements of this section of the specification except where those requirements are modified by the provisions of later Clauses relating to specialized uses for concrete in which case the requirements of those Clauses shall take precedence.

3.2 Quality Assurance Plans and Supervision:

A competent person shall be employed full time whose first duty will be to supervise all stages in the preparation and placing of the concrete. All test on materials, the making and testing of cubes and the maintenance and calibration of all mixing and measuring plant shall be carried out under his direct supervision in the presence of the Project Manager. Contractor shall set up a laboratory with all testing arrangement at site. On award of the work contractor shall submit their quality assurance plans, complete methodology, list of testing equipment & sequence of construction for all activities.

3.3 Materials

a) Cement

Cement shall in general comply the following specifications:-

i) Types

The cement used shall be ordinary portland cement conforming to IS 8112 (Latest revision) of grade 43 for all works except where specifically mentioned in the Drawings, Bill of Quantities, and/or directed by the Project Manager (use of Grade 53 cement is strictly prohibited).

All cement shall be fresh when delivered. Cement shall be delivered in sound and properly secured bags or other packages ready for immediate use and shall be used direct from the bag. The contractor shall maintain for Project Manager' inspection a record of receipts and consumption of cement indicating the source, the age and the date of receipt of cement. Cement containing lumps which cannot be broken by a light touch of fingers shall not be used in the works. Admixtures shall not be used without written consent of the Project Manager.

ii) Sources

Cement shall be obtained from sources, which are approved by the Project Manager. Makes and sources of cement shall not be varied from those used for trial mixes; should a change be unavoidable the contractor shall submit his proposals for the prior approval of the Project Manager and then carry out new trial mixes unless otherwise directed by the Project Manager. Cement of different kinds shall not be mixed at any stage.

iii) Manufacturers' Test Certificates for Cement

The Contractor shall request the cement manufacturer to forward to his site office the Certificate of conformity in accordance with IS. 269 (Latest Revision), and he shall cause a copy to be supplied to the Project Manager

within 48 hours of the arrival of the certificate, which shall not be later than 14 days from the day of delivery of the relevant consignment. The test certificate shall be related to the date of delivery at site of consignment. The frequency of deliveries shall be such as to ensure that no cement is more than 3 months old when used in the works.

iv) Samples of Cement

Samples of cement to be used in the works shall be deposited with the Project Manager for his approval together with a certificate stating the name and address of the Manufacturer, the name and address of the supplier from whom it was purchased. The Project Manager may from time to time take samples of the cement being used in the works for testing.

v) Storage of Cement

The contractor shall provide a proper separate weatherproof store building with raised floor for cement storage on the site and shall at all times protect the cement from damp or any other deleterious influences. Each consignment of cement shall be kept separately and the contractor shall be careful to ensure the consignments are used in the order in which they are received.

Incase cement gets affected from damp or any other deleterious influence, such cement shall not be used for construction work.

b) Aggregates

- i) Materials used as aggregates shall be obtained from a source known to produce aggregates satisfactory for concrete and shall be chemically inert, strong, hard, durable, of limited porosity and free from adherings, coating, clay lumps, coal residues and organic or other impurities that may cause corrosion of reinforcement or may impair the strength or durability of the concrete. Aggregates shall be tested in accordance with the requirements of IS. 383 or IS. 515 and the results of such tests shall be as hereinafter specified, the percentages being by weight unless the context indicates otherwise.
- ii) Fine aggregates shall be natural sand or sand derived by crushing material like gravel or stone and shall be free from coagulated lumps. Sand derived from stone unsuitable for coarse aggregates shall not be used as fine aggregates. The caustic soda test for organic impurities shall show a colour not deeper than that of the Standard solution. The amount of fine particles as ascertained by the Laboratory Sedimentation test shall not exceed 10% for crushed stones. The settling test for natural sand or crushed stone shall be made, and after being allowed to set in for three hours the thickness of the layer of silt deposited on the coarser material shall not exceed 8%.

The grading of a natural sand or crushed stone i.e. fine aggregates shall be such that not more than 5 (five) percent shall exceed 5 mm in size, not more than 10% shall pass IS sieve No. 150 not less than 45% or more than 85% shall pass IS sieve No. 1.18 mm and not less than 25% or more than 60% shall pass IS Sieve No. 600 micron.

Only washed sand of quality and grading specified herein above shall be used. Admixture of sand obtained by crushing natural stone may be permitted by the Project Manager, provided the mixture satisfies the requirements for the fine aggregates here in above specified. But not more than one part of the sand obtained by crushing natural stone may be added to two parts of washed sand.

iii) Coarse Aggregate

Coarse Aggregates shall be crushed stone. The pieces shall be angular, rounded in shape and shall have granular or crystalline or smooth (but not glossy) non-powdery surface. Fragile, flaky and laminated pieces, and mica shall not be present.

The "Aggregates Crushing Value" shall not exceed 45%. The amount of fine particles occurring in a free state or as a loose adherent shall not exceed 1%. When determined by the laboratory sedimentation test, after twenty four hours immersion in water. A previously dried sample of the coarse aggregates shall not have gained in weight more than 5%.

Size of coarse aggregate shall be maintained within tolerance limit of 2.5%.

The grading of coarse aggregate shall be such that not more than 5% shall be larger than 20 mm and not more 10% shall be smaller than 5 mm and not less than 25% or more than 55% shall be smaller than 10 mm.

Maximum nominal size of coarse aggregate shall be of 20 mm unless otherwise noted.

The grading of coarse aggregate of nominal size of 40 mm shall be such that not more than 5% shall be larger than 40 mm and not more than 5% shall be smaller than 5 mm and not less than 10% or more than 35% shall be of 10 mm size.

Aggregate (Fine and Coarse) shall be thoroughly washed with clean water if so directed by the Project Manager.

Fragile, flaky and laminated pieces, and mica shall not be present. Aggregate should be free from fine holes and stone should not be weathered.

3.4 **Steel Reinforcement**

The reinforcement steel shall in general comply the following specifications, these specifications shall also be binding on the contractor incase reinforcement steel is supplied by the Owner / Project Manager.

Type

Steel for bar and fabric reinforcement shall conform to mild steel of tested quality conforming to IS. 432 (Latest), or high yield strength deformed bar conforming to IS. 1786 or 1139 (Latest) as specified in the drawings. The steel shall be kept clean and free from pitting, loose rust, mill scale, oil, grease, earth, paint or any material which may impair the bond between the concrete and the reinforcement or which may cause corrosion of the reinforcement or deterioration of the concrete. Fabric reinforcement (IRC weld mesh or equivalent) shall be delivered to site in flat sheets only.

Storage of Reinforcement

Before and after bending, reinforcement shall be stored on raised racks in separate lots by size and type and protected from damage, contamination and the effects of the weather. For the purposes of identification each lot shall be marked plainly and securely by approved methods.

Fabrication

Fabrication shall be accurately done to the dimensions, spacing and minimum cover as per structural drawings. Spacers shall be of cement mortar (1:2) cubes however shall not be leaner than the approved design mix. Steel chairs, spacer bars shall be used in order to ensure accurate positioning of reinforcement. All joints in steel reinforcement shall be overlapped. The length of over lap for tension and compression joints in mild steel reinforcement above 16 mm diameter may be welded if permitted by the Project Manager in writing.

Welded Laps

Wherever specified, welded laps shall be provided and paid for separately unless specifically included in the item of work. No payment shall be made to the contractor for welding as per Project Manager's requirements, if the same is necessitated due to the reasons attributable to the Contractor. The welding of bars shall be carried out as per IS: 2751-1979, IS:9417-1979. Before doing welding of bars at site, the contractor shall make minimum 3 joints and get them tested in an approved laboratory at his own cost. The following precautions shall be taken:

- a) If the cold twisted deformed bar has an untwisted end at lapping point, then this portion shall be cut off prior to welding.
- b) Bars shall be free from rust at joints to be welded.
- c) Bars shall be aligned and kept in proper axis in order to minimize crookedness in bar after welding.

3.5 Water

Type

Water for mixing concrete shall be clean and free from harmful material and comply with the requirements of Clause 5.4 of IS:456:latest.

Water shall be only from sources / bore wells approved by the Project Manager, and shall be used in a manner as directed by the Project Manager.

Testing of Water

Prior to the commencement of the works, or whenever there is a change in the source of supply or when directed by the Project Manager, the contractor shall arrange for samples of water, for mixing concrete, to be submitted to an independent Government authorised testing laboratory, acceptable to the Project Manager for tests to determine that the water complies with this specification and is satisfaction in all other respects for the manufacture of high quality concrete.

3.6 Grades and Strength Requirements of Concrete

General

Concrete shall consist of the material described under previous sections, using separate coarse and fine aggregate in an appropriate combination determined in the course of the preparation of mix design described hereinafter. The overall grading shall be such as to produce a concrete of the specified quality, which will work readily in to position without segregation and without the use of excessive water. In the case of mass concrete or blinding concrete specified by nominal mix the use of "all-in" (20 mm and down) aggregate may be approved by the Project Manager. No addition of water shall be made at site. It shall be a homogeneous mix before use at site.

Slump

Only specified quantity of water shall be added to the cement and aggregate during mixing to produce concrete having a sufficient workability to enable it to be well consolidated, to be worked in to the corners of the shuttering and around the reinforcement to give the specified surface finish, and to have the specified strength. Water cement ratio shall be maintained as per IS. 456-(latest) unless specified otherwise. When a suitable amount of water has been determined, the resulting consistency shall be maintained through out the corresponding parts of the work and tests shall be conducted to ensure the maintenance of this consistency according to the standard method of test for consistencies of concrete (slump test) as below:

Description of work

Maximum slump in mm.

Beams and slabs Columns & Walls Slabs & Staircase Footings 25 to 75 mm 50 to 100 mm upto 25 mm upto 25 mm

Incase of pumpable concrete the slump & workability required for pumping the concrete shall be achieved by the contractor at his own cost. Nothing extra shall be paid for use of extra cement and / or plasticisers.

Concrete Grades

Grade of concrete used in the works shall be shown on the drawings or as directed by the Project Manager. Minimum cement contents shall be as per IS 456- (latest) or specified otherwise. The grade of concrete to be adopted in the construction shall be as follows:-

- a) For mud mat, lean concrete, mass filling the concrete mix will be nominal mix concrete of 1:5:10, 1:4:8, 1: 3:6 (Cement: Coarse sand: 20mm Down aggregates) grade as specified in the construction drawings. These mixes may be prepared using mechanical mixer.
- b) For all RC.C work concrete used will be controlled concrete with grade of concrete M15 or more as per construction drawings. The cement contents in the mix design shall not be lesser than as indicated in the table below. The water cement ratio and other parameters shall be strictly adhered to as per the table below:

| Grade | Min. cement | Water Cemen | t | Compressive Strength Kg/Sq.cm |
|--------|-------------|-------------|--------|-------------------------------|
| | Kg/Cum.(*) | ratio | 7 days | 28 days |
| | | | | Field test |
| M - 10 | 170 | 0.6 | 70 | 100 |
| M - 15 | 240 | 0.6 | 105 | 150 |
| M - 20 | 320 | 0.55 | 140 | 200 |
| M - 25 | 350 | 0.50 | 175 | 250 |
| M - 30 | 400 | 0.45 | 210 | 300 |
| M - 35 | 450 | 0.45 | 245 | 350 |

*

Note:- the actual requirements of cement contents are likely to be more than the minimum indicated. The limit has been fixed strictly from the concrete's durability point of view.

Approved admixtures may be used strictly as per IS 456-(latest) and nothing extra will be paid for the use of the same. Admixture used should not impair durability of concrete nor combine with constituents to form harmful compounds nor increase the risk of corrosion of reinforcement. Dosages of retarders , plasticisers and supertplasticisers if used shall not exceed 0.5 , 1.0 and 2.0 percent respectively by weight of cementitious materials.

MIX DESIGN

As the guarantor of quality of concrete used in the construction, contractor shall carryout mix design and the mix so designed shall be approved by the Project Manager, however approval by Project Manager shall not relive the contractor from his responsibility towards quality & sufficiency of design mixes. The mix shall be designed to produce the

grade of concrete having workability and a characteristic strength as indicated in the drawings. The target mean strength of concrete mix should be equal to the characteristic strength plus 1.65 times the standard deviation as indicated below.

| GRADE OF CONCRETE | STANDARD DEVIATION (N/Sq |
|-------------------|--------------------------|
| <u>mm)</u> | |
| M10, M15 | 3.5 |
| M20, M25 | 4.0 |
| M30, M35 | 5.0 |

Mix design shall be carried out as per SP-23 (Hand book concrete mixes) Proportion / Type of aggregates shall be made by trial in such a way so as to obtain dense possible concrete with required workability. All ingredients of concrete should be used by mass only. Contractor shall carry out the mix design and get it tested from the laboratory / Institution as per the instructions of Project Manager. Test report shall indicate

- 1. Workability Test of fresh concrete
- 2. Analysis of fresh concrete
- 3. Setting time of concrete < Initial setting time

Final setting time

- 4. Strength Test < 7 days 8 days
- 5. Cement Type
- 6. Grades of aggregate and their specific gravity.
- 7. 28 days strength results.
- 8. Quantity of water.
- 9. Quantity and make /grade of chemical admixture, if required.

No substitutions in materials used on the work or alterations in the established proportions be made without additional test to show that the quality and strength of concrete are satisfactory. Design mix shall not be converted into volume mix under any circumstances.

3.7 Batching and Mixing

Only controlled design mix will be used for concrete with strength more or equal to M15. Volume batching may be allowed (Using mechanical Mixers) for mixes up to M10, for these leaner mixes mass volume relationship shall be checked frequently to ensure specified grading is maintained.

For the production of controlled concrete contractor shall set up, on site, automatic microchip controlled batching plant of capacity 10Cum/Hr or more, complete with silos / stock piles for cement and aggregates and D.G sets to be provided to have

uninterrupted supply of concrete. The batching plant shall be tested and calibrated as per manufacturers manual and to the satisfaction of Project Manager, before starting the production of concrete, to provide uniform & consistent cement concrete mix conforming to approved mix design Batching / Mixing plant shall conform to the requirements of IS 4925 & 4926. Batching plant shall have facilities for presetting the quantities to be weighed with automatic cut off when the same is achieved and also shall be equipped with sensors to control water ratio as per moisture contents of aggregates. Printed reports of all the components of all the batches of concrete as separated by on line computer of batching plant, shall be presented to Project Manager for his approval and records. Cube samples from each batch shall be taken as per the requirement of IS 456-(latest), in the presence of Project Manager. Cubes shall be tested to record 7days & 28Days cube strength. Contractor shall be responsible for the quality of concrete which will be indicated as per the cube strength results at the end of 7days & 28days. However 28days strength results will be treated as final.

Contractor shall make his own trial mixes for different grade and submit the report of the final design mix to be adopted for different grades to Project Manager for his approval and records (Contractor shall take in cognisance while designing concrete mixes, time required for transporting and placing the cement concrete mix at final position). Contractor shall specify along its bid the type and make of the proposed batching plant with brief specifications.

The accuracy of the measuring equipment should be within plus or minus 2% of the quantity of cement being measured and within plus or minus 3% of the quantity of aggregate, water, admixture being measured. All measuring equipment should be maintained in a clean, serviceable condition.

Mixing with mechanical mixer (for M15 or richer) will only be permitted in exceptional circumstances and then with the specific arrangement of the Project Manager. No water shall be added to mixed concrete other than the quantity of water allowed for in the mix design and incorporated in batching.

Concrete or mortar which has commenced to set shall not be remixed with additional water and in no circumstances shall such concrete or mortar be used in the work.

3.8 Concrete Admixtures & Plastisizers

Admixtures are materials added to the concrete before or during mixing with a view to modify one or more properties of concrete in plastic or hardened state. Concrete admixtures are proprietary items of manufacturers and shall be obtained from established manufacturers having proven track record, with Project Manager's approval.

3.9 Transporting Concrete

From batching plant concrete to the location of proposed construction shall be transported through transit mixers or concrete pumps only. Contractor shall specify the make & type and number of transit mixers to be deployed along with concrete pumps with their make, capacity. The path to be used by transit mixers will be strictly as per the instructions of Project Manager. From the transit mixers concrete shall be transported to the final floor level / position through pumping or builders hoist only. Concrete and mortar shall be transported speedily and deposited in its place in the works without contamination, loss of ingredients or segregation.. Buckets of builders hoist shall be large enough to contain an integral number of batches. No concrete shall be placed in the works until the contractors' proposed method of transporting concrete have been approved. When concrete is conveyed in chutes from transit mixers, the equipment shall be of such size and design as to ensue a continuous flow in the chute. The chute shall be of metal or metal lined, and if two or more lengths are used they all shall have approximately the same

slope. If the distance of the discharge end of the chute above the surface of the concrete is more than 1 metre, a spout or "elephant trunk" shall be used and the lower end positioned as near to the surface of deposit as practicable. The chute or "elephant trunk" shall be thoroughly cleaned before and after each run. The debris and any water shall be discharged outside the forms.

3.10 Concrete placement

General

Concrete, when deposited, shall have a temperature of not less than 5°C (41°F) and not more than 32°C (90°F).

The concrete shall be placed in the positions and sequences indicated on the drawings, in this specification and/or as directed by the Project Manager.

Contractor shall give adequate notice to the Project Manager of his intention to concrete any section of the works.

Except where otherwise directed, concrete shall not be placed unless the representative of the Project Manager is present and has previously examined and approved the positioning, fixing and condition of the reinforcement or any other items to be embedded and the cleanliness, positioning and suitability of the concreting surface.

The concrete shall be deposited as nearly as possible in its final position. It shall be placed in such a manner as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in horizontal layers not exceeding 450 mm in compacted thickness unless otherwise authorised or directed by Project Manager. Concrete shall not be placed simultaneously on each side of large horizontal specified or approved construction joints.

Shutters for walls or thin sections of considerable height shall be provided with openings or other devices that will facilitate the cleaning of the accumulation of hardened concrete on the shutters or on the metal reinforcement above the level of the concrete and the removal of concrete in the case of segregations.

Placing concrete in cold weather

No concrete shall be mixed or placed while the ambient temperature is above 40 degree C. on a rising thermometer or below 5 degree C. on a falling thermometer. The contractor shall supply an accurate maximum and minimum thermometer and hang it in an approved position on the works. Aggregates that have been exposed to frost shall not be used until completely thawed. Concrete shall be maintained by approved means at a temperature of not less than 4 degree C. during placing, and for a period of three days thereafter. All concrete placed during cold weather or when a frost is predicated or is likely to occur or occurs contrary to expectation, shall be protected from freezing by approved means.

Placing of concrete in wet weather

Concrete shall not be mixed and or placed in rainy weather or when there is likelihood of impending heavy showers. If it becomes necessary to place concrete during rainy weather, the contractor shall provide adequate protection by means of tarpaulin or similar other water proof material to immediately cover fresh concrete to prevent rain falling over it. This protection shall be left on the concrete for a period of 24 hours after placing of concrete.

3.11 Concrete placement under water

Concrete placed under water shall be deposited through a tremmie pipe the diameter of which shall be atleast 8 times the size of the largest aggregate used in the concrete mix.

The construction of and the method of handling the tremmie pipes shall be approved by the Project Manager. The pipes shall be waterproof and sufficiently strong to withstand severe handling conditions and any joints must be sealed with adequate gaskets.

At the commencement of tremmie work the bottom of the pipe shall be sealed before being lowered in to position. The seal shall only be broken by the concrete being placed. The concrete placed in contact with a horizontal construction joint shall have a lower proportion of coarse aggregate and a higher proportion of cement than the remainder of the concrete. The proportion shall be agreed with the Project Manager's Representative.

All underwater concrete shall be placed in still water within a cofferdam or formwork which shall extend above water level.

The proportions of the mixes shall be agreed in accordance with the strength and workability required by the specification. To allow for losses an addition of 10% of cement shall be added to mixes of concrete scheduled to be placed under water.

3.12 Maintenance of Plant and Equipment

The contractor shall keep Bathing Plant , weight batching machines, mixing machines, compressors, vibrators and other plant and equipment for concrete and mortar work clean, well maintained and adjusted and where appropriate, shall check the accuracy of the measuring devices at regular intervals, all to the approval of the Project Manager's Representative. Mixer blades shall be replaced when worn down by 20 mm.

3.13 **Night Work**

Concrete shall not be mixed, placed, compacted or finished during the hours of darkness, except where necessary to complete a pour. However, concreting in darkness for these exceptions shall be only after obtaining the express permission in writing from the Architect's/Project Manager's representative and in his presence only.

3.14 Compacting Concrete

The concrete shall be fully compacted through out the full extent of the layer. It shall be thoroughly worked against the moulds, and around any reinforcement and other embedded items without displacing them, and in to corners of the moulds. Successive layers of the same lift shall be thoroughly worked together adjacent to the common face. The date of laying concrete shall be marked for curing and removal of form work.

Immersion vibrators shall be of approved type and shall have frequency of not less than 10000 oscillations per minute. They shall penetrate the full depth of the concrete to be vibrated and be immersed at sufficiency close spacing so that the whole volume of the concrete is satisfactorily and uniformly compacted.

Where the underlying layer is of fresh concrete, immersion vibrators shall also penetrate that layer to ensure homogeneity. Immersion vibrators shall be withdrawn slowly to prevent formation of voids. Vibrators shall not be used to work the concrete along the moulds or in such a way as to damage shuttering or other parts of the structure or to displace the reinforcement or other embedded items. Immersion vibrators shall only be operated by those who have received proper instruction and training in their use.

External vibrators shall be of approved type and shall have a frequency of not less than 3000 oscillations per minute. They shall be securely and rigidly clamped to the shuttering. External vibrators shall only be used on shuttering which is strong enough to withstand the vibration without displacement, distortion or other damage.

The contractor shall ensure that sufficient standby vibrators and ancillary equipment are available during concreting operations.

3.15 Quality Control

- i) In order to ensure that the quality of materials and the mix proportions are suitable for the particular grade of concrete required are so maintained, sampling and testing shall be carried out regularly during the course or the works.
- As frequently as the Project Manager's representative may require and in any case at least once a day while concreting is in progress, the contractor shall sample and carry out a determination of the moisture content and a mechanical analysis of the fine aggregate and each nominal size of coarse aggregate shall lie within the respective limits specified.

 The surface moisture test of aggregates should be carried out a number of times during the day and necessary adjustments in the water content of the concrete mix should be made.
- iii) Workability testing shall be carried out in accordance with IS:456. The results shall lie within the range upon which the accepted mix design is based. Testing shall be carried out at such a frequency that the required workability is consistently achieved.
- iv) Samples of concrete shall be taken at random in accordance with IS: 516 at the time and place of deposition of the concrete.
- v) Notwithstanding the foregoing, additional samples shall be taken by the contractor when directed by the Project Manager. The test cube procedure shall be in accordance with IS: 516 throughout.
- vi) Compliance with the specified characteristic strength shall be assumed if:
 - a) Each of the six cubes in a group has a test strength not less than the characteristic strength or,
 - b) Not more than one cube has a test strength less than the specified characteristic strength but not less than 85% of the specified characteristic strength and the average strength of the group of four test results is not less than the specified characteristic strength plus the standard deviation of the group.

3.16 Seven day cube tests

Acceptance of concrete is based on the 28th day results. However, the contractor shall establish a relation ship between 7 days and 28 days strengths by carrying out 7 days tests at the time of performing the laboratory testing and from subsequent quality control testing. This relation ship shall be used in interpreting any further test results to predict the probable value of the corresponding 28 days cube strengths. The contractor shall without delay advise the Project Manager of any sample that appears likely to fail to meet the specification and the contractor shall take any necessary action to minimize the effect of such failure.

3.17 Acceptance Criteria

The general Acceptance Criteria of any and all of the concrete work shall be as per the relevant Clauses of IS. 456.

If any of the works tests are not up to the standard, the Project Manager shall have the power to stop the work until the reason is investigated and steps taken to prevent further low results. The contractor shall not be entitled to any claims on account of such delays. Any concrete carried out from the batch that is afterwards found to be faulty, will be liable for rejection and if so directed, the contractor shall at his own expenses dismantle and replace the defective work and any work built thereon or shall take such other measures as may be deemed necessary by the Project Manager. At the discretion of the Project Manager, the contractor may be allowed to prove by means of a load test to be carried out at his own expense, that the concrete is capable of safely withstanding the loads as specified in the test.

3.18 Construction joints

Construction joints shall be provided in the position described on the drawings or elsewhere and where not so described on the drawings or else shall be in accordance with the following: -

- a) A joint shall be formed horizontally at the top of a foundation and 75 mm below the lowest soffit of the beams meeting at the head of a column.
- b) A joint shall be formed in the rib of a large tee beam and all beams 25 mm below the soffit of the slab.
- c) Concrete in a haunch or a splay on beam or a brace, and in the head of a column where one or more beams meet, shall be placed without a joint at the same time as that in the beam or beams or brace.
- d) Concrete in the splay at the junction of a wall and slab shall be placed throughout without a joint, but if the provisions of a joint is unavoidable, the joint shall be vertical and the middle of a span.
- e) A joint in a slab shall be vertical and parallel to the principal reinforcement, where it is unavoidable, at the right angles to the principal reinforcement, the joint shall be vertical and at the middle of the span.
- f) Expansion joints, hinges or other permanent structural joints shall be provided in the positions and of the form described in the drawings or elsewhere. Before placing new concrete against concrete that has already hardened the face of old concrete shall be cleaned and roughened and scrubbed and loose aggregate removed from the form. Immediately before placing the new concrete the face shall be thoroughly wetted and a coating of neat cement grout applied thereto. The new concrete shall be well rammed against the prepared face before the grout sets.

3.19 Form Work and scaffolding / Staging:-

Form work to the fresh concrete shall be sufficiently rigid and shall be such as to prevent loss of slurry from the concrete and details and design of the form work shall conform to IS 14687. The tolerances on the shape , lines and dimensions shall be as per CL. 11 of IS 456-2000.

All staging and scaffolding work shall comprise of MS .Pipes / Structural steel sections with necessary coupling arrangement. (NO WOODEN BALLIES / PROPS WILL BE PERMITTED) . Adequate size foundation blocks / base plates shall be provide below staging members to disperse the loads as per the founding strata.

Form work construction

i) The contractor should submit detailed drawing of the centering & shuttering and get the same approved from the Project Manager before laying concrete also he should get the centering shuttering approved in writing before start

of concreting. The concreting should be done in the scientific and methodical manner so as to give a uniform finish in line and level, so that minimum rendering or plastering is done. The work found defective, should be dismantled & redone and site cleared.

- ii) Form work shall be so constructed that concrete can be properly placed and thoroughly compacted. Form work shall be firmly supported and adequately strutted, braced or tied to maintain position and size. Forms shall have sufficient strength and rigidity to with stand the weight of wet concrete and necessary pressure due to ramming and vibration of concrete and movement of men material and other loads without excessive deflection from prescribed limits. It shall be capable of adjustment to the lines, levels and dimensions of the finished concrete.
- All form work shall be constructed to be rigid during the casting of concrete and constructed so that the surfaces adjacent to the concrete are with plus minus 6 mm or the required surfaces when supporting the concrete and sufficiently watertight to prevent loss of liquid from the concrete, and it shall be capable of being removed without shock or vibration to the concrete. Forms shall be cleaned with compressed air immediately before placing concrete to remove all rubbish. The inside faces of the form work shall be treated with a mould oil of type to be approved by the Project Manager and every care shall be taken to prevent mould oil from getting on to the reinforcement.
- iv) Beams boxes shall be erected with an upward camber of 6 mm for each 3 M. of span.
- v) Around the periphery of the building beyond building line, staging shall be erected by the contractor free of cost, using structural steel members duly braced to sustain all loads, with all safety measures like netting, temporary railings / parapets, platforms etc. to provide free access to external façade of the building at each floor level for construction and inspection. Staging shall grow along with the building.

Removal of Form work (Striking Time)

Unless certainly specified in the drawing, or directed by the Project Manager, the following shall be minimum intervals of time, which should be allowed between the placing of the concrete and the striking of the mould where ordinary portland cement is used and ambient temperature does not fall below 15 degree Celsius.

| a) | Walls, column & vertical faces decided | 16 to 24 hours as may be |
|----|--|--------------------------|
| b) | of all structural members Slab | by the Project Manager. |
| , | i) Spanning upto 4.50 mii) Spanning over 4.50 M | 7 days 14 days |

Note: Soffit forms of the slab may be removed after 3 days, props to be fixed immediately after removal of shuttering.

c) Beams and arches

| i) | Spanning upto 6 M | 14 | days |
|------|---------------------|----|------|
| ii) | Spanning 6 M to 9 M | 21 | days |
| iii) | Spanning over 9 M | 28 | days |

Note:

1. For other types of cement, the stripping time recommended for ordinary portland cement may be suitably modified. Forms shall not be released un

till the concrete has achieved a strength of at least twice the stress to which concrete may be subjected to after removal of the form.

2. The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slabs, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

However, the Contractor shall delay the removal of shuttering as long as necessary in order to avoid damaging the work. Where shuttering to soffit is removed prior to the props this is only permissible if the design of the shuttering allows such a sequence of operations without the props being in any way disturbed. If the shuttering and props are not independent, both must be left in place until propping is no longer required.

Where shuttering to sides is removed prior to the shuttering soffit, the side shuttering shall be removed without disturbing the shuttering to the soffit.

No concrete structure shall be loaded until the concrete is at least 21 days old and only then with the approval of the Project Manager and subject to such conditions as may be imposed.

The contractor may be required to produce evidence that the concrete has attained a strength sufficient to support the live and dead loads to which that part of the structure may be subjected. This evidence shall consist of reports of compression tests made on job cured test cubes. The cost of such tests shall be borne by the contractor. The foregoing provisions of this clause shall not relieve the Contractor of his responsibility to ensure that the stability and strength of any structure or part of a structure is not impaired by the release of shuttering.

Proposals for form work

Not less than 8 days before the contractor proposes to construct any form work his detailed proposals thereof shall be delivered to the Project Manager. Proposals shall comprise all relevant information including calculations, detailed drawings, rates of placing of concrete, sequence of placing of concrete and details of any external vibrators which are proposed to be used.

No form work shall be constructed until the Contractors' proposals have been received and approved by the Project Manager.

Type of form work

Wrought frame work wherever used should be of film faced marine ply for a good quality concrete work. The frame work for the ply should not be of timber / wood and shall be of MS frame work only.

Wrought form work, to all surfaces for which a smooth fair faced finish is required, shall be constructed of purpose-made metal, water proof marine ply wood panel, hardboard lined form work or of planed timber with edges shot so that tight joints can be formed which will prevent loss of liquid from the concrete. The use of a particular material for wrought form work shall be consistently maintained throughout the structure. The surfaces of the form work in contact with the concrete shall be smooth and free from all blemishes. The number of times wrought form work may be used shall be subject to the surfaces, joints and edges being clean and undamaged.

Surfaces of concrete

The contractor shall ensure that the finished face of concrete offers a suitable keyed surface for the application of the finishing media, e.g. plaster, sand and cement screed, etc. The contractor shall also ensure that where thin films of finished, e.g. skim coats "Snowcem", paint, etc. are to be applied that the previous provisions regarding supporting of form work are complied with, so that the concrete faces to be treated are left smooth, unblemished and true to line both vertically and horizontally and require no making good before applying the finish.

Should the contractor fail however, to comply with the provision of this Clause, he shall submit details of his proposed method of redoing the situation to the Project Manager and must obtain written consent from the Project Manager to the proposals before continuing with any further work on the affected surfaces.

Tolerances in concrete surfaces

The permissible tolerance in the surface of the hardened concrete shall not exceed the following limits :

Type of irregularity

Departure of member planes from position and level. + 12 mm

Variation in cross-sections + 6 mm

Sharp changes in plane + 2 mm

Departure from 3 M. template of any part of planes + 3 mm

3.20 Curing

Canvass, Hessian or other approved screens shall be erected at all points where concrete is being placed to protect the concrete from the direct sun or from drying winds and such screens shall be kept in position until the surface of the concrete has been protected as specified in the following Clauses. The contractor shall be responsible for removing such screens and preparing surface of concrete .

As soon as possible after it has been placed and concrete shall be covered with Hessian or other approved material to protect it from the sun and all concrete surfaces shall be kept visibly wet continuously for 14 days after placement, the Hessian being kept in position throughout this period. Surfaces cast against forms shall also be kept moist and covered with Hessian for these periods if the form work is removed before the periods have elapsed.

The top surface of slab shall be kept flooded with water at all times till the curing period of 14 days is over. Columns, wall and beam sides and other surface shall be completely covered by gunny bags and kept thoroughly wet continuously for the period specified for curing. The ceiling of slabs shall be frequently sprayed with water until the end of curing period.

The contractor shall ensure that all times there is an adequate supply of fresh water available for curing the concrete.

3.21 Examinations and Repairs

The contractor shall not proceed with the surface finish or making good of concrete surfaces until he has received the Project Manager's written permission to do so and he shall not apply cement slurry or mortar or any other coating to the concrete surfaces as struck from the shuttering or do anything else which would hinder the proper inspection of the concrete by the Project Manager.

Concrete which is defective, has honeycombs, or which contains defective parts shall be cut out completely unless the Project Manager agrees that a repair may be satisfactorily effected. This agreement shall not preclude subsequent condemnation of the repaired work.

The method of repairing defective concrete which the contractor proposes to adopt shall be submitted to the Project Manager for his prior written agreement in each particular case.

No repairs or remedial work shall be carried out without prior inspection and instructions of the Project Manager. (No extra shall be paid to the contractor for the repair works).

3.22 Fair face finish to concrete surfaces

Concrete surfaces shall be finished smooth fair faced where indicated as such on the drawings. These areas shall be entirely free from honey combing, stains, fins, lipping, nail or screw marks, raised grain marks, air holes or any other imperfections. They shall also be of even texture throughout. Very slight variations between member and member may be acceptable but any such variations within a single member cannot be tolerated. The concrete faces shall not be marked with mould oil.

The form work to these areas shall be wrought form work as specified herein.

Following inspection by the Project Manager the whole surface shall be rubbed down by hand. Any surfaces with major imperfections, i.e. greater than can be easily, completely and permanently obliterated by rubbing down shall be reported immediately to the Project Manager.

Remedial work is not normally possible to the above fair faced finish surfaces and the Contractor will be required to demolish and recast defective works.

3.23 Reinforcement Fabrication Bending Schedules

The Contractor shall submit to the Project Manager, for the Project Manager's approval, bending schedule for all the works, not less than Ten days before the contractor intends to bend the reinforcing steel.

The Approval of the Project Manager shall in no way absolve the contractor of his responsibilities under the Contract.

Programme of reinforcement details required

The Contractor shall provide a programme which gives the Project Manager at least 28 days prior notification of any reinforcement details required. The contractor shall justify the practicability of his programme to the Project Manager should it seem unreasonable before the programme be regarded as valid notification. If progress on site falls behind the contractors' programme, the issue of reinforcement details may be delayed by a period corresponding to the delay in construction.

Bending and placing reinforcement

Reinforcement shall be cut and bent to the shapes and dimensions shown on the finally agreed bending schedules in accordance with the requirements of IS: 2502 and to the tolerances set out therein.

Bending shall be carried out with an appliance which provides a continuous and uniform application of the bending deformation at every section of the bend. There shall be provision for the free movement of the surface of the bar during bending and the bends shall follow the contour of the former without peaking.

High Yield reinforcement must be bent without the application of artificial heating.

Mild steel reinforcement may be sent either hot or cold but shall not be heated to a temperature greater than 850 C., and if heated not cooled by quenching.

Mild steel reinforcement temporary left projecting from the concrete at construction or other joints shall not be bent out of position unless shown on the drawings or agreed by the Project Manager. Where such bending and subsequent rebinding takes place the radius of the bend shall not be less than 4 bar diameters.

Reinforcement shall be fixed without forcing in the position shown on the drawings within a tolerance of 5 mm or 5% of the minimum dimension of cross section, whichever be the greater and maintained so that it is not displaced during concreting or other operations.

Horizontal bars shall be supported sufficiently to prevent displacement. This may be plastic spacers, chairs bent from steel bar, or by concrete blocks. The method and sufficiency of the support shall be subject to the approval of the Project Manager.

Where concrete blocks are used, they shall be precast from concrete (not mortar) of the same class as the concrete in which they are to be embedded, except that the largest size of aggregate shall be 10 mm. Each block shall be secured to the reinforcement with wire or a clip embedded in the centre of the block so that, it shall not be in contact with the shuttering or subsequently cause rust marks on the concrete. Intersections of reinforcement shall be bound together with 16 gauge annealed soft iron binding wire.

Unless otherwise noted on the drawings, no intersections of reinforcement may be fixed by welding without the permission of the Project Manager. High yield and cold worked steel shall, in no circumstances, be welded together.

Should any difficulty arise during the placing of steel in obtaining the appropriate cover, the contractor shall immediately draw the attention of the Project Manager to the difficulty and shall carryout such corrective measures as the Project Manager may suggest.

Protection of reinforcement and concrete

The Contractor shall ensure that movement of men and material subsequent to steel fixing is organized so that reinforcement is not thereby displaced.

Reinforcement left projecting from any concrete shall be protected so that there is no risk of corrosion staining to any exposed concrete surface or to any other part of the works. For this purpose a stiff grout wash will normally be acceptable to the Project Manager, this wash shall be wire-brushed vigorously before further concrete is placed to remove any ill-bonded material.

3.24 Precast concrete units

Precast concrete materials and workmanship shall be in accordance with specifications unless indicated otherwise. Where different tolerances are indicated in this specification or on the drawings from these in the more severe tolerances shall apply. The units shall all be cast in properly made strong moulds to form the shapes required. For work described as "finished fair" the mould shall be lined with sheet steel or other approved material and care should be taken to ensure no damage is caused to edges or surfaces when units are removed from the moulds.

The concrete shall be of the mixes given on the drawings and shall be thoroughly vibrated in the moulds.

All precast work shall be cast under cover and shall so remain for seven days and shall be kept damp in order that the units are properly matured. No units shall be lifted until 18 days have elapsed since casting and no unit shall be erected until it has been approved by the Project Manager as free from defects.

No cracked units will be accepted for incorporation in the works.

All reinforced structural precast units shall have the tops clearly marked.

Un-reinforced precast units, such as sills and copings, shall be lightly reinforced as necessary to facilitate handling.

4.0 MASONRY WORKS

4.1 STONE MASONRY

4.1.1 MATERIALS FOR STONE MASONRY WORK

4.1.1.1 **Stone**: The stone shall be of the type specified such as Delhi Quartzite, Pink quartzite, granite, trap, limestone, sand stone, etc. and shall be obtained from the quarries, approved by the Project Manager. Stone shall be hard, sound, durable and free from weathering decay and defects like cavities, cracks, flaws, sand holes, injurious veins, patches of loose or soft materials and other similar defects that may adversely affect its strength and appearance. As far as possible stones shall be of uniform colour, quality or texture. Generally stone shall not contain crypts crystalline silica or chart, mica and other deleterious materials like iron-oxide organic impurities etc.

Stones with round surface shall not be used.

The compressive strength of common types of stones shall be as per Table 1 and the percentage of water absorption shall generally not exceed 5% for stones other than specified in Table. For laterite this percentage is 12%.

| Type of Stone | Max. Water absorption % age by | Minimum. Compressive strength kg/sqcm. |
|--------------------|--------------------------------|--|
| | weight | |
| Granite | 0.5 | 100 |
| Basalt | 0.5 | 400 |
| Lime Stone (Slab & | 0.15 | 200 |
| Tiles) | | |
| Sand Stone (Slab & | 2.5 | 300 |
| Tiles) | | |
| Marble | 0.40 | 500 |
| Quartzite | 0.40 | 800 |
| Laterite (Block) | 12 | 35 |

a) **Size of Stones:** Normally stones used should be small enough to be lifted and placed by hand. Unless otherwise indicated, the length of stones for stone masonry shall not exceed three times the height/ breadth/ base of the stone and shall not be greater than three-fourth the thickness of wall, or not less than 15cm. The height of stone may be upto 30 cm or as decided by Project Manager.

- b) Random Rubble Masonry shall be un-coursed or brought to courses as specified. Un-coursed random rubble masonry shall be constructed with stone of sizes as referred in above para and shapes picked up random from the stones brought from the approved quarry. Stones having sharp corners or round surfaces shall, however, not be used.
- c) Random Rubble Masonry brought to the course is similar to uncoursed random rubble masonry except that the courses are roughly levelled at intervals varying from 30cm to 90cm in height according to the size of stones used.
- d) **Dressing:** Each stone shall be hammer dressed on the face, the sides and the bed. Hammer dressing shall enable the stones to be laid close to neighbouring stones such that the bushing in the face shall not project more than 10mm on both the exposed faces.
- 4.1.1.2 **Mortar**: The mortar used for joining shall be as specified.
- 4.1.1.3 **Laying**: All stones shall be wetted before use. Each stone shall be placed close to the stones already laid so that the thickness of the mortar joints at the face is not more than 20mm. Face stones shall be arranged suitably to stagger the vertical joints and long vertical joints shall be avoided. Stones for hearting or interior filling shall be hammered down with wooden mallet into the position firmly bedded in mortar. Chips or sprawls of stones may be used for filing of interstices between the adjacent stones in heartening and these shall not exceed 20% of the quantity of stone masonry. To form a bond between successive courses plum stones projecting vertically by about 15 to 20 cm shall be firmly embedded in the heartening at the interval of about one metre in every course. No hollow space shall be left any where in the masonry.

The masonry work in wall shall be carried up true to plumb or to specified batter.

Random rubble masonry shall be brought to the level courses at plinth, window sills, lintel and roof levels. Levelling shall be done with concrete comprising of one part of the mortar as used of masonry and two parts of graded stone aggregate of 20mm nominal size.

The masonry in structure shall be carried uniformly. Where the masonry of one part is to be delayed, the work shall be raked back at an angle not steeper than 45 degree.

4.1.1.4 **Bond Stones :** Bond or through stones running right through the thickness of walls, shall be provided in walls upto 60cm thick and in case of walls above 60cm thickness, a set of two or more bond stones overlapping each other by at-least 15cm shall be provided in a line from face of the wall to the back.

In case of highly absorbent types of stones (porous lime stone and sand stone etc.) single piece bond stone may give rise to dampness. For all thicknesses of such walls, a set of two or more bond stones overlapping each other by at least 15cm shall be provided. Length of each such bond stone shall be less than two-third of the thickness of the wall.

Where bond stones of suitable length are not available precast cement concrete block of 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate 20mm

nominal size) of cross section not less than 225 sqcm and length equal to the thickness of wall shall be used in lieu to bond stones. (This shall be applicable only in masonry below ground level and where masonry above ground level is finally required to be plastered).

At least one bond stone or a set of bond stones shall be provided for every 0.5 sqm of the area of wall surface. All bond stones shall be marked suitably with paint as directed by the Project Manager.

- 4.1.1.5 **Quoin and Jamb Stones:** The quoin and jamb stones shall be of selected stones neatly dressed with hammer or chisel to form the required angle. Quoin stones shall not be less than 0.01 cum in volume. Height of quoins and jamb stones shall not be less than 15cm. Quoins shall be laid header and stretcher alternatively.
- 4.1.1.6 **Joints**: Stones shall be so laid that all joints are fully packed with mortar and chips. Face joints shall not be more than 20mm thick.

The joints shall be struck flush and finished at the time of laying when plastering or pointing is not to be done. For the surfaces to be plastered or pointed, the joints shall be raked to a minimum depth of 20 mm when the mortar is still green.

- 4.1.1.7 **Scaffolding :** Single scaffolding having one set of vertical support shall be allowed. The supports shall be sound and strong, tied together by horizontal pieces, over which the scaffolding planks shall be fixed. The inner end of the horizontal scaffolding member may rest in a hole provided in the masonry. Such holes, however, shall not be allowed in pillars under one metre in width or near the skew back of arches. The holes left in masonry work for supporting scaffolding shall be filled and made good with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 stone aggregate 20 mm nominal size).
- 4.1.1.8 **Curing :** Masonry work in cement or composite mortar shall be kept constantly moist on all faces for a minimum period of seven days. In case of masonry with fat lime mortar curing shall commence tow days after laying of masonry and shall continue for at least seven days thereafter.
- 4.1.1.9 **Protection :** Green work shall be protected from rain by suitable covering. the work shall also be suitably protected from damage , mortar dropping and rain during construction.

4.1.1.10 Measurement

- a) The length, height and thickness shall be measured correct to a cm. The thickness of wall shall be measured as per drawing. Only specified dimensions shall be allowed; anything extra shall be ignored. The quantity shall be calculated in cubic metre nearest to two places of decimal.
- b) The work under the following categories shall be measured separately.
 - i) From foundation to plinth level:
 - ii) From plinth level to superstructure level.

- iii) Stone masonry in parapet shall be measured together with the corresponding item in the wall of the storey next below.
- c) No deduction shall be made nor extra payment made for the following:
- i) Ends of dissimilar materials (that is joists, beams, lintels, posts, girders, rafters purlins, trusses, corbels, steps etc.) upto 0.1 sqm in section.
- ii) Openings each upto 0.1 sqm in area. In calculating the area of openings, any separate lintels or sills shall be included alongwith the size of opening but the end portions of the lintels shall be excluded and the extra width or rebated reveals, if any, shall also be excluded.
- iii) Wall plates and bed plates, and bearing of chajjas and the like, where the thickness does not exceed 10cm and the bearing does not extend over the full thickness of the wall.
- iv) Drain holes and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.
- v) Building in masonry, iron fixture, pipes upto 300mm dia, hold fasts of doors and windows etc.
- vi) Forming chases in masonry each upto section of 350 sq cm.

 Masonry (excluding fixing brick work) in chimney breasts with smoke of air flues not exceeding 20 sq dm (0.20 sqm) in sectional area shall be measured as solid and not extra payment shall be made for pargetting and coring such flues. Where flues exceed 20 sq dm (0.20 sqm) sectional area, deduction shall be made for the same and pargetting and coring flues shall be measured in running metres stating size of flues and paid for separately. Aperture for fire place shall not be deducted and no extra payment made for splaying of jambs and throating.
- d) Apertures for fire places shall not be deducted and extra labour shall not be measured for splaying of jambs, throating and making arch to support the opening.

e) Square or Rectangular Pillars

These shall be measured as walls, no extra payment shall be allowed for stone work in square or rectangular pillars over the rate for stone work in walls.

e) Tapered walls shall be measured net, as per actual dimensions and paid for as other walls.

4.1.1.11 **Curved Masonry**

Stone masonry curved on plan to a mean radius exceeding 6 metres shall be measured and included with general stone work. Stone work circular on plan to a mean radius not exceeding 6 metres shall be measured separately and shall include all cuttings and waste and templates. It shall be measured as the mean length of the wall.

4.2 CONCRETE BLOCK

4.2.1 Description

This section covers the requirements for furnishing of all material and the construction of hollow concrete block masonry load bearing and filler / partition walls using the type, dimensions, arrangement and the coursing as required complete with reinforcing anchorage, mortar, jointing grouting, pointing, and masonry accessories.

4.2.2 Application Codes and Standards

IS: 269 Ordinary and low heat portland cement.

IS : 383 Aggregates, coarse and fine from natural source for concrete.

IS : 456 Code of practice for plain and reinforced concrete.

IS : 2185 Specifications for concrete masonry units.

Part - I Hollow and solid concrete block.

IS : 2250 Code of practice for the preparation and use of masonry

mortars.

4.2.3 Products

4.2.3.1 Hollow Concrete masonry blocks

Hollow concrete masonry blocks shall be of approved make conforming to IS: 2185. The concrete mix used for blocks shall not be richer than 1 cement: 6 combined aggregate by volume before mixing. Cement used in making concrete masonry unit shall conform IS: 269 and the aggregates used shall conform to IS: 383. All units shall be cured in curing tank / curing yard or steam cured.

A Physical Requirements

i) General

All units shall be sound and free from cracks, honey combing, broken edges and other defects. However minor chipping resulting from the customary methods of handling during delivery shall not be deemed ground for rejection.

The face of masonry units shall be flat and rectangular, opposite faces shall be paralleled and all rises shall be square. The bedding surface shall be at right angle to the face of the blocks.

ii) Texture

Concrete masonry units used in constructing exposed walls shall be of the specified surface texture, free from stains and discoloration blemished and defects which detract the desired appearance of the finished wall.

iii) Dimensions

Unless specified otherwise the nominal dimensions of hollow concrete masonry units shall be as follows:

Length 400mm Height 200mm

Width As specified in the drawings.

The maximum variation in dimension shall not be more than \pm 1.5 mm in height and breadth and \pm 3mm in length.

iv) Special Units

Hollow concrete block masonry units shall include closer jamb, header and bond beam units and special shapes and sizes required to complete the work indicated.

v) Block Density

The density of hollow concrete block shall be as prescribed in Table below :-

| Type | | Density of Block | Min. Avg. | Min Strength |
|---------|----------|--------------------|-------------------|-------------------------|
| | | kg/M3 | Strength of Units | Individual Units |
| a) Load | bearing | Not less than 1500 | 5.5 N/Sqmm | 4.4 N / Sqmm |
| b) | Non-load | Less than 1500 but | 1.5 N / Sqmm | 1.2 N/Sqmm |
| bearing | | not less than 1000 | _ | |

vi) Compressive Strength

The minimum compressive strength at 28 days being the average of 8 units, and the minimum compressive strength at 28 days of individual units shall be as prescribed in Table above.

vii) Water Absorption

The water absorption, being the average of 3 units, shall not be more than 10% by mass.

viii) Drying Shrinkage

The drying shrinkage, being average of 3 units shall not exceed 0.1 percent.

ix) Moisture movement

The moisture movement of the dried blocks on immersion in water being the average of 3 units, shall not exceed 0.09%.

B Product Handling

i) Transportation

The contractor shall be responsible for transporting hollow concrete masonry units in such a manner that the units are adequately protected during transportation cracked, chipped, or otherwise damaged concrete masonry units, delivered at the site shall be considered unacceptable and shall be delivery to the site in air dry condition.

ii) Handling and storage

Concrete block masonry units shall be handled, stored and protected with care in an approved manner to avoid any contact with moisture on the site, soiling, chipping or damage of any kind. They shall be stock piled in neat piles on planks or other supports free from contact with the ground and covered to protect against wetting. Broken chipped or otherwise damaged units will be rejected and shall not be used on the works.

C Tests

Tests shall be conducted on samples of units selected according to the sampling productive given in D below, to ensure conforming with the physical requirement laid down in A. The cost of the tests shall be borne by the contractor.

D Sampling

i) A sample of 20 blocks shall be taken from every consignment of 4000 blocks or part thereof the same size and same batch of manufacture. From these samples, the blocks shall be taken at random for conducting the tests. The sample of block shall be marked for future identification of the consignment it represents. The blocks shall be kept under cover and protect from extreme condition of temperature relative humidity and wind until they are required for test. The tests shall be undertaken as soon practicably after the sample has been taken.

ii) Number of Tests

All the 20 blocks shall be checked for dimension and inspected for visual defects. Out of 20 blocks, 3 blocks shall be subjected to the testing for block density, 8 blocks to the test for compressive strength, 3 blocks to the test for drying shrinkage and later to the test for moisture movement. The remaining 3 blocks shall be reserved for retest for drying shrinkage and moisture movement if a need arises.

E Criteria for conformity

The lot shall be considered as conforming to the requirements of the specifications if the conditions mentioned below are satisfied.

a) The number of blocks with dimensions outside the tolerance limit and / or visual defects, among those inspected shall not be more than two.

- b) For block density and compressive strength, the mean value determined shall be greater than or equal at the minimum limit specified in **A** (v) and (vi) respectively.
- c) For drying shrinkage and moisture movement, all the test specimens shall satisfy the requirements of the test. If one or more specimens fail to satisfy the requirements, the remaining three blocks shall be subjected to these tests. All these blocks shall satisfy the requirements.
- d) For water absorption, the mean value determined shall be equal or less than the maximum as specified.

F Marking

Concrete masonry units shall be marked for the following information.

- a) The identification of the manufacture.
- b) The grade of the unit i.e. load bearing or non-load bearing.
- c) The year of manufacture if required.

4.2.3.2 Mortar

Mortar shall be composed of cement and sand, unless otherwise specified. All mortar shall be prepared in accordance with IS: 2250. Hollow concrete blocks shall be embedded with a mortar which is relatively weaker than the mix used in making blocks in order to avoid the formation of cracks. The proportions of mortar measured by volume shall be as specified.

4.2.3.3 Concrete

Concrete used for filling cells in hollow concrete block masonry when reinforced shall be composed of 1 part of cement : $2\frac{1}{2}$ parts of sand and 3 parts of coarse aggregate of size ranging 4.75 mm to 12.5 mm. The water cement ratio shall not exceed 0.6. When the cells exceed 10 cm in the least side, the coarse aggregate size shall be graded between 4.75 and 20 mm and the proportion of mix shall be 1:2 $\frac{1}{2}$: $\frac{1}{2}$ for reinforcements of IS : 456 shall be complied with.

Superstructure

i) First Course

The first course of concrete block masonry shall be laid with great care making sure that it is properly aligned, leveled and plumbed. Before laying the first course, the alignment of the wall shall be marked on the foundation, footings. The blocks for this course shall first be laid dry along a string lighting stretched between properly located corners of the wall in order to determine the correct position of the blocks including those of cross walls joining it and also to adjust their spacing. When the blocks are set in proper position the two corner blocks shall be removed a full mortar bed spread on the footing and these blocks laid back in place truly level and

plumb. The string shall then be stretched tightly along the faces of the two corner blocks and the faces of the intermediate ones adjusted to coincide with the line. Therefore each block shall be removed and re-laid over a bed of mortar. After every 3 or 4 blocks have been laid their correct alignment, level and vertically shall be carefully checked.

ii) Horizontal Joints

Mortar shall be spread over the entire top surface of the block including front and rear as well as the webs to a uniform layer of 1 cm thickness. Full mortar bedding shall be adopted for load bearing walls but for non-load bearing walls. The mortar may be spread only over.

iii) Vertical Joints

For vertical joints, the mortar shall be applied on the vertical edges of the front and rear shells of the blocks. The mortar may be applied either on the unit already placed on the wall or aggregate size shall be graded between 4.75 and 20mm and the proportion of mix shall be 1:2 $\frac{1}{2}$: 3 $\frac{1}{2}$ for reinforced concrete and 1:3:6 for unreinforced concrete. Generally, in making the concrete, the requirements of IS: 456 shall be complied with.

4.2.3.4 Anchors and Ties

The ties for laying concrete block masonry partitions to intersecting masonry and the anchorage of interior walls to abutting walls and columns shall be as indicated on the drawings.

4.2.4 Execution

4.2.4.1 Preparation

The blocks shall be wetted before or during laying in the walls. In case the climatic conditions require the top and the side of the blocks may only be slightly moistured so as to prevent absorption of water from the mortar and ensure development of the required bond with the mortar. No unit having a film of water on its surface shall be laid.

4.2.4.2 Foundations

In foundation courses, plinth and basement walls, solid concrete blocks shall preferably be used. If hollow blocks are used, their hollow must be filled with cement concrete 1:3:6 (1 cement : 3 sand : 6 gravel or crushed stone 5 to 20mm size). In special cases, the hollows may be left unfilled if so approved by the PMC.

In damp soils the foundation and basement masonry shall be laid in richer mortar as directed by the PMC.

i) Masonry shall not be spread so much ahead of the actual laying of the units that it tends to stiffen and loss its plasticity, thereby resulting on poor bond. For most of the work, the joints both horizontal and vertical shall be 1 cm thick. When the mortar has stiffened somewhat, it shall be firmly compacted with the jointing tool.

It may be necessary to add mortar, particularly to the vertical joints, to ensure that they are well filled. Each units shall be adjusted to final position while the mortar is still soft and plastic. Any unit that is disturbed after mortar has stiffened shall be removed and re-laid with fresh mortar.

- ii) The construction of walls may be started either at the corners first or started form one end proceeding in the other direction. If the corners of the wall are built first, they shall be built 4 to 5 courses higher than the centre of the wall. After each course is laid at the corner, it shall be checked for alignment, level and for being in plumb. Each block shall be carefully checked with a level or straight edge to make certain that the faces of the block are all in the same plane. All mortar joints shall be 1 cm thick. Each course, in binding the corners, shall be stepped back by a half block and the horizontal spacing of the block shall be checked by placing a mason's level diagonally across the corners of the blocks.
- **iii**) When filling in the wall, between corners, the mason's line shall be stretched from corner to corner for each course and the top outside edge of the each block shall be laid to this line. The manner of handling or gripping the block shall be such as to position the block properly with minimum adjustment. Dead mortar that has been picked up from the scaffold or from the floor shall not be used.

iv) Closure Blocks

When installing the closure block, all edges of the opening and all four vertical edges of the closure block shall be buttered with mortar. The closure block shall be carefully lowered into place. If any of the mortar falls out leaving as open joint, the closure block shall be removed, fresh mortar applied and the operation repeated.

v) Provision for Door and Window frames

A course of solid concrete block masonry shall be provided under window openings or a 10 cm thick pre-cast concrete sill blocks under windows as per the drawings. The solid course shall extend for at least 20 cm beyond the opening on either side. If hollow concrete block units are used the hollow shall be filled in with concrete of mix 1:3:6.

MS Hold fasts shall be so fixed to the door or window frames that these fall at block course level and their ends are embedded in a hollow which shall be filled with 1:3:6 cement concrete

vi) Provisions for lintels

Lintels shall consist of either a single pre-cast units or a number of units. They shall be reinforced as per structural drawings. In situ concrete used for forming a composite lintel with the use of a number of units, shall preferably be of the same mix as of the concrete that is used in the pre-cast units and the composite unit shall also be reinforced as per structural drawings. Where openings occur close to one another a continuous lintel shall be provided.

vii) Provision for roof

The course immediately below the roof slab shall be built with solid blocks. Alternatively, U - shaped units may be used and filled in with 1:3:6 concrete later on.

5.0 WATER PROOFING

5.1 General

It is the intent of this specification to secure a completely water tight basement, toilets and terraces etc. guaranteed for at least 10 (Ten) years from the date of final completion. The guarantee shall be executed & extended by the Contractor & not by the water proofing agency. The contractor shall provide all materials, labour, plant, equipment, incidentals and everything necessary for securing a fully waterproof job as called for above.

All water proofing work shall be carried out by specialists as approved by the Project Manager. Installation and materials shall be as per best practices for obtaining water proof work and as recommended by the manufacturer.

Water proofing work shall be commenced only after the surface is prepared, smooth rendered, cleaned free of dirt, dust and foreign matters, inspected and approved. Compressed air shall be used for effective cleaning of all surfaces. The vents and other projections through the roof shall be made absolutely secure before flashing.

5.2 Roof And Sunken Area Water Proofing (Mud Phuska waterproofing and terracing)

The procedure is to clean the RCC slab off dust and loose material. Spread hot bitumen at 1.70 kg bitumen per square metre.

Immediately spread a layer of coarse sand over hot bitumen at 0.6 m3 of sand over 100 square metre. Paddled clay mixed with hay (bhusa) is laid in 10 cm thick layer giving a proper slope (1:40). This layer is thoroughly consolidated. Mud-phuska layer is plastered with mud-cow dung mortar (3:1). 35 mm thk Tile bricks are laid flat on plastered surface and joints are sealed and grouted in 1:3 cement mortar and finished neat.

5.3 **Tapecrete Waterproofing**

All the chasings or cuttings in the floors and walls shall be carried out prior to the commencement of the treatment. The prepared surface than shall be plastered with 12mm thick cement mortar 1:4 mix (1 cement : 4 coarse sand), mixed with `CICO' admixture, as per manufacturers' specifications. The plastering shall be carried out throughout the sunk portion and carried up to all sides of the walls. The specialist then shall carry out 'TAPECRETE' waterproofing treatment comprising of 3 coats of tapecrete with 1st coat of tapecrete mixed with grey cement in proportion of 1:2 (1 part tapecrete: 2 grey cement), 2nd coat of tapecrete mixed with grey cement and silica sand in proportion of 1:2:1.5 (1 Tapecrete: 2 grey cement: 1.5 silaca sand), 3rd coat of tapecrete mixed with grey cement in proportion of 1:2. After the first coat of Tapecrete all corners, junctions, joints of pipes and masonry to be sealed with Epoxy putty. The treatment is laid underneath and behind all pipes. The specification on verticals is taken 150mm above the finished floor level and to full height where tubs/wash basin and WC are being fixed. The top surface shall be protected with 12mm thick plaster in cement mortar 1:4 mix (1 cement : 4 coarse sand).

6.0 WOOD WORKS

The Contractor shall be responsible for providing all plant, tools, materials, labour and all things necessary for the proper execution, completion and maintenance of the works.

a) Timber:-

The moisture content of the timber during manufacture, delivery to site, storage, site working, assembly, installation shall be 10 to 12 percent.

Timber shall be Burma Teak Wood/ Ivory Coast Teak Wood / Champ Wood, / Red mirinti, soft or hardwood and shall be suitable for the purpose for which it is intended. It shall be seasoned or Kiln dried, absolutely free from worm holes, large loose or dead Knots or other defects which would effect strength or usability and shall be flat, straight non-splitting and dressed on all sides. It shall be matched for colours and graining.

Burma Teak Wood/ Ivory Coast Teak Wood / Champ Wood / Red mirinti wherever specified in the drawings / schedule of quantities , it is Ist quality Light Grained of reasonably straight grains, light vein free of Knots and sap. **Fixing:**-

The carpentry timber shall be fixed with nails, spikes, bolts screws, hangers, stirrups, anchors, ties or any other accessories which are suitable to develop the full strength of the member to which they are attached, as directed.

Carpentry timber where fixed to solid masonry or concrete shall be secured with expansion bolts or other positive methods of mechanical fastening. MS hold fast grouted in CC block shall be used to hold the door frames.

Timber - Treatment

All timber shall be protected with an organic solvent water repellent wood preservative to give a highly efficient protection against termite, spider, worm, all insects and fungus and rot attach and shall, where exposed, enhance the appearance of the timber. Colour of the product shall be such as to bring out the natural colour of the respective timbers. Fire retardant paint to timber shall be applied as per the recommendations of manufacturer and shall comply with the requirement of ISI / B.S. code and local fire requirements.

b) Plastic Laminate:-

Plastic decorative laminate sheeting shall be of the brand, catalogues number and indicated or approved. Plastic laminate shall be fire retardant to class I of BS: 476 or ISI code where specified.

c) Veneers:-

Veneer shall be of the timber species of Indian origin shown on drawings. Veneers are to be kept in sequence as they are being cut from wood and supplied as such to the site for accurate matching or figuring. The veneer shall be finished as specified and shall be equal or superior quality to that laid down in IS: 1659 - 1960 or as approved.

wherever Veneer is stated, it is mainly Teak veneer of approved quality in Indian origin unless otherwise mentioned.

d) Plywood :-

All ply wood shall be of best / high quality close grained suitable for veneering, painting or bonding plastic laminate. It shall be resin bonded and weather proof. Exposed edges shall be finished with an edge strip of solid teak wood. tongued and grooved and glued, or as detailed. The plywood of approved brand and manufacture only shall be used in the work. The thickness shall be in accordance with the drawings /schedule of quantities.

e) MDF (Medium Density Fibre Board):

For Interior Works MDF of approved make /manufacturer shall be of only EXTERIOR GRADE as per IS: 12406-1988. It is to be contained that MDF shall be invariably used in place of Ply / Boards .so specified in the specifications of either same thickness or of higher thickness .wherever feasible The minimum thickness of MDF to be used shall be 8mm. Wood screws are not to be used for MDF and only fully threaded parallel shank screws shall be used after drilling pilot holes. Veneering /lamination to the MDF surface shall be done by exterior grade adhesive only. Poly urethene primers shall be used for sealing the edges and painting the rear side. For specifications of various applications the MANUFACTURER USERS MANUAL shall be followed.

Adhesives :-

The adhesives used for all wood work and MDF shall be FEVICOL or approved equivalent of appropriate Grade. Manufacturer's recommendations shall be followed for adhesive other than above required for any specified / specialized work.

Joinery :- Joinery shall be carried out strictly in accordance with the drawings, Where joints are not specifically indicated recognized forms of joints shall be used. Joinery shall conform to IS Standards.

Panels shall be rendered flame retardant and to conform to local fire regulations.

The Contractor shall submit samples of all materials including samples of veneer for approval.

All materials pre-fabricated, delivered and assembled shall be in accordance with the approved sample.

The Contractor shall be responsible for protecting all items of wood-work done by him. The contractor shall replace at his own expense any damaged work caused through lack of adequate protection or care in installation or handling .

f) Flush Doors

All flush door shall be solid core as specified. It shall conform to the relevant specifications to IS: 2202 and shall be obtained from ISI approved manufacturers. The finished thickness of the shutter shall be as mentioned in the items. Face veneers shall be of the pattern and colour approved by the Architects and an approved sample shall be deposited with the Architects for

reference. The solid core shall be wood laminates prepared from battens of well seasoned and treated good quality wood having straight grains.

g) Gypsum - Board :-

Gypsum -Board (Glass Fibre Reinforced Board) or Equivalent conforming to IS-2095 - 1982 and 2542-1981 shall be used. Technical detailing for fixing Gypsum-Board along with jointing compound, paper tape, primer, screws, edge bead, angle bead etc. shall be as per Manufacturers specification. Proper care is to be taken while handling, storing and cutting the Gypsum-board as per manufacturer's manual and the work shall be done in technical co-ordination /assistance with the trained staff of Manufacturer, such services being offered free by them.

h) Mirrors and Glasses:-

Mirrors shall be fabricated from best clear plate or float glass of approved quality in imported variety and shall match the International Standards. All fixed panel mirrors shall be \pm 0.30mm tolerance. The edges of mirrors shall be polished and bevelled and mitred as per IS specifications wherever, it's indicated in the drawing.

All vision glasses shall be float glass of specified thickness. The edges shall be bevelled as indicated in drawings and shall be done at approved source.

The Etching wherever specified in drawings, shall be done at approved sources as per full-scale drawing approved by the Project Manger. The etched panel shall be chemically washed /treated as per specialist specifications to have a permanent dust free surface.

The Contractor shall be responsible for protecting all mirrors and glasses fixed by him and shall replace at his own expense any broken or damaged mirror / glass caused through lack of adequate protection or care in installation or handling.

7.0 FLOORING/ CLADDING WORKS

7.1 General

All flooring shall be laid to the best practice known to the trade. The flooring shall be laid to the level except where slopes are called for on the drawings in which case the slopes shall be uniform and so arranged to drain in to the indicated outlets.

Particular care shall be exercised to ensure that all flooring, skirting and dado are perfectly matched for colour and finish. Sufficient extra tiles (not less than 5%) shall be cast/ordered to ensure an adequate supply of matched floor tiles. The contractor shall furnish for approval by the Project Manager, samples of each type of floor finish.

7.2 Cement Concrete flooring (IPS Flooring)

Indian patent stone flooring shall be 40mm or of specified thickness and laid in two layers, bottom layer 28mm thick or as specified in 1 part of portland cement, 2 parts of coarse sand and 4 parts of crushed stone aggregate 12.5mm down well graded

machine mixed with not more than 5.5 gallons of water for each bag of cement and top layer 6mm thick in one part of portland cement, 2.5 parts of selected crushed stone chips with just enough sand maximum part to make workable mix, machine mixed with not more than 5 gallons of water. Top layer to be laid before the bottom layer has hardened. Flooring shall be laid in squares or bays as directed and each layers shall be well compacted by ramming with heavy teak wood floats. The top shall be brought to a smooth and even surface free from blemishes and finished smooth with neat cement by steel trowelling. The flooring shall be kept wet for seven days for curing. The flooring shall be laid by forming panels as per the advised of the Project Manager / Architect including roughening of the base layer and providing cement slurry for jointing.

Where ironite/hardonite topping is specified in the "Bill of Quantities" the bottom layer shall be 50mm thick or in the item of B.O.Q. and the top layer shall be 12mm thick mixed with ironite/hardonite as per manufacturers specification and finished fair

7.3 **Granolithic Flooring**

The general specifications for granolithic floors, where called for, shall be as per the cement flooring except that the top 12mm finish shall be of granolithic consisting of 1 part of cement and 1.1/2 part of well graded crushed aggregate. The aggregate shall be of approved quality.

7.4 Tiles

All tiles shall be minimum 8 mm thick of approved manufacturer as stated in the schedule of quantities. Only first quality tiles of approved colour shall be used. No cracked or warped tiles shall be used in the work. All tiles shall be required to be set in cement mortar. Prior to setting the tiles the contractor shall at his own cost, clear the whole surface and thoroughly saturate it with water. A layer of 12 to 20 mm avg. thick cement mortar shall then be applied to the surface and the tiles laid firmly over a layer of clear cement slurry. The tiles shall be set in perfect line, level and true to plumb line. The joints of tiles shall have white, coloured cement filling/tile grout. After the setting operation is completed, the contractor shall carefully remove all cement and dribbling and cure the tiled surface for atleast seven days with water.

7.5 Tile Dado

Tile dado where called for in the drawings, shall be minimum 6 mm thick tiles of approved manufacture. The tiles shall be free from cracks, twists, uneven edges, cracking and such other defects. The rear face of tiles shall be grooved and/or recessed to provide an adequately key for the plaster. A layer of 12mm thick rough base plaster shall be done with cement mortar 1:3 (1 cement: 3 coarse sand). The tiles shall be finally set true to plumb with rich cement slurry over a 6mm average thick cement plaster in 1:3 (1 cement: 3 fine sand), the joints of tiles shall have white, coloured cement filling/tile grout. After laying the tiles shall be thoroughly washed and cleaned to the satisfaction of the Project Manager.

7.6 Marble / Granite Stone

Marble/Granite shall be the best Indian Marble/Granite to be approved by the Project Manager and a sample piece should be kept in the office of the Project Manager. The quality shall be uniform and it shall be hard and free from any discolorations, cracks, flaws, veins of foreign materials or any other defects. When marble/Granite of different colour and kinds associated, care shall be taken to see that they are of equal hardness so as to wear evenly. The marble/Granite slabs shall be machine cut true to the shape and size and machine mirror polished. Care shall

be taken to cut the slabs so as to provide a pattern as indicated. Marble/Granite stone slabs for wall lining and dadoes shall be machine mirror polished edges. The wall shall be lined with the marble/Granite in courses as indicated and grain of the marble/Granite shall be arranged in pattern as per detailed drawings. The marble/Granite shall be bedded in adequate thickness of cement mortar, backing covering the full area of the marble. The wall surface shall cleaned from all dirt, mortar droppings etc. before applying the base plaster. The marble/Granite shall be fixed to the wall by S.S cramps and pins of required sizes embedded firmly in to wall by cutting hole and grouting alternately stainless steel cramps and pins as per design including fixing small stone pieces with adhesive. Fixing of cramp shall be with fastener (as approved by Project Manager) in case of RCC and in Brick Work pocket (100mmX75mmX75mm) shall be made and filled by non-shrinkage compound (as approved by Project Manager). The size and design of the cramp and fastener shall be to suite site requirement and shall be approved by the Project Manager. The load of one marble/Granite slab shall not be borne by the slab below. Joints between slabs shall be hair fine and filled with coloured cement to match the marble/Granite. The marble/Granite lining and dadoes shall be finally polished by Carborundum stone, buffing with polishing felt and cleaned with diluted oxalic acid wash.

7.7 Expansion and compression joints

These shall be clearly indicated on the shop drawings and formed of non-staining two parts polysulphide with polyethylene foam backing to full depth of screed in pavings.

In no instance shall expansion joints be less than 10 mm. Supporting corbels cover shall be recessed into the back of the above slab and not placed in the expansion joint. Expansion joint shall be kept completely free of all fixing materials and are to be inspected by the consultant prior to filling.

8.0 FINISHING WORKS

8.1 General

- 8.1.1 All plaster work shall be of the best workmanship and in strict accordance with the dimensions of the drawings. All plastering shall be finished to true levels including plumbs, without imperfections, and square with adjoining work. It shall form proper foundations for finishing materials such as paint etc. Masonry and concrete surface to which plaster is to be applied shall be clean, free from efflorescence, sufficiently rough and keyed to ensure proper bond.
- 8.1.2 Wherever directed all joints between RCC frames and masonry walls, shall be expressed by a groove in the plaster. This groove will exactly coincide with the joint beneath. At the corners of all windows and doors or other openings and wherever instructed, 24 gauge expanded galvanized metal mesh strips 300 mm wide shall be placed diagonally to prevent plaster cracks.
- 8.1.3 Where grooves are not called for, the joint between concrete and masonry in filling, chasing for conduits, pipes, boxes etc. shall be covered by 24 gauge expanded galvanized metal strips, 300 mm wide installed before plastering. The contractor shall supply all necessary labour, material, tools and scaffolding necessary for the completion of the work detailed. He shall be responsible to take proper precautions to all works from damage. Any work rejected through non-compliance with the specifications or damaged work shall be removed and replaced at the expense of the contractor.
- 8.1.4 All chasing, installation of conduits, boxes, etc. shall be completed before any plastering is commenced on a surface. Chasing or cutting of plaster will not be permitted. Broken corners shall be cut back less than 150 mm on both sides and patched with plaster of Paris as directed. All corners shall be rounded to a radius. Contractor shall get samples of each type of plaster work approved by the Project Manager.
- 8.1.5 The materials used for plastering shall be proportioned by volume by means of gauge boxes. Alternatively it may be required to proportion the materials by weight.

8.2 Plaster Work

- 8.2.1 The joints in the brick work, concrete blocks, shall be raked (as specified in respective subhead) while the masonry is green. Concrete surfaces to receive plaster shall be suitably roughened. All walls shall be washed with water and kept damp for 10 hours before plastering.
- 8.2.2 The plaster unless specified otherwise shall be average of 15 mm thick on walls and minimum 6 mm thick for the ceiling. The finished texture shall be as approved by the Project Manager. The mix for plaster unless otherwise specified, shall be one part cement and four parts sand, to walls and one part cement, 3 parts sand to ceiling.
- 8.2.3 The interior plaster shall be applied in one coat only. The surface shall be trowelled smooth to an approved surface. All plaster work shall be kept continuously wet for seven days.
- 8.2.4 The external plaster shall be minimum 20 mm. Preparations of walls to receive plaster work shall be the same as in internal plaster. Both layers of all external plaster shall be waterproofed with approved water proofing powder added to cement in proportion of 1.5 Kg. to 50 Kg. of cement as per the manufacturers' instruction,

for both the coats under layer 12 mm thick cement plaster 1:5 (1 cement : 5 coarse sand) finished with a top layer 8mm thick cement plaster 1:6 (1 cement :6 fine sand) including making of grooves, bands, drip coarse as shown in drawing.

8.2.5 For sand faced cement plaster, the finishing coat shall be in cement mortar 1:3, sand used shall be of selected colour, properly graded and washed so as to give a grained texture. Finishing plaster coat shall be 8 mm thick, uniformly applied and surface finished with special rubbing by sponge pads and other tools and recommended by the Project Manager.

8.3 White Washing

8.3.1 White washing with Lime

The wash shall be prepared from fresh stone lime (Narnaul/Satna or Dehradun quality). The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficiencies to water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm of gum desolved in hot water, shall be added to each 10 entire delimiters of cream. The approximate quantity of water to be added in making ht cream will be 5 liters of water to 1 Kg. of lime.

Indigo (Neel) up to 3 gm. per Kg. of lime desolved in water, shall then be added and wash stirred well. Water then shall be added at the rate of about 5 liters per Kg. of lime to produce a milky solution.

8.3.2 **Preparation of surface**

Before white washing is started, the surface shall be thoroughly brushed free from mortar droppings and foreign-matter. Any unevenness shall be made good by applying putty made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it dry.

8.3.3 **Application**

The white wash shall be applied with moon brushes to the specified number of coats. The operation for each coat shall consist of a stroke of the brush given from top downwards, another from bottom upwards over the first stroke, and similarly one stroke horizontally from the right and another from the left before it dries up.

8.4 White washing with whiting

Preparation of mix: Whiting (ground white chalk) shall be dissolved in sufficient quantity of warm and thoroughly stirred to form a thin slurry which shall then be screened through a clean coarse cloth. Two Kg. of gum and 0.4 Kg. of copper sulphate dissolved separately in hot water shall be added for every cum of the slurry which shall then be diluted with water to the consistency of milk also as to make a wash ready for use.

Other specifications described in above shall be applied in this case also.

8.5 **Colour Washing**

The mineral colours not affected by lime, shall be added to white wash. Indigo shall however, not be added. No colour wash shall be done until a sample of the colour wash of the required tint or shade has been got approved from the Project Manager. The colour shall be of even tint or shade over the whole area.

A priming coat of white wash with lime or with whiting shall be applied. Three or more coats, shall then be applied on the entire surface till it represents a smooth and uniform finish.

Other specifications described in above shall apply in this case also.

8.6 **Distempering**

Dry distemper of required colour and (IS; 427 - 1965) of approved brand and manufacture shall be used. The shade shall be got approved from the Project Manager before application of the distemper. The dry distemper colour as required shall be stirred slowly in clean water using 6 decilitres (0.6 litre) of water per Kg. of distemper or as specified by the makers. Warm water shall preferably be used. It shall be allowed to stand for atleast 30 minutes (or if practicable over night) before use. The mixture shall be well stirred before and during use to maintain an even consistency. Distemper shall not be mixed in larger quantity than is actually required for one days' work.

Preparation of surface

Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth. Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

A priming coat of whiting shall be applied over the prepared surface. No white washing coat shall be used as a priming coat for distemper.

Application

The treatment shall consist of a priming coat of whiting followed by the application of three or more coats of distemper till the surface shows an even colour.

Other specifications described as above shall apply in this case also.

8.7 Oil bound distempering

Material: Oil emulsion (oil bound) distemper (IS:428-1929) of approved brand and manufacture shall be used. The primer used shall be cement primer or distemper primer. This shall be of same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for days work shall be prepared. The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities, at a time to suffice for a fortnights work. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Project Manager.

Preparation of surface

Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth. Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

A priming coat of approved primer shall be applied over the prepared surface. No white washing coat shall be used as a priming coat for oil bound distemper.

Application

The priming coat shall be with cement primer, as required in the description of the item and as recommended by the manufacturer.

Note:

If the wall surface plaster has not dried completely cement primer shall be applied before distempering the walls. But if distempering is done after the wall surface is dried completely, distemper primer shall be applied.

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

After the primer coat has dried for atleast 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rule out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (Water or other liquid as stipulated by the manufacture) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitute one coat. The subsequent coats shall be applied in the same way.

For distemper 15 cm double bristled brushes shall be used. After each days work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. The final coat shall be done by using approved roller.

The specifications in respect of scaffolding protective measures and rute shall be as described under.

8.8 **Cement Primer Coat**

Cement primer shall be used as lease on wall finish of cement lime or lime cement plaster or asbestos cement surface before oil distemper paints are applied on them. Only approved cement primer shall be used. Primer coat shall be preferably applied by brushing and not by spraying.

Preparation of surface

The surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface then be allow to dry for atleast 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

Application

Cement primer shall be applied with a brush. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. The entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for atleast 48 hours, before oil emulsion paint is applied.

8.9 **Cement Paint**

Cement paint shall be (conforming to IS:5410 - 1969) of approved brand and manufacture.

Preparation of surface

The surface shall be thoroughly cleaned of all mortar dropping, dirt, dust, alga, grease and other foreign matter by brushing and washing. The surface shall be thoroughly wetted with clean water before the cement paint is applied.

Preparation of mix

Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish.

Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturers instructions shall be followed meticulously. The lid of cement paint drums shall be kept tightly closed when not in

use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hydrophobic qualities.

Application

The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application shall be as per manufacturer's specifications. The completed surface shall be watered after day's work.

Water cement paint shall not be applied on surface already treated with white wash, colour wash distemper dry or oil bound, varnishes, paints etc. It shall not be applied on gypsum, wood and metal surfaces.

8.10 **Painting**

i) Painting priming coat of wood surface

Primer for wood work shall be as specified in the description of the item. Surface to be primed shall be dry and 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 wood filler material with same shade as paint shall be used where so specified.

The surface treated for knotting shall be dry before primer is applied. After the primer is applied the holes and indentation on the surface shall be stopped with glaziers putty or wood putty, stopping shall not be done before the priming coat.

ii) Painting priming coat on Iron & Steel surfaces

All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during raking which becomes loose by rushing, shall be removed. All dust and dirt shall be thoroughly wiped away from the surface.

iii) **Textured paint**

The textured finish to external surfaces of walls as per manufacturer's specification and approved by the Project Manager including scaffolding etc. complete.

iv) Painting priming coat on plastered surface

The surface shall ordinarily not be painted shall be applied to get correct finish until it has dried completely. Before primer is applied, holes and undulations shall be filled up with plaster of Paris and rubbed smooth.

The primer shall be applied with brushes, worked well into the surface and spread even and smooth. Painting shall be done by crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left the laying off is finished. The full process of crossing and laying off will constitute one coat.

The surface to be painted shall have received the approval of the Project Manager after inspection, before painting is commended.

Application

The number of coats including the under coat shall be stipulated in the item.

a) **Under Coat**

One coat of specified paint of shade suited to the shade of the top coat shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.

b) Top Coat

Top coats of specified paint of desired shade shall be applied. Each coat shall be allowed to dry for not less than 24 hours and lightly rubbed down smooth with finest wet abrasion paper to get an even glossy surface. If, however, the surface is not satisfactory additional coats as required.

8.11 Acrylic Emulsion paint

The acrylic emulsion paint is not suitable for application on external wood, and iron surface and surfaces which are liable to heavy condensation and are to be used on internal surfaces except wood and steel which are liable for condensation. No priming coat is required for the latter.

Acrylic emulsion paint as per IS : 5411 - 1969 of approved brand and manufacture and of the required shade shall be used.

8.11.1 Painting on New Surface

Preparation of surface

Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth. Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of paint shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular of acrylic emulsion paint is applied.

A priming coat shall be applied over the prepared surface. No white washing coat shall be used as a priming coat.

Application

The number of coats shall be as stipulated in the item. The paint will be applied in the usual manner with brush and roller. The paint dries by evaporation of the water content and as soon as the water has evaporated the film gets hard and the next coat can be applied. The time of drying varies from one hour on absorbent surfaces to 2 to 3 hours on non-absorbent surfaces.

The thinning of emulsion is to be done with water and not with turpentine. Thinning with water will be particularly required for the undercoat which is applied on the absorbent surface. The quantity of water to be added shall be as per manufacturer's instructions.

The surface on finishing shall present a flat velvety smooth finish. If necessary more coats will be applied till the surface presents a uniform appearance.

Precautions

a) Old brushes and rollers if they are to be used with emulsion paints, should be completely dried of turpentine or oil paints by washing in warm soap water.

Brushes and rollers should be quickly washed in water immediately after use and kept immersed in water during break periods to prevent the paint from hardening on the brush and roller.

- b) In the preparation of walls for plastic emulsion painting, no oil base putties shall be used in filling cracks, holes etc.
- c) Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening.
- d) Washing of surfaces treated with emulsion paints shall not be done within 3 to 4 weeks of application.

8.12 Synthetic Enamel Paint

Synthetic Enamel Paint (conforming to IS: 1932 - 1964) of approved brand and manufacture and of the required colour shall be used for the top coat and an undercoat of shade to match the top coat as recommended by the manufacturer shall be used.

8.12.1 **Painting on New Surface**

Preparation of surface

- a) Wood work: The surface shall be cleaned and all unevenness removed. Knotes if available, shall be covered with a preparation of red red lead. Holes and indentations on the surface shall be filled in with glazire's putty or wood putty and rubbed smooth before painting is done. The surface should be thoroughly dry before painting.
- b) Iron and steel work: The priming coat shall have dried up completely before painting is started. Rust and scaling shall be carefully removed by scraping or by brushing with steel wire brushes. All dust and dirt shall be carefully and thoroughly wiped away.
- c) Plastered surface:- The priming coat shall have dried up completely before painting is started. All dust and dirt that has settled on the priming coat shall be thoroughly wiped away before painting is started.

Application

The number of coats including the undercoat shall be as stipulated in the item.

Under Coat :- Two coat by spray method (by using compressor) of the specified paint of shade suited to the shade of the top coat shall be applied

and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free form brush marks and all loose particles dusted off.

Top Coat: Top coats of specified paint of the desired shade shall be applied by spray method (by using compressor) after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

8.13 Polishing New Surface

Preparation of surface

a) The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

Application

The number of coats of polish to be applied to achieve the desired shade / finish.

A pad of woollen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to given an even level surface. A trace of linseed oil on the face of the pad facilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

8.14 Melamine Polish

Timber works shall be finished by the application of two coats and catalysed clear lacquer (melamine) wherever it is indicated in the drawing/specified. The finish shall be a stain semi-gloss finish and shall be carried out as follows:-

The base shall be sand papered to the desired finish and coated with a colour tings to give it shade. This shade shall be sealed with a coat of spirit finish.

After the base, first coat of melamine shall be applied evenly by spray to give as even coat to the veneer surface.

After the first coat has fully dried, the surface shall be rubbed down in the direction of the veneer grain with very fine glass paper and left completely smooth and clean before the second coat is applied.

When the second coat of melamine is fully dry, the surface shall be rubbed down in the direction of veneer grain with very wire dipped in a petroleum based wax to give lubrication.

Twenty four hours after completion of this process the melamined veneer surface shall be finished by burnishing a soft cloth to an approved finish.

8.15 PLASTER OF PARIS PUNNING

Where specified the walls and ceilings are to be treated with plaster of Paris over cement plaster.

The particular brand of in gradients forming this special plaster and its composition to be used must be previously approved by the Project Manager. The entire surface must be of a very smooth surface and minutest unevenness must be removed. Specially trained skilled labour with previous experience of this type work shall have to be employed for the purpose to achieve high grade finish.

8.16 GRIT FINISH PLASTER

- 1. Select aggregates, 12mm below, Dholpur chips.
- 2. Remove all dirt, foreign material and stone dust.
- 3. Clean the aggregates with water thoroughly.
- 4. Mix the grey cement with marble powder in proportion of three Grey cement to one marble powder by weight.
- 5. Mix the cement Marble powder mix with Dholpur chips in proportion of four cement Marble powder mix to seven Dholpur chips by volume.
- 6. Apply on a rough plastered surface prepared to receive the grit plaster.
- 7. Water the plastered surface to an extent such that the grit plaster can be applied.
- 8. After initial setting of grit plaster use a wet sponge to clean the surface.
- 9. Use hose water to clean the grit surface effectively so that the grit particles are seen neat and clean and the surface is cleaned of any of the cemented particles.

9.0 MISCELLANEOUS WORKS

9.1 STRUCTURAL STEEL WORK

- 9.1.1 This specification covers the fabrication and transportation to site and erection on prepared foundations and structural steel work consisting of beams, columns, vertical trusses, bracings, shear connections etc.
- 9.1.2 Fabrication, erection and approval of steel structures shall be in compliance with :
 - These General Specifications and IS: 800 1984
 - Drawings and supplementary drawings to be supplied to the contractors during execution of the work.
- 9.1.3 Providing primer coat for steel structures. Grouting of holding-down bolt pockets and below base plates where required.
- 9.1.4 In case of conflict between the Clauses mentioned here and the Indian Standards, those expressed in this specification shall govern.
- 9.2 Scope
- 9.2.1 The fabrication and erection of the steel work consists of accomplishing of all jobs here-in enumerated including providing all labour, tools and plant all materials and consumables such as welding electrodes, bolts and nuts, oxygen and acetylene gases, oils for cleaning etc. of approved quality as per relevant IS. The work shall be executed according to the drawings, specifications, relevant codes etc. in an expeditious and workman like manner, as detailed in the specifications and the relevant Indian Standard Codes and Standard Practice and to the complete satisfaction of the Project Manager.
- 9.3 Fabrication Drawings
- 9.3.1 The contractor shall prepare all fabrication and erection drawings on the basis of design drawings supplied to him and submit the same in triplicate to the Project Manager for review, Project Manager shall review and comment, if any, on the same. Such review, if any, by the Project Manager, does not relieve the contractor of any of his required guarantees responsibilities. The contractor shall however be responsible to fabricate the structurals strictly conforming to specifications and reviewed drawings.
- 9.3.2 Fabrication drawings shall include the following:
 - Member sizes and details
 - Types and dimensions of welds and bolts
 - Shapes and sizes of edge preparation for welding
 - Details of shop and field joints included in assemblies.

Bill of material

- Quality of structural steels, welding electrodes, bolts, nuts and washers etc. to be used.
- Erection assemblies, identifying all transportable parts and sub-assemblies, associated with special erection instructions, if required.
- Calculations where asked for, for approval.

- 9.3.3 Connections, splices etc. other details not specifically detailed in design drawings shall be suitably given on fabrication drawings considering normal detailing practices and developing full member strengths. Where asked for calculations for the merit shall also be submitted for approval.
- 9.3.4 Any alternate design or change in section is allowed when approved in writing by the Project Manager.
- 9.3.5 However if any variation in the scheme is found necessary later, the contractor will be supplied with revised drawings. The contractor shall incorporate these changes in his drawings at no extra cost and resubmit for review.
- 9.3.6 Project Manager review shall not absolve the contractor of his responsibility for the correctness of dimensions, adequacy of details and connections. One copy will be returned reviewed with or without comments to the contractor for necessary action. In the former case further three copies of amended drawings shall be submitted by the contractor for final review.
- 9.3.7 The contractor shall supply three prints each of the final reviewed drawings to the Project Manager within a week since final review, at no extra cost for reference and records.
- 9.3.8 The Project Manager will verify the correct interpretation of their requirements.
- 9.3.9 If any modification is made in the design drawing during the course of execution of the job, revised design drawings will be issued to the contractor. Further changes arising out of these shall be incorporated by the contractor in the fabrication drawings already prepared at no extra cost and the revised fabrication drawings shall be duly got reviewed as per the above Clauses.
- 9.4 Materials
- 9.4.1 Rolled Sections

The following grades of steel shall be used for steel structures:

Structural steel will generally be of standard quality conforming to IS: 226. Whenever welded construction is specified plates of more than 20 mm thickness will generally conform to IS: 2062.

9.4.2 Welding Materials

Welding electrodes shall conform to IS: 814.

Approval of welding procedures shall be as per IS: 823.

9.4.3 Bolts, Nuts & Washers

Bolts and nuts shall be as per IS: 1367 and tested as per IS:1608. It shall have a minimum tensile strength of 44 Kg/mm2 and minimum elongation of 23% on a gauge length of 5.65 (A- Original cross sectional area of the gauge length). Washers shall be as per IS: 2016.

9.4.4 All materials shall conform to their respective specifications. The use of equivalent or higher grade or alternate materials will be considered only in very special cases subject to the approval of the Project Manager in writing.

9.4.5 Receipt & Storing of Materials

Steel materials supplied by the contractor must be marked for identification and each lot should be accompanied by manufacturer's quality certificate, conforming chemical analysis and mechanical characteristics.

All steel parts furnished by supplier shall be checked, sorted out, straightened, and arranged by grades and qualities in stores.

Structurals with surface defects such as pitting, cracks, laminations etc. shall be rejected if the defects exceed the allowable tolerances specified in relevant standards or as directed by the Project Manager.

Welding wire and electrodes shall be stored separately by qualities and lots inside a dry and enclosed room, in compliance with IS: 816 - 1969 and as per instructions given by the Project Manager. Electrodes shall be perfectly dry and drawn from an electrode even, if required.

Checking of quality bolts of any kind as well as storage of same shall be made conforming to relevant standards.

Each lot of electrodes, bolts, nuts, etc. shall be accompanied by manufacturer's test certificate.

The contractor may use alternative materials as compared to design specification only with the written approval of the Project Manager.

9.4.6 Material Tests

The contractor shall be required to produce manufacturer's quality certificates for the materials supplied by the contractor. Notwithstanding the manufacturer's certificates, the Project Manager may ask for testing of materials in approved test houses. The test results shall satisfy the requirements of the relevant Indian Standards.

Whenever quality certificates are missing or incomplete or when material quality differs from standard specifications the contractor shall conduct all appropriate tests as directed by the Project Manager at no extra cost.

Materials for which test certificates are not available or for which test results do not tally with relevant standard specifications, shall not be used.

9.5 Fabrication

Fabrication shall be in accordance with IS: 800 Section V in addition to the following:

Fabrication shall be done as per approved fabrication drawings adhering strictly to work points and work lines on the same. The connections shall be welded or bolted as per design drawings. Work shall also include fabricating built up sections.

Any defective material used shall be replaced by the contractor at his own expense, care being taken to prevent any damage to the structure during removal.

All the fabricated and delivered items shall be suitably packed to be protected from any damage during transportation and handling. Any damage caused at any time shall be made good by the Contractor at his own cost.

Any faulty fabrication pointed out at any stage of work shall be made good by the contractor at his own cost.

9.5.1 Preparation of Materials

Prior to release for fabrication, all rolled sections warped beyond allowable limit shall be pressed or rolled straight and freed from twists, taking care that an uniform pressure is applied.

Minor warping, corrugations etc. in rolled sections shall be rectified by cold working.

The sections shall be straightened by hot working where the Project Manager so direct and shall cooled slowly after straightening.

Warped members like plates and flats may be used as such only if wave like deformation does not exceed L/1000 but limited to 10 mm (L-Length).

Surface of members that are to be jointed by lap or fillet welding or bolting shall be even so that there is no gap between overlapping surfaces.

9.5.2 Marking

Marking of members shall be made on horizontal pads, of an appropriate racks or supports in order to ensure horizontal and straight placement of such members. Marking accuracy shall be at least +1 mm.

9.5.3 Cutting

Members shall be cut mechanically (by saw or shear or by oxyacetylene flame).

All sharp, rough, or broken edges, and all edges of joints which are subjected to tensile or oscillating stresses, shall be ground.

No electric metal arc cutting shall be allowed.

All edges cut by oxyacetylene process shall be cleaned of impurities prior to assembly.

Cutting tolerances shall be as follows:

- a) For members connected at both ends + 1 mm.
- b) Elsewhere +3 mm.

The edge preparation for welding of members more than 12 mm thick shall be done by flame cutting and grinding. Cut faces shall not have cracks or be rough.

Edge preparation shall be as per IS: 823 - 1964.

9.5.4 Drilling

Bolts holes shall be drilled.

Drilling shall be made to the diameter specified in drawings.

No enlarging of holes filling, by mandrolling or oxyacetylene flame shall be allowed.

Allowed variations for holes (out-of-roundness, eccentricity, plumb-line deviation) shall be as per IS:800.

- Maximum deviation for spacing of two holes on the same axis shall be + 1 mm.
- Two perpendicular diameters of any oval hole shall not differ by more than 1 mm.

Drilling faults in holes may be rectified by reaming the holes to the next upper diameter, provided that spacing of new hole centres and distance of hole centres to the edges of members are not less than allowed and that the increase of hole diameter does not impair the structural strength. Hole reaming shall be allowed if the number of faulty holes does not exceed 15% of the total number of holes for one joint.

9.5.6 Preparation of Members for Welding

Assembly of structural members shall be made with proper jigs and fixtures to ensure correct positioning of members (angles, axes nodes etc.)

Sharp edges, rust of cut edges, notches, irregularities and fissures due to faulty cutting shall be chipped or ground or filled over the length of the affected area, deep enough to remove faults completely.

Edge preparation for welding shall be carefully and accurately made so as to facilitate a good joint.

Generally no special edge preparation shall be required for members under 8 mm thick.

Edge preparation (bevelling) denotes cutting of the same so as to result in V, X K or U seam shapes as per IS: 823.

The members to be assembled shall be clean and dry on the welding edges. Under no circumstances shall wet, greasy, rust or dirt covered parts be assembled. Joints shall be kept free from any foreign matter likely to get in to the gaps between members to be welded.

Before assembly the edges to be welded as well as adjacent areas extending for atleast 20 mm shall be cleaned (until metallic polish is achieved).

When assembling members, proper care shall be taken of welding shrinkage and distortions, as the drawing dimensions cover finished dimensions of the structure.

The elements shall be got checked and approved by the Project Manager or their authorised representative before assembly.

The permissible tolerances for assembly of members preparatory to welding shall be as per IS: 823-1964.

After the assemble has been checked, temporary tack welding in position shall be done by electric welding, keeping in view finished dimensions of the structure.

9.5.7 Welding procedures

Welding shall be carried out only by fully trained and experienced welders as tested and approved by the Project Manager. Any test carried out either by the Project Manager of their representative or the inspectors shall constitute a right by them for such tests and the cost involved thereon shall be borne by the contractor himself.

Qualification tests for welders as well as tests for approval of electrodes will be carried out as per IS: 823. The nature of test for performance qualification of welders shall be commensurate with the quality of welding required on this job as judged by the Project Manager.

The steel structures shall be automatically, semi-automatically or manually welded.

Welding shall begin only after the checks mentioned in Clause 5.1 to 5.6 have been carried out.

The welder shall mark with his identification mark on each element welded by him

When welding is carried out in open air, steps shall be taken to protect the face of welding against wind or rain. The electrodes, wire and parts being welded shall be dry.

Before beginning the welding operation, each joint shall be checked to ensure that the parts to be welded are clean and root gaps provided as per IS: 823.

For continuing the welding of seems discontinued due to some reason, the end of the discontinued seem shall be melted in order to obtain a good continuity. Before resuming the welding operation, the groove as well as the adjacent parts shall be well cleaned for a length of approx. 50 mm.

For single butt welds (in V, 1/2 V or U) and double butt welds (in K, double U etc.) the rewelding of the root is mandatory but only the metal deposit on the root has been cleaned by back gouging or chipping.

The welding seams shall be left to cool slowly. The contractor shall not be allowed to cool the welds quickly by any other method.

For multi-layer welding, before welding the following layer, the formerly welded layer shall be cleaned metal bright by light chipping and wire brushing. Backing strips shall not be allowed.

The order and method of welding shall be so that -

- No unacceptable deformation appears in the welded parts.
- Due margin is provided to compensate for contraction due to welding in order to avoid any high permanent stresses.

The defects in welds must be rectified according to IS: 823 and as per instruction of Project Manager.

9.5.8 Weld Inspection

The weld seams shall satisfy the following:

- shall correspond to design shapes and dimensions.
- shall not have any defects such as cracks, incomplete penetration and fusion, under-cuts, rough surfaces, burns, blow holes and porosity etc. beyond permissible limits.

During the welding operation and approval of finished elements, inspections and tests shall be made as shown in annexure-B.

The mechanical characteristics of the welded joints shall be as in IS: 823.

9.5.9 Preparation of Members for Bolting

The members shall be assembled for bolting with proper jigs and fixtures to sustain the assemblies without deformation and bending.

Before assembly, all sharp edges, shavings, rust dirt, etc. shall be removed.

Before assembly, the contacting surfaces of the members shall be cleaned and given a coat of primer as per IS: 2074.

The members which are bolt assembled shall be set according to drawings and temporarily fastened with erection bolts (minimum 4 pieces) to check the coaxiality of the holes.

The members shall be finally bolted after the deviations have been corrected, after which there shall not be gaps.

Before assembly, the members shall be checked and got approved by the Project Manager.

The difference in thickness of the sections that are butt assembled shall not be more than 3% or maximum 0.8 mm whichever is less. If the difference is larger, it shall be corrected by grinding or filling.

Reaming of holes to final diameter or cleaning of these shall be done only after the parts have been check assembled.

As each hole is finished to final dimensions (reamed if necessary) it shall be set and bolted up. Erection bolts shall not be removed before other bolts are set.

9.5.10 Bolting up

Final bolting of the members shall be done after the defects have been rectified and approval of joints obtained.

The bolts shall be tightened starting from the centre of joint towards the edge.

9.5.11 Planing of Ends

Planing of ends of members like column ends shall be done by grinding when so specified in the design.

Planing of butt welded members shall be done after these have been assembled, the spare edges shall be removed with grinding machines or files.

The following tolerances shall be permitted on member that have been planed.

- On the length of the member having both ends planed, maximum + 2 mm with respect to design.
- Level differences of planed surfaces, maximum 0.3 mm.
- Deviation between planed surface and member's axis maximum 1/1500.

9.5.12 Holes for Field Joints

Holes for field joints shall be drilled in the shop to final diameters and tested in the shop, with trial assemblies.

When three-dimensional assembly is not possible in the shop, the holes for field joints may be drilled in shop and reamed on site after erection, on approval by the Project Manager.

For bolted steel structures, trial assembly in shop is mandatory.

The tolerance for spacing of holes shall be + 1 mm.

9.5.13 Tolerances

All tolerances regarding dimensions, geometrical shapes and sections of steel structures, shall be as per Annexure B, if not specified in the drawing.

9.5.14 Marking for Identification

All elements and members prior to despatch for erection shall be shop marked.

The members shall be visibly marked with a weather proof light coloured paint. The size and thickness of the numbers shall be chosen as to facilitate the indentification of members.

For the small members that are delivered in bundles or crates, the required marking shall be done on small metal tags securely tied to the bundle, while the crates shall be marked directly.

Each bundle or crate shall be packed with members for one and the same assembly; in the same bundle or crate, general utility members such as bolts, quests etc. may be packed.

All bill of materials showing weight, quality and dimension of contents shall be placed in the crates.

The members shall be marked with a durable paint, in a visible location, preferably at one end of the member so that these may be easily checked during storage and erection.

All members shall be marked in the shop before inspection and acceptance.

When the member is being painted, the marking area shall not be painted but bordered with white paint.

The marking and job symbol shall be registered in all shop delivery documents (transportation, for erection etc.)

9.5.15 Shop Test Pre-assembly

For steel structures that have the same type of welding the shop test pre-assembly shall be performed on one out of every 10 members minimum.

For bolted steel structures, shop test pre-assembly is mandatory for all elements as well as for the entire structure in conformity with Clause 5.12.

9.6 Shop Inspection and Approval

9.6.1 General

The Project Manager or their representative shall have free access at all responsible times to the contractors fabrication shop and shall be afforded all reasonable facilities for satisfying himself that the fabrication is being undertaken in accordance with drawings and specifications.

Technical approval of the steel structure in the shop by the Project Manager is mandatory.

The contractor shall not limit the number and kinds of tests, final as well as intermediate once, or extra tests required by the Project Manager.

The contractor shall furnish necessary tools, gauges, instruments etc. and technical non-technical personnel for shop tests by the Project Manager, free of cost.

9.6.2 Shop Acceptance

The Project Manager shall inspect and approve at the following stages:

The following approvals may given in shop:

- Intermediate approvals of work that cannot be inspected later.
- Partial approvals
- Final approvals

Intermediate approval of work shall be given when a part of the work is preformed later:

- Cannot be inspected later
- Inspection would be difficult to perform and results would not be satisfactory.

Partial approval in the shop is given on members and assemblies of steel structures before the primer coat is applied and includes:

- Approval of materials
- Approval of field joints
- Approval of parts with planed surfaces
- Test erection
- Approval of members
- Approval of markings
- Inspections and approvals of special features, like Rollers, loading platform mechanism etc.

During the partial approval, intermediate approvals as well as all former approvals, shall be taken in to consideration.

9.6.3 Final approval in the Shop

The final approval refers to all elements and assemblies of the steel structures, with shop primer coat, ready for delivery from shop to be loaded for transportation, or stored.

The final approval comprises of:

- Partial approvals
- Approval of shop primer coat
- Approval of mode of loading and transport
- Approval of storage (for materials stored)

9.7 Painting and Delivery

9.7.1 Preparation of parts for shop painting

Painting shall consist of providing one coat of red oxide zinc chromate primer to steel members before despatch from shop.

Primer coat shall not be applied unless:

- Surface have been wire brushed, cleaned of dust, oil, rust etc.
- Erection gaps between members, spots that cannot be painted or where moisture or other aggressive agents may penetrate, have been filled with an approved type of oil and putty.
- The surface to be painted are completely dry.
- The parts where water of aggressive agents may collect (during transportation, storage, erection and operation) are filled with putty and provided with holes for drainage of water.
- Members and parts have been inspected and accepted
- Welds have been accepted.

The following are not to be painted or protected by any other product:

- Surface which are in the vicinity of joints to be welded at site.
- Surfaces bearing markings
- Other surfaces indicated in the design.

The following shall be given a coat of hot oil or any approved resistant lubricant only.

- Planed surfaces
- Holes for links

The surfaces that are to be embedded or in contact with the concrete shall be given a cost of cement wash.

The surfaces which are in contact with the ground, gravel or brick work and subject to moisture, shall be given bituminous coat.

The other surfaces shall be given a primer coating.

Special attention shall be given to locations not easily accessible, where water can collect and which after assembly and erection cannot be inspected, painted and maintained. Holes shall be provided for water drainage and in accessible box type sections shall be hermetically sealed by welds.

If specified elsewhere, in the schedule of quantities, the contractor shall paint further coats of red-oxide after erection and placing in position of the steel structures.

9.7.2 Packing, transportation, delivery

After final shop acceptance and marking, the item shall be packed and loaded for transportation.

Packing must be adequate to protect item against warping during loading and unloading.

Proper lifting devices shall be used for loading, in order to protect items against warping.

Slender projecting parts shall be braced with additional steel bars, before loading, for protection against warping during transportation.

Loading and transportation shall be done in compliance with transportation rules.

If certain parts cannot be transported in the lengths stipulated in the design, the position and type of additional splice joints shall be approved by the Project Manager.

Items must be carefully loaded on platforms of transportation means to prevent warping, bending or falling during transportation.

The small parts such as fish-plates, quests etc. shall be securely tied with wire to their respective parts.

Bolts, nuts and washers shall be packed and transported in crates.

The parts shall be delivered in the order stipulated by the Project Manager and shall be accompanied by document showing:

- Quality and quantity of structure or members
- Position of member in the structure
- Particulars of structure
- Identification number job symbol.
- 9.8 Field Erection
- 9.8.1 The erection work shall be permitted only after the foundation or other structure over which the steel work will be erected is approved and is ready for erection.
- 9.8.2 The contractor shall satisfy himself about the levels, alignment etc. for the foundations well in advance, before starting the erection. Minor chipping etc. shall be carried out by the contractor on his expense.
- 9.8.3 Any faulty erection done by the contractor shall be made good at his own cost.
- 9.8.4 Approval by the Project Manager or their representatives at any stage of work does not relieve the contractor of any of his required guarantees of the contract.
- 9.8.5 Storage and preparation of parts prior to erection

The storage place for steel parts shall be prepared in advance and got approved by the Project Manager before the steel structures start arriving from the shop.

A platform shall be provided by the Contractor near the erection site for preliminary erection work.

The contractor shall make the following verifications upon receipt of material at site.

- for quality certificates regarding materials and workmanship according to these general specifications and drawings.
- Whether parts received are complete without defects due to transportation, loading and unloading and defects, if any, are well within the admissible limit.

For the above work sufficient space must be allotted in the storage area.

Steps shall be taken to prevent warping of items during unloading.

The parts shall be unloaded, stored and stored so as to be easily identified.

The parts shall be stored according to construction symbol and markings so that these may be taken out in order or erection.

The parts shall be at least 150 mm clear from ground on wooden or steel blocks for protection against direct contact with ground and to permit drainage of water.

If rectification of members like straightening etc. are required, these shall be done in a special place allotted which shall be adequately equipped.

The parts shall be clean when delivered for erection.

9.8.6 Erection & Tolerances

Erection in general shall be carried out as required and approved by the Project Manager.

Positioning and levelling of the structure, alignment and plumbing of the stanchion and fixing every member of the structure shall be in accordance with the relevant drawings and to the complete satisfaction of the Project Manager.

The following checks and inspection shall be carried out before during and after erection.

- damage during transportation
- accuracy of alignment of structures
- erection according to drawings and specifications
- progress and workmanship.

In case there be any deviations regarding positions of foundations or anchor bolts, which would lead to erection deviations, the Project Manager shall be informed immediately. Minor rectifications in foundations, orientation of bolts holes etc. shall be carried out as part of the work, at no extra cost.

The various parts of the steel structure shall be so erected so to ensure stability against inherent weight, wind and erection stresses.

The structure shall be anchored and final erection joints completed after plan and elevation positions of the structural members have been verified with corresponding drawings and approved by the Project Manager.

The bolted joints shall be tightened so that the entire surface of the bolt heads and nuts shall rest on the member. For parts with sloping surfaces tapered washers shall be used.

- 9.9.1 At acceptance, the contractor shall submit the following documents:
 - Shop and erection drawings either in tracings or reproducible.
 - 4 copies of each of the following:
 - \- shop acceptance documents
 - quality certificate for structurals, plates, etc. (electrodes, welding wire, bolts, nuts, washers etc.)
 - List of certified welders who worked on erection of structures.
 - \- acceptance and intermediate control procedure of erection operations.
- Approval by the Project Manager at any stage of work does not relieve the contractor of any of his required guarantees of the contract.
- 9.10 Method of Payments
- 9.10.1 Payment for steel work shall be made on basis of admissible weight of the structure accepted, the weight being determined as described in such Clause 9.10.2 below:

The rate for supply, fabrication and erection, shall include cost of all handling and transportation to Owner's store/site o work where supply and fabrication only are involved, trimming, straightening, edge preparation, preparation and getting reviewed of fabrication drawings, and providing one or more coat of Red-oxide zinc chromate primer as specified in the schedule of quantity.

In the case, Owner supplies materials the rate shall include cost of steel materials taking delivery of the materials, from owner's store all handling and rehandling, loading and unloading, transport to site or work, returning of surplus materials to owner's stores etc. complete as well as the cost of all handling and transport, scaffolding, temporary supports, tools and tackles, touching up primer coat, grouting etc.

- 9.10.2 The actual lengths installed shall be measured and the weight of structural material/plate shall be calculated wherever necessary on the basis of IS handbook. If sections are different from IS section, then manufacturers handbook shall be adopted. No allowance in weights shall be made for rolling tolerance.
- 9.10.3 Sections built out of plates, structural shall be paid on the actual weight incorporated except for gussets which will be paid on the weight of the smallest rectangle enclosing the shape. No deductions shall be made for skew cuts in rolled steel sections.
- 9.10.4 Welds, bolts, nuts, washers, etc. shall not be measured. Rate for structural steel work shall be deemed to include the same.
- 9.10.5 No other payment either for temporary works connected with this contract or for any other item such as welds, shims, pacing plates etc. shall be made. Such item shall be deemed to have been allowed for in the rate quoted for steel work.
- 9.11 Grouting of Pockets
- 9.11.1 Grouting of pockets and under base plates will be done only after the steel work has been levelled and plumbed and the bases of stranchions are supported by steel shims. The space below the base plate and pockets shall be thoroughly cleaned.

- 9.11.2 The mortar used for grouting shall not be leaner than 1:2 (1 cement : 2 sand) (grade 300 in case of concrete) and shall be mixed to the minimum consistency required. It shall be poured under suitable head and tamped until the space has been completely filled.
- 9.12 Tolerances allowed in the erection of plant building without cranes

The maximum tolerances for line and level of the steel work shall be + 3.00 mm on any part of the structure. The structure shall not be out of plumb more than 3.5 mm on each 10 M. section of height and not more than 7.0 mm per 30 M. section.

These tolerances shall apply to all parts of the structure unless the drawings issued for erection purposes state otherwise.

9.13 **Rolling Shutters**

Rolling shutters shall be in extruded MS sections, of approved make, type and finish. These shutters shall be complete with locking arrangements, hoods, guides, pulling devices, springs and other accessories. Wherever specified, mechanical device shall be fixed for easy operation of the shutters. (Rolling shutters as per CPWD Specification Volume -1, Clause No. 10.8, Page No. 564).

9.14 Steel Door / Window

Hot rolled steel sections for fabrication of steel doors, windows, ventilators and fixed lights shall conform to IS: 7452. Shapes weights and designations of hot rolled sections shall be as per IS: 7452. Appendix 'D' of Chapter 10 (CPWD specification 2000) indicates the purpose or the situation where the sections are normally used. Tolerance in thickness of the sections shall be +0.2mm including provisions of lugs or anchoring strips, both for RCC and Brickwork backing.

- 9.14.1 The steel doors and windows shall be according to the specified sizes and design. The size of doors and windows shall be calculated, so as to allow 1.25 cm clearance on all the four sides of opening to allow for easy fitting of doors windows and ventilators into opening. The actual sizes of doors, windows and ventilators shall not vary by more than +1.5mm from those given in the drawing.
- 9.14.2 Fabrication

9.14.2.1 Frames

Both the fixed and opening frames shall be made of sections which have been cut to length and metered. The corner of fixed and opening frames shall be welded to form a solid fused welded joint conforming to the requirements given below. All frames shall be square and flat. The process of welding adopted shall be flash butt welding. The section for glazing shall be tennoned and riveted into the frames and where they intersect the vertical tie shall be broached and horizontal tee threads through it, and the intersection closed by hydraulic pressure.

Requirements of welded joints

i) Visual Inspection Test

When two opposite corners of the frame are cut, paint removed and inspected, the joint shall conform to the following:

- a) Welds should have been made all along the place of meeting the members and tack welding shall not be permitted.
- b) Welds should have been properly grounded and

c) Complete cross section of the corner shall be checked up to see that the joint is completely solid and there are no cavaties visible.

ii) Micro and Macro Examinations

From the two opposite corners obtained for visual test, the flanges of the sections shall be cut with the help of the sections shall be cut with the help of a saw. The cut surface of the remaining portions shall be polished, etched and examined. The polished and etched faces of the weld and the base metal shall be free from cracks and reasonably free from under cutting, overlaps, gross porosity and entrapped slag.

iii) Fillet Weld Test

The fillet weld in the remaining portion of the joint shall be fractured by hammering. The fractured surfaces shall be free from slag inclusion porosity, crack penetration defects and fusion defects.

9.14.2.2 Door

The hinges shall be of 50mm projecting type, Non projecting type hinges may also be used if approved by the Project Manager. The hinge pin shall be of electro-galvanized steel or aluminium alloy of suitable thickness and size. Door handles shall be approved by the Project Manager. A suitable latch lock for door openable both from inside and outside shall be provided.

In the case of double doors, the first closing leaf shall be the left hand leaf locking at the door from the push side. The first closing shutter shall have a concealed steel bolt at top and bottom. The bolts shall be so constructed as not to work loose or drop by its own weight.

Single and double shutter door may be provided with a three way bolting device. Where the device is provided in the case of double shutters, concealed brass or steel bolts shall not be provided.

9.14.2.3 Windows

- a) For fixed windows, the frames shall be fabricated as per relevant CPWD specification 2000.
- b) Side hung windows.

For fixing steel hinges, slots shall be cut in the fixed frame and hinges inserted inside and welded to the frame at the back . The hinges shall be of projecting type with thickness not less than 3.15 mm and length not less than 65mm and width not more than 25mm. Non-projecting type hinges may also be allowed if approved by the Project Manager. The diameter of hinge pins shall not be less than 6mm. The hinge pin and washer shall be of galvanised steel or aluminium alloy of suitable thickness.

For fixing hinges to inside frame, the method described above may be adopted but the weld shall be cleaned, or the holes made in the inside frame and hinge revetted.

The handle of side hung shutters shall be pressed brass, cast brass, aluminium or steel protected against rusting and shall be mounted on a steel plate. Thickness of handle shall not be less than 3 mm incase of steel or brass and 3.5mm in ase of aluminium. The handle plate shall be welded, screwed and/or revetted to the opening frame in such a manner that it should be fixed before the shutter is glazed and should not be easily removable after glazing.

The handle shall have a two point nose which shall engage with a brass or aluminium alloy striking plate on the fixed frame in a slightly opened position as well as closed position. The boss of handle shall incorporate a friction device to prevent the handle shall incorporate a friction device to prevent the handle from dropping under its own weight and the assembly shall be so designed that the rotation of the handle may not cause it to unscrew from the pin.

The height of the handle plate in each type of standard windows will be as specified. Otherwise it shall be at a height of 3/8 of the height of shutter, from its bottom. The strike plate shall be so designed and fixed in such a position in relation to the handle that with the later bearing against its stop, there shall be adequately tight fit between the casement and outer frames.

In case where no friction type hinges are provided, the window shall be fitted with peg stays which shall be either of black oxidised steel, pressed or cast brass or as specified, 300mm long with steel peg and locking brackets. The pegs stay shall have three holes to open the side hung casement in three different angles. The peg stay shall be of minimum thickness 2mm in case of brass or aluminium and 1.25mm in case of steel. Where specified friction hinges shall be provided. Side hung shutters fitted with friction hinges shall not be provided with a peg stay.

If specified, side hung shutters maybe fitted with an internal removable fly proof screen in a 1.25mm thick sheet steel frame to the outer frame of the shutter by brass turn buckless at the jambs, and brass tuds at the sill to allow the screen being readily removed. The windows with removable fly proof screen shall be fitted with a through – the – screen level operator at the sill level to permit the operation of the shutter through an angle of 90o without having to remove the fly proof screen. The lever shall permit keeping the shutter open in minium three different position.

9.14.2.4 Ventilators

a) Top Hung Ventilators

The steel butt hinges for top hung ventilators shall be riveted to the fixed frame or welded to it at the back after cutting a slot in it. Hinges to the opening frame shall be revetted or welded.

Top hung ventilators shall be provided with a peg stay with three holes which when closed shall be held tightly by the locking bracket. The locking bracket shall either be fitted to the fixed frames or to the window.

b) Centre Hung Ventilators

Central hung ventilators shall be hung on two pairs of brass or aluminium cup pivots as specified, riveted to the inner and outer frames of ventilators to permit the ventilator shutter to swing to an angle of approx. 850. The opening portion of the ventilators shall be so balanced that it remains open at any desired angle under normal weather conditions.

9.15 Glazing

- 9.15.1 Specifications as described shall apply. The glass panes shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. In doors, windows, clerestory windows of bath, WC and lavatories frosted glass panes shall be used.
- 9.15.2 Glazing shall be provided on the outside of the frame unless otherwise specified. Putty of approved make conforming to IS:419 shall be used for fixing glass

panes. Putty shall be applied between glass panes and glazing bars. Putty shall then be applied over the glass pane, which shall stop 2 to 3 mm from the sight line of the back rebate to enable the painting to be done upto the sight line to seal the edge of the putty to the glass. The oozed out putty shall be cleaned and from putty cut to straight line. Quantity of putty shall not be less than 185 gm/metre of glass perimeter. Putty shall be painted within 2 to 3 weeks, after glazing is fixed to avoid its cracking.

Note: Putty may be prepared by mixing one part of the white lead with three parts of finely powdered chalk and then adding boiled linseed oil to the mixture to from a stiff paste and adding varnish to the past at the rate of 1 litre of varnish to the paste at the rate of 1 litre of varnish to 18 kg of paste.

9.15.3 Minimum Six glazing clips to be provided per glass pane of all types. In case of doors, windows and ventilators without horizontal glazing bars, the glazing clips may be spaced, according to the slots, in the vertical members provided the spacing does not exceed 30cm otherwise the spacing shall be 30cm.

Note: Where large size glass panes are required to be used or where the door window is located in heavily exposed situation, holes for glazing clips have to be drilled prior to fabrication and cannot be done at any later stages.

9.15.4 Where specially stipulated, fixing of glass panes may be done with metal or wooden beading instead of mere putty. Where beading are proposed to be used, the manufacturers shall be intimated in advance to drill holes for hard screws. Usually beads shall be fixed with screws spaced not more than 10 cm from each corner and the intermediate not more than 20 cm apart. When glass panes are fixed with wooden or metal beading having mitred joints, a thin layer of putty shall be applied between glass panes and sash bars and also between glass panes and the beading.

Where metal beading is specified extra payment shall be made on this account.

9.16 T-Iron / Angle Iron Doors Frames

T-iron / Angle Iron doors, frames shall be manufactured from uniform mild steel tee section / angle section. The steel shall be of approved grade. The frames shall be got fabricated in approved workshop as approved by the Project Manager. Provisions of lugs or anchoring strips, both for RCC and Brickwork backing.

9.16.1 The sizes of door frames shall be as per drawing or as decided by the Project Manager. MS tie bar of 10mm dia shall be welded at bottom of the frame. The size of doors shall be calculated so as to allow 12.5mm clarance on all sizes to allow an easy fittings in opening. The actual size of doors, windows and ventilators shall not vary by more than +/- 2mm than those shown in the drawing.

The size of T-section / Angle section used for manufacture of doors, windows and ventilators shall not be less than those specified in IS:1038. Unless otherwise directed by the Project Manager.

9.16.2 Fabrications

The frame shall be constructed in section which has been cut to length and metered. The corners of the frames shall be butt welded to form a true and right angle. All frames shall be square and flat.

The T-section / Angle section shall be mitre joined and continuously butt welded all along.

9.16.3 Fittings

Requisite number of holes shall be made in the frame for fixing of fittings. Detailed arrangements of fixing fittings shall be as shown. All fittings shall be fillet welded to T-iron / Angle iron frame all along the periphery of contact.

Butt hinges shall be fixed to the frame as below:

- i) MS flat of size 100mm x 25mm x 6mm will be welded with fillet weld all along the periphery of contact on the rear side of the web of T-iron / Angle iron to receive the hinges. Requisite number of holes shall be made in T-iron / Angle iron frame and MS flat for fixing of hinges with counter sunk steel screws as shown.
- ii) An alternate method of fixing butt hinges can be adopted by fillet welding the hinge to the T-iron / Angle iron frame on three sides. No welding shall be done along the hinge pin to allow free movement of butt hinges as shown.

9.16.4 Fixing Procedure

Fixing procedure for T-iron / Angle iron doors, windows and ventilator frames in masonry opening shall be as shown in the drawing.

9.17 Gypsum Board False Ceiling

9.17.1 Products

A Manufactures

Manufacturer: Indian Gypsum Ltd. or approved equivalent, for gypsum board and all accessories, suspension systems, finishing coats etc.

9.17.1.1 **Gypsum Board**

- A General: Provide gypsum board of types indicated in maximum lengths available to minimise end to end joints.
- Thickness: Gypsum board in thickness indicated, in 12.5mm thickness to comply with ASTMC 840 for application system and support spacing indicated.

9.17.1.2 **Trim Accessories**

A **Cornerbead and Edge Trim for Interior Installation:** G.I. corner beads, edge trim and control joints which comply with ASTM C 1047 to be provided as per requirements and drawings.

9.17.1.3 **Gypsum Board Joint treatment Materials**

- A General: Materials complying with ASTM C 475, ASTM C 840 and recommendations of manufacturer or both gypsum board and joint treatment materials for the application indicated.
- B Joint Tape: Paper reinforcing tape.
- C Setting Type Joint Compounds: Factory Pre-packaged, job-mixed, chemical hardening powder products formulated for uses indicated.

9.17.2 Execution

9.17.2.1 **Installation of G.I. Steel Framing**

- A Hangers to be secured to structural support by connecting directly to structure where possible, otherwise to be connected to cast-in concrete inserts or other anchorage devices fasteners as required.
- B Hangers are not to be connected or suspended from steel framing from ducts, pipes or conduits.
- C To keep hangers and braces 50mm clear of ducts, pipes and conduits.
- D To install suspended steel framing components in size and at spacing indicated but not less than that required by referenced steel framing installation standard.
- E Installation Tolerances: To install steel framing components for suspended ceilings so that cross furring members or grid suspension members are level to within 3mm in 4M as measured both lengthwise on each member and transversely between parallel members.
- F Wire-tie or clip furring members to main runners and to other structural supports as indicated.
- G Grid Suspension System: Perimeter wall track or angle not to touch where grid suspension system meets vertical surfaces, suspended from structure above. Mechanically join main beam and cross furring members to each other and butt-cut to fit into wall track. Wall track to be free moving from vertical wall surfaces.
- H For exterior soffits to provide cross-bracing and additional framing indicated or required to resist wind uplift.
- I For isolated ceilings to hold perimeter 12mm away from adjacent partitions to prevent flanking. The openings are to be sealed with compressible weather strip type edge seal to allow vertical movement.

9.17.2.2 Application and finishing of Gypsum Board, General

A Gypsum Board Application and Finishing Standard: shall be to comply with ASTM C 840.

- B To install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.
- C To locate exposed end-butt joints as far from centre of walls and ceilings as possible, and stagger not less than 600mm in alternate courses of board.
- D To install ceiling boards across traming in the manner which minimize the number of end-butt joints, and which avoids end joints central area of each ceiling. Stagger end joints at least 600mm.
- E To attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

9.18 **Armstrong False Ceiling**

9.18.1 Armstrong Acoustical Suspended Ceiling System shall be done as detailed below:

9.18.2 TILES:

Mineral Fiber Acoustical Tiles with crisp finely granulated surface shall be of Armstrong (Tegular edge/Micro) suitable for grids of specified sizes as per specifications below:-

Type : Prima Dune Plus /Prima Fine

Fissured

Humidity Resistance : RH 95

Fire Performance : Class 0 /class 1 (BS - 476)

Noise Reduction Coefficient (NRC) : 0.50 (Average)

Sound Attenuation : 34 db

Light Reflectance : 85%

Thermal Conductivity : 0.052 - 0.057 w/m c

('K' Value)

Acoustical Punchers : 24000 (10mm deep)

9.18.3 SUSPENSION SYSTEM

Suspension system shall be Armstrong Prelude XL / TL Trulok F24 exposed grid T-section. Flanges exposed face shall be powder coated colour white.

Suspension system (Hot Dipped galvanised steel) sections consisting of the following members :

- a) Main Runner Main Runner shall be T-shaped section with single rotary stitching made from 0.33mm thick GS sheet and of size 24mm x 38mm and 3.60mm long.
- b) Cross Runner

- i) Cross Runner T-shaped with double rotary stitching made from 0.25mm thick GS sheet and of size 24mm x 30mm and 1.20m long.
- ii) Cross Runner T-shaped section made from 0.25mm thick GS sheet and of size 24mm x 25mm and 0.60m long.
- c) Perimeter Section Perimeter wall angle made from 0.45m thick GS sheet and of size 22mm x 22mm and 3.00m long, colour white.

LIST OF CODES

The materials and workmanship shall be in accordance with the requirement of the appropriate IS code wherever applicable together with any building regulations or bye-laws governing the works.

The following list is included for guidance only and the omission from the list does not relieve the contractor from compliance there with:

| IS 1200 | •• | Mode of measurement. |
|-----------------------|----|---|
| IS 269 | : | Ordinary portland cement. |
| IS 3812, 1981 | | Flyash for use as pozzolana and admixtures, |
| IS 2386 | : | Method of test for aggregate for concrete. |
| IS 516 | : | Method of test for strength of concrete |
| | | Coarse and fine aggregate from natural sources for concrete. |
| IS 1077, 1970 | : | Method of test for Bricks. |
| IS 456 | : | Code of practice for plain and reinforced concrete. |
| IS 1597 | : | Code of practice for construction of stone masonry. |
| IS 1597 PART 1 | : | Code of practice for construction of rubble stone masonry. |
| IS 1130 | : | Marble (blocks, slabs and tiles) |
| IS 287 | : | Recommendation for maximum permissible moisture contents of |
| | | Timber used for different purposes. |
| IS 1141 | : | Code of practice for seasoning of timber. |
| IS 6313 PART 2 | : | Anti-termite measures in buildings, pre-constructional chemical |
| | | treatment measures. |
| IS 2571 | : | Code of practice for laying in situ cement concrete flooring |
| IS: 226 | : | Structural Steel (Standard Quality) |
| IS: 451 | : | Technical Supply Conditions for Wood Screws |
| IS: 800 | : | Code of Practice for Use of Structural Steel in General Building Construction |
| IS: 806 | : | Code of Practice for Use of Steel Tubes in General Building Construction |
| IS: 813 | • | Scheme of Symbols for Welding |
| IS: 814 | : | Covered Electrodes for Metal Arc Welding of (part I & II) Structural |
| 10.01. | | Steel |
| IS: 816 | : | Code of Practice for Use of Metal Arc Welding for General Construction in Mild Steel |
| IS: 822 | : | Code of Practice for Inspection of Welds |
| IS: 961 | : | Structural Steel (High Tensile) |
| IS 73 | : | Paving bitumen. |
| IS 702 | : | Industrial Bitumen |
| IS 1322 | : | Bitumen felts for waterproofing and damp proofing. |
| IS 1609 | : | Code of practice for laying damp proof treatment using bitumen felts. |
| IS 13711 & 13712 | : | Ceramic tiles |
| IS 13630 Part 1 to 13 | •• | Testing for Ceramic tiles |
| IS 104 | •• | Specification for ready mixed painted, brushing, zinc chrome, priming. |
| IS 137 | : | Ready mixed paint, brushing, matt or egg-shell flat, finishing, interior to |
| | | Indian standard colour as required. |
| | | |

| IS 5410 | : | Cement paint, colour as required. |
|---------|---|--|
| IS 6241 | : | Method of test for determination of stripping value of road aggregate. |
| IS 2720 | : | Density test of aggregate. |

PREAMBLE TO SPECIFICATIONS

GENERAL

The conditions of contract and the drawings shall be read in conjunction with the specifications and matters referred to, shown or described in one are not necessarily repeated in the other. These specifications are comprehensive but may exceed the requirements of this project. Any ambiguity between the General Specifications, the Bill of quantities and contract drawings, shall be referred to the Project Manager for clarification not later than 10 days before the date fixed for delivery of Tenders. Any ambiguity may be referred to the Project Manager after signing of the contract and Project Manager shall give a ruling which shall prevail. No claim for additional cost due to above, however, will be entertained.

Notwithstanding the sub-division of the specification into various headings, every part of it is to be deemed supplementary to every other part and is to be read with it, so far as it may be practicable so to do, or when the context so admits.

In this contract, reference is made to the Indian Standards or CPWD specification as approved by Project Manager and these references shall be deemed to include the latest editions or issue of standards, specifications or By-Law including all revisions upto the date of invitation of Tenders. The contractor shall ensure that all materials and workmanship in so far as they apply to this contract shall comply in every specifications or any other equivalent or specification approved by the Project Manager.

The Contractor shall keep at site copies of all relevant standards and codes of practice referred in these specifications throughout the period of contract. These shall be the latest editions and shall include all revisions/addendums thereof.

Approved Manufacturers: Names of approved manufacturers are given in the specifications.

Reference in the specifications to approved manufacturers shall be construed as establishing a standard of quality and not as limiting competition.

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

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

All items or materials shall be assembled, mixed, fixed, applied or otherwise incorporated in the works in accordance with the printed instructions of the manufacturer of the item or materials.

Date of construction to be written on all respective items for monitoring curing.

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

1. 0 SITE DEVELOPMENT AND EARTH WORK

♦ The rate of items in this section to include:

- 1. Measurement of excavation for payment shall be recorded only for the plan dimensions of the bedding concrete (PCC under foundation) provided in the structure drawings. Excavation for working space and slopes for soil stability shall not be measured and paid.
- 2. Stacking of excavated earth within the site including handling & rehandling.
- 3. Site clearance such as clearing of shrubs, brushwood, undergrowth, roots and small trees not exceeding 30cm in girth measured at 1m above ground.
- 4. Setting out the work, profiles, bench marks etc.
- 5. Excavation either straight or curved in plan or to any desired shape or slope.
- 6. Provision of adequate barriers, Signages, lighting, and gangways across excavated area open trenches etc. for protection of workmen and public.
- 7. Getting out and throwing spoil clear of area being excavated or disposing clear of edge of excavation to avoid falling in, as directed by the Project Manager.
- 8. Trimming all sides, plumb and square, levelling all bottoms, clearing out loose earth, slips and falls from excavations before concreting.
- 9. Work at all depths and locations, unless otherwise specified.
- 10. Necessary shoring, strutting, battening, benching. Contractor to submit methodology & design.
- 11. Signing guarantee Performa for anti-termite treatment i.e. satisfactory performance for minimum of 10 years from the date of final completion of project in an approved proforma. The guarantee shall be executed and extended by the Contractor and not by the anti-termite agency.
- 12. Conducting laboratory or field test for soil compaction.
- 13. Compacted volume of earth shall be measured for payment at true location of filling/ back filling.
- 14. All excavated material shall be the property of the owner or otherwise as specified in the Items.
- 15. Excavation and disposal for basement shall be done by mechanical means and equipment.
- 16. Manual dressing to achieve the final level as directed by structural Consultant.
- 17. Royalty & other taxes payable to authorities.
- 18. Dismantling & disposal of any structure / construction in excavation area found during excavation.
- 19. Compliance with all stipulation of technical specification.

2.0 CONCRETE WORKS (PLAIN AND RCC)

♦ The rates for all items under this section include :

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

- 8. Generally in items for form work rate to include for form work, centring, shuttering, boxing propping including special nuts, bolts etc. in perfect line, level, plumb and if required to provide camber, slope and removal thereof. Colourless shuttering oil or grease of approved quality shall be applied to forms before placing steel. Rate to include for any shapes including offsets/ chamfering in columns, residues, grooves, drip moulds, irregular shapes etc. Mode of measurement shall be in sqm regardless of shape, size and thickness of members. Stripping time for the formwork, centring and dropping shall be as per IS-456 (Latest Edition).
- 9. Work at all heights, depths & levels irrespective of individual storey.
- 10. Work in narrow widths, Piece meal/small work, screeding under floor etc.
- 11. All staging upto any height and scaffolding work shall comprise of MS Pipes/ Structural steel sections with necessary coupling arrangement. (NO WOODEN BALLIES / PROPS WILL BE PERMITTED). Adequate size foundation blocks / base plates shall be provide below staging members to disperse the loads as per the founding strata.
- 12. Contractor shall set up on site concrete pump, hoists, tower cranes, passenger elevator, automatic microchips controlled Batching plant of capacity 10 cum per hour or more complete with silos/ stock piles for cement and aggregates, and also a D.G. set to be provided for uninterrupted supply of concrete. Use of batching plant for all concrete work is mandatory.
- 13. Providing grooves, drip moulds, moulds, chamfers, curved surfaces, and ornamental works in RCC members as per drawing and finishing to specified shape.
- 14. Forming all expansion and / or construction joints as directed.
- 15. Contractor to consider in his quoted rates the necessary arrangement e.g. providing and fixing of required quantity of woven mesh at the junction of Beam and Column or any other RCC members to separate two different grade of concrete mixes. No payment shall be made for over flowed richer mix of one RCC member into the other.
- 16. Use of greater than minimum specified quantities of cement to achieve specified or required mix design.
- 17. Use of plasticiser / super plasticiser (approved by Project Manager) and / or additional cement for pumpable concrete.
- 18. Non-destructive test for defective concrete as directed by Project Manager, and their remedial measures thereof.
- 19. Leaving dowels for anchorage of brickwork and other RCC members.
- 20. Mix designing and testing of all the ingredients of concrete from approved laboratory for each grade, pumpable & non-pumpable concrete.
- 21. Compliance with all requirements of technical specification.

3.0 MASONRY WORKS:

♦ The rates for all items under this section to include:

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

4.0 WATER PROOFING:

- ♦ Waterproofing work shall be carried out by the specialise agency as approved by Architect/ Project Manager.
- The rate of all relevant items of water-proofing covered under this section to include:
- 1. Cleaning, smooth rendering and preparation of surface for laying waterproofing, insulation and other treatments.
- 2. All cutting, trimming, dressing and waste.
- 3. Treatment of down take pipes, and other obstructions as shown.
- 4. Providing 50x50, size chase in wall, parapets etc. at height as shown in the drawing from floor finish level for tucking ends of vertical layers of the treatment, filling up the chase with cement mortar 1:4 and preparing a drip mould as per detailed drawing just above the chase.
- 5. Sealing all joints, corners, junctions of pipes and masonry/ concrete with epoxy putty.
- 6. Curing/ wetting the surface at least for 10days and gunny bags to be spread wherever required before applicant of subsequent coat.
- 7. Work in narrow widths, junctions and at all locations as shown.
- 8. Work at all heights and depths.
- 9. 72 hours Pond testing of treated areas to the satisfaction of Project Manager.
- 10. Signing guarantee as per approved Performa for waterproofing treatment for 10 years from the date of final completion on non judicial stamp paper. The guarantee shall be executed & extended by the contractor and not by the water proofing agency.
- 11. Hydro testing for under ground and over head water tanks. The contractor shall get water tanks tested against any leakage by filling the tanks with water and maintaining it for seven days upto free board including cost of water, all necessary arrangements required for filling and emptying the tank after testing.
- 12. Mode of Measurements.
- a) <u>Terrace</u>

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

b) Toilet blocks

<u>Floor</u>: Area of the toilet blocks shall be measured by length x breadth between wall.

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

c) Injection Treatment

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

d) Walls: Actual area treated shall be measured.

13. Compliance with requirement of technical specifications.

5.0 WOOD WORKS:

♦ The rates for all items under this section include :

- 1. All timber shall be of Ist class quality as described and indicated on drawings and schedules, shall be uniform in texture, free from large loose heads or cluster knots, injurious open shakes, bore holes, soft or spongy spots, hollow pockets and all other defects and blemishes. The size shown or described are to be taken as net sizes when finished, and cubic contents of wood as actually fixed would be measured.
- 2. All framing and other concealed wood members shall be sound wood or approved specials and shall be well seasoned. Wood more than 12% moisture content shall not be used in any part of the structure.
- 3. All joints shall be approved by Project mangers and according to the best practice. All joinery work shall be glued with best quality synthetic waterproof adhesive Fevicol or equivalent make as approved.
- 4. All woodwork in contact with masonry/ R.C.C shall be painted with approved antitermite paint before placing in position. Care shall be taken to keep the exposed surface clear. All concealed wood members shall be painted with applying Anti-termite paint.
- 5. Fixing the frames by using holdfasts, anchor fasteners, screws, nut and bolts etc.
- 6. The work shall have to be executed at all heights and levels.
- 7. Compliance with requirements of technical specification.

6.0 FLOORING/ CLADDING WORKS:

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

- 1. Use and waste of all temporary fillets, side forms, templates, moulds, straight edges etc.
- 2. Final preparation of the base, sub-grade or sub-floor including trimming of the base to remove all undulations including chipping or filling with concrete/ cement mortar, if necessary.
- 3. Cleaning and watering the surface immediately before laying the floor.
- 4. Providing bedding layer of mortar as specified, in the case of slabs, tiles etc. to correct levels and slopes as called for.
- 5. Cutting, Rubbing and Tinoxide (mirror) polishing. Rounding of corners, edges, and junctions of floor with skirting or dado.
- 6. Necessary cutting for Electrical switch boxes/ lift boxes, sinks, mixers, taps, gratings/floor trap jali etc and all other Electrical and Plumbing fixtures as deemed necessary by Project Manager.
- 7. Providing and applying silicon sealant between the joints of floor & dado, around bath tub, kitchen sink, wash basin etc.
- 8. Forming rounded recess in the floor where called for.
- 9. Providing grooves chamfering, moulding, noising, edge polishing etc where shown in the drawings.
- 10. Work in narrow widths, bands, architraves, curved surfaces, set backs, offsets, (any geometric pattern) pattern and design at all heights and locations, unless otherwise mentioned.
- 11. Curing, protecting and cleaning all surfaces as specified.
- 12. Leaving or chasing recess for skirting to match with plaster surface, bends, steps etc. on walls/ concrete and making them good after finishing of the wall.
- 13. Payment shall be made only for the finished dimension actually measured at site of work.
- 14. Matching grains/veins for different finishing items.
- 15. Protection (in required manner) & precaution to avoid any damage of flooring, dado, risers, treads etc. Any damage shall be repaired at contractors expenses.
- 16. Cost of pre polishing (Tinoxide)/mirror wherever pre polished stones are specified.
- 17. No work shall be started until the concealed piping drains etc, are laid by other agencies. Prior to commencing any finishing surfaces, levels and the slopes to drains shall be got approved, in writing by the Project Manger. Further to do so may result in demolishing the finished surface and redoing the work, all at contractors expenses
- 18. Laying floors to required slope in any size and shape of panels, pattern & design of panels. The strips shall not be paid for separately.
- 19. Fixing of clamp shall be with fastner (as approved by Project Manager) in case of RCC and in Brick Work pocket (100mmX75mmX75mm) shall be made and filled by non-shrinkage compound (as approved by Project Manager). The size and design of the cramp and fastener shall be to suite site requirement and shall be approved by the Project Manager.

- 20. Work shall be carried out at any elevations all heights, levels, leads and lifts.
- 21. Use of all scaffolding and cradles, dust seats and other coverings for fittings, furniture, floors etc. (for all heights and locations).
- 22. Painting and Polishing on stone/wood/structural steel prior to handing over.
- 23. Cladding in toilets and kitchen to be as per the pattern shown in drawings. To facilitate the work and its accuracy providing tile module and marking of location coordinates for electrical and plumbing fixtures in each toilet & kitchen.
- 24. The flooring stone / tile shall be taken continuously over the floor traps and cleanout plugs the location of which shall be clearly marked / engraved on the floor. The cut outs shall be made for fixing jali after completion the floor polish.
- 25. Compliance with requirements of technical specification.

7.0 FINISHING WORKS:

♦ The rates for all items under this section include :

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

8.0 MISCELLANEOUS WORKS:

♦ The rates for all items under this section include :

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

SPECIAL NOTE TO THE BIDDER

- 1. The bidders are requested to attend pre bid meeting and visit the site to get complete knowledge about the site conditions before quoting the rates. Pre bid attendance is a must to understand the site conditions, availability of materials, clarifications regarding tender etc.
- 2. Bidders are requested to get all clarifications regarding tender document, drawing, site conditions etc. during the pre bid meeting. The clarification/decision taken during the pre bid meeting will be notified in the Institute website and no individual intimation will be provided. Bidders are requested to check the website till the last date for submission of bids for updates on addendums, corrigendum, extensions etc.
- 3. The availability of materials, transportation of materials etc. to be ascertained before quoting the rates.
- 4. No labour will be allowed to work/stay beyond working hours and during institute holidays. If need to work/stay beyond working hours/on holidays, prior permission from the Engineer in Charge/Scientist in Charge should be obtained in writing.
- 5. No water and electricity will be supplied by IIA and separate arrangement has to be made by the contractor.
- 6. Quality and time for completion are the main essence of the contract and contractor has to keep in mind while quoting the rates.
- 7. Since the area under renovation is scientific activity area, proper care to be taken to avoid disturbance to the working personnel.
- 8. All the debris shall be kept in one place as directed by the Engineer in Charge and disposed off outside the campus on working days. Working area/surrounding area shall be kept neat and clean every day after the work is completed.
- 9. All the materials shall be approved by IIA by providing sample/ mock up before executing the complete work.
- 10. The indicative drawing is provided for the purpose of tendering/pricing. The detailed approved drawing will be provided along with the work order.
- 11. Any discrepancy in the tender documents in found, CPWD technical specifications, rate analysis, works manual etc. will be referred for clarification and decision will be taken accordingly.

- 12. All the works shall strictly follow the guidelines of COVID 19 like wearing mask, hand sanitization, social distancing etc. Thermal scanning will be done by IIA for which everyone should cooperate
- 13. Please find the check list enclosed in the last page of this tender document and comply accordingly. (No document will be considered without check list compliance. Non compliance of any document referred in check list will be treated as incomplete and tender will be disqualified.)

LIST OF APPROVED MAKES OF MATERIALS

| 1. | Chlorpyriphios | - | DE-NOCIL, Cynamide |
|-----|---|---|--|
| 2. | Structural Sealant | - | Wacker, Dow Corning, GE |
| 3. | Structural Steel | - | SAIL / TISCO /vizag/ JSW |
| 4. | M.S. Pipe, Tubes, Bar, Flats, Angle, Tee Sections | - | SAIL / TISCO |
| 5. | Concrete admixture | - | Fosroc/ Cico. |
| 6. | Polysulphide sealant | - | Pidilite, Chemetall-Rai |
| 7. | Bitumen Impregnated Board | - | Shalitex or approved equivalent |
| 8. | Polyethylene back up rod | - | Supreme Ind. Ltd. or approved equivalent |
| 9. | PVC water stops | | - Fixopan / Sintex |
| 10. | White Cement | - | Birla, J.K |
| 11. | Water proofing compound | - | CICO / Pidilite / Laticrete or approved equivalent |
| 12. | White washing lime | - | Dehradun (Source) |
| 13. | Paints | - | Asian Paints, ICI, Nerolac |
| 14. | Water proof cement paint | - | Snowcem India Ltd |
| 15. | Fire Retardant paint | - | Viper or approved equivalent |
| 16. | Wax Polish | - | Mansion or approved equivalent |
| 17. | Epoxy | - | Fosroc/ STP/ Cico. |
| 18. | Glass | - | Modi Guard, Asahi or approved equivalent |
| 19. | Mirror | - | Modi Guard or approved equivalent |
| 20. | Waterproof Ply | - | Duro, Century, Jyotiply, Premier, Mayurply |
| 21. | Commercial ply. | - | Duro, Century, Jyotiply, Premier, Mayurply |
| 22. | Veneer | - | Duro, Green, Premier, Century, Mayurply |
| 23. | Laminate | - | Donear, Merino, Century or approved equivalent |
| 24. | Cement Bonded Board | - | 'BISON' by NCL or approved equivalent |
| 25. | Gypsum board. | - | India Gypsum Ltd. |
| | | | |

| 26. | False Ceiling Members a) Perimeter b) Celling section c) Intermediate d) Angle | - | Gyp. Steel of India Gypsum Ltd. |
|-----|--|------|--|
| 27. | APP Polymeric Polyethylene | Felt | - 'BITUMAT' or approved equivalent |
| 28. | Expanded Polystyrene (Thermocole) | | - Beardshell or approved equivalent |
| 29. | Extruded Polystyrene | - | ISO board ND or approved equivalent |
| 30. | Hessian Based Felt | - | 'BITUMAT' or approved equivalent |
| 31. | Flush Door Shutter | - | Duro, Jyotiply, Century, Premier or approved equivalent |
| 32. | Door Hardware | | - Haffle / Hetitch |
| 33. | Door Lock & Handle | - | Dorma, Haffle |
| 34. | Door closer | - | Dorma, Haffle |
| 35. | Chequered Precast Cement c Concrete Tiles | - | NITCO / Unitile or approved equivalent |
| 36. | Commercial Quality White Glazed Ceramic Tiles | - | Orient or approved equivalent |
| 37. | PVC strips | - | Fixopan or approved equivalent |
| 38. | Geotextile Fabric | - | Netlon / Ca Polyteck Pvt. Ltd. or approved equivalent |
| 39. | UPVC Pipe | - | Finolex Industries Ltd. or approved equivalent |
| 40. | Steel Fire Door | | - Shakti Met / Promat or approved equivalent |
| 41. | Non Metallic Fire Door | | - Navir / Promat or approved equivalent |
| 42. | Particle Board | - | Novopan, Merino, Bajaj Ecotec |
| 43. | MDF | - | NUWUD MDF grade I as per IS 12406 / Green Panelmax / Bajaj Ecotec |
| 44. | Screws, Nails etc. | - | Nettlefold or approved equivalent. |
| 45. | Pre-Laminated Board | - | Merino / Green / Duro |
| 46. | Metallic Laminate | - | Duro, Green or approved equivalent |
| 47. | Welding rod | - | ADVANI or approved equivalent |
| 48. | MS black enameled/ galvanized ERW conduits | - | AKG, BEC, Steelkraft |

| 49. | MS Conduit accesso | ries | - | Sharma, Approved equivalent |
|-----|--------------------|-----------|------|-----------------------------------|
| 50. | Modular Kitchen | - | Vene | eta Cucine or Approved equivalent |
| 51. | Shower Cubical | hardwares | - | Dorma or Approved equivalent |
| 52. | Wooden Flooring | - | Cosr | nos, New Era |

53. Laminated Wooden Flooring - Pergo, Span, Armstrong

54. Fire Door Hardware - Briton or approved equivalent

55. Toilet Partition - Merino / Green

56. MR Ultra Partition - Gypsum India

57. Cement – OPC 43 Grade - ACC Ltd., Ultra tech, Birla, L&T

Note: In the List of recommended above, out of makes mentioned in the list, only 1st make shall be quoted for and used. However if due to non-availability or any other technical reasons, the alternative make is allowed, it shall be subject to price adjustment.

Any materials not listed in the above list will be decided by IIA.

PROJECT

"Construction of Coursed rubble Stone Masonry Compound Wall (Phase II) at CREST Campus, I.I.A, Hosakote, Bengaluru Rural District."

GRAND SUMMARY OF COST

| ITEM NO | DESCRIPTION | |
|------------|--|--|
| 1. | DADT A Courth food common districtions | |
| 1. | PART - A : South face compound structure | |
| 2. | PART - B : East face compound wall | |
| 3. | PART - C : IIA sign board | |
| 4. | PART - D : R C C Retaining wall | |
| | TOTAL OF PART($A+B+C+D$)=(E) (Rs) | |
| | GST @%=(F)(Rs) | |
| | GRAND TOTAL (E+F)=G (Rs) | |

| AMOUNT IN WORDS: | |
|------------------|--|
| Rupees | |
| • | |
| | |

SEAL & SIGNATURE OF BIDDER

Bill Of Quantities construction of coursed rubble Stone Masonry compound wall (phase II) at Crest campus, I.I.A, Hosakote, Bengaluru Rural District.

(NOTE: Rates shall be quoted after reading the complete specifications and understanding site conditions)

| Sl. No. | Description | O | TT24 | Rate (Rs.) | | Amount (Rs.) |
|----------|---|----------|--------|------------|----------|--------------|
| | Description | Quantity | Unit – | In Figures | In Words | |
| PART - A | A: South face compound structure | | | | | |
| 1 | Dismantling and stacking within 50 metres lead, fencing posts or strut s including all earth work and dismantling of concrete etc. | | | | | |
| 1.1 | RCC / stone post | 327.00 | Each | | | |
| 2 | Dismantling barbed wire or flexible wire rope in fencing including making rolls and stacking within 50 metres lead. | | Kgs | | | |
| 3 | Earth work in surface excavation not exceeding 30 cm in depth but exceeding 1.5 m in width as well as 10 Sqm on plan including getting out and disposal of excavated earth upto 50 m and lift upto 1.5 m, as directed by Engineer-in-Charge: | | | | | |
| 3.1 | All kinds of soil. | 3,200.00 | Sqm | | | |

| Sl. No. | Description | Quantity | Unit - | Rate (| Amount (Rs.) | |
|---------|---|----------|--------|------------|--------------|--|
| S1. NO. | Description | Quantity | UIII | In Figures | In Words | |
| 4 | Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 Sqm on plan), including dressing of sides and ramming of bottoms, lift upto 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. | | | | | |
| 4.1 | All kinds of soil. | 1,200.00 | Cum | | | |
| 5 | Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating Each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m. | 500.00 | Cum | | | |
| 6 | Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : | | | | | |
| 6.1 | 1:4:8 (1 Cement : 4 coarse sand (zone-III) : 8 graded stone aggregate 20 mm nominal size) | 145.00 | Cum | | | |
| 7 | Coursed rubble masonry (second sort) with hard stone in foundation & plinth with : | | | | | |
| 7.1 | Cement mortar 1:6 (1 cement : 6 coarse sand) | 390.00 | Cum | _ | | |
| 8 | Coursed rubble masonry with hard stone (first or second sort) in superstructure above plinth level and upto floor five level. | | | | | |

| Sl. No. | Description | Quantity | Unit | Rate (| Rate (Rs.) | |
|----------|--|-----------|------|------------|------------|--|
| 51. 140. | Description | Quantity | Omt | In Figures | In Words | |
| 8.1 | Masonry work (first sort), in cement mortar 1:6 (1 cement: 6 coarse sand) | 700.00 | Cum | | | |
| 9 | Extra for coursed rubble masonry with hard stone (first or second sort) in: | | | | | |
| 9.1 | Square or rectangular pillars cum | 200.00 | Cum | | | |
| 10 | Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. | | | | | |
| 10.1 | Thermo-Mechanically Treated bars of grade Fe-500D or more | 10,284.00 | Kgs | | | |
| 11 | Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level: | | | | | |
| 11.1 | 1:1.5:3 (1 cement : 1.5 coarse sand (zone-III): 3 graded stone aggregate 20 mm nominal size). | 85.00 | Cum | | | |
| 12 | Providing and fixing 'Y' shaped Angle iron (50 x 50 x4 mm) post & strut of required size including bottom to be split and bent at right angle in opposite direction for 10 cm length and drilling holes upto 10 mm dia. Complete as per direction of engineer in-charge. The rate is inclusive of applying a priming coat of red oxide zinc chromate primer and painting with two coats of synthetic enamel paint of Asian (cleaning the surface, etc) and angle post to be embedded on cement concrete. | 4,000.00 | Kgs | | | |

| Sl. No. | Description | Quantity | tity Unit — | Rate (| (Rs.) | Amount (Rs.) |
|---------|--|----------|-------------|------------|----------|--------------|
| SI. NO. | Description | Quantity | Omt | In Figures | In Words | |
| 13 | Supplying and fixing of Fencing with angle iron post placed at required distance embedded in cement concrete blocks, of barbed wire weighing 9.38 Kgs per 100 m (minimum), between the two posts fitted and fixed with G.I. staples, turn buckles etc. complete. (Cost of posts, struts, earth work and concrete work to be paid for separately). Payment to be made per metre length of barbed wire used. | | | | | |
| 13.1 | With G.I. barbed wire | 7,200.00 | Metre | | | |
| 14 | Pointing on stone work with cement mortar 1:3 (1 cement: 3 fine sand) | | | | | |
| 14.1 | Flush/ Ruled pointing | 4,200.00 | Sqm | | | |
| 15 | Centering and shuttering including strutting, propping etc. and removal of form for all heights: | | | | | |
| 15.1 | Lintels/coping, beams, plinth beams, girders, bressumers and cantilevers | 600.00 | Sqm | | | |
| 16 | Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping , bed blocks, anchor blocks, plain window sills, fillets, sunken floor etc., up to floor five level , excluding the cost of centering, shuttering, etc complete. | | | | | |
| 16.1 | 1:1½:3 (1 cement : 1½ coarse sand (zone-III) : 3 graded stone aggregate 20 mm nominal size). | 45.00 | Cum | | | |

| Sl. No. | Description | Quantity | Unit | Rate (Rs.) | | Amount (Rs.) |
|----------|---|----------|------|--------------------|----------|--------------|
| S1. NO. | Description | Quantity | Omt | In Figures | In Words | |
| 17 | Cement Plaster (In Fine sand) on RCC surface with 12 mm thick plastering with cement mortar specified below, finished rough including hacking, scaffolding, curing, etc, complete. | | | | | |
| 17.1 | 1:4 (1 cement: 4 fine sand) | 850.00 | Sqm | | | |
| 18 | Painting external plastered surfaces with two or more coats of 100% acrylic exterior emulsion paint of approved make and colour (apcolite apex of Asian) having protection against fungal growth, flaking, fading, alkali and UV degradation and to give an even shade with required finish including cleaning the surfaces, applying one coat of primer, filling the crevices with approved filler, scaffolding, etc., complete all as per specifications, make Asian paint. Painting with synthetic enamel paint of approved brand | 850.00 | Sqm | | | |
| 19 | and manufacture to give an even shade including priming coat: | | | | | |
| 19.1 | Two or more coats on new work | 800.00 | sqm | | | |
| | | | | Sub Total Part A (| (Rs). | |
| | | | | | | |
| PART - E | 3 : East face compound wall | | | | | |
| 20 | Stone work in plain ashlars in super structure upto floor five level in cement mortar 1:6 (1 cement : 6 coarse sand) including pointing with cement mortar 1:2 (1 white cement : 2 stone dust) with an admixture of pigment matching the stone shade : | | | | | |
| 20.1 | Both face dressed | | | | | |

| Sl. No. | Description | 0 | TT . *4 | Rate (Rs.) | | Amount (Rs.) |
|----------|---|-----------|---------|--------------------|----------|--------------|
| S1. INO. | | Quantity | Unit | In Figures | In Words | |
| 20.2 | White sand stone | 210.00 | cum | | | |
| 21 | Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. | 18 500 00 | kg | | | |
| 22 | Providing and laying Non Pressure NP-3 class (Medium duty) R.C.C. pipes including collars/spigot jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete | | | | | |
| 22.1 | 450 mm dia RCC pipes. | 10.00 | Metre | | | |
| 22.2 | 1200 mm dia RCC pipes. (Laying by manual/machanical means) | 20.00 | metre | | | |
| 23 | Providing and laying 60mm thick factory made cement concrete interlocking paver block of M -30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer-in-charge. | 750.00 | sqm | | | |
| | | | | Sub Total Part B (| Rs). | |

| Sl. No. | Description | Quantity | Unit | Rate (| Rs.) | Amount (Rs.) |
|----------|--|----------|------|---------------------|------------------------|--------------|
| S1. No. | | | | In Figures | In Words | |
| PART - 0 | C : IIA sign board | | | | | |
| 24 | Providing and fixing 18 mm thick gang saw cut, mirror polished, premoulded and prepolished, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations of required size, approved shade, colour and texture laid over 20 mm thick base cementmortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels. | | | | | |
| 24.1 | Granite of any colour and shade | | | | | |
| 24.2 | Area of slab over 0.50 sqm | 35.00 | sqm | | | |
| 25 | Providing and installation of Stainless steel 3D letters of height 18" as per the font decided by IIA | 30.00 | Each | | | |
| 26 | Providing and installation of Stainless steel 3D letters of height 17" as per the font decided by IIA. | 20.00 | Each | | | |
| 27 | Providing and installation of Stainless steel 3D letters of height 7" as per the font decided by IIA. | 120.00 | Each | | | |
| 28 | Providing and installation of Stainless steel 3D logo of IIA of diameter 3'-0" | 1.00 | Each | | | |
| | | | | Sub Total Part C (I | Sub Total Part C (Rs). | |

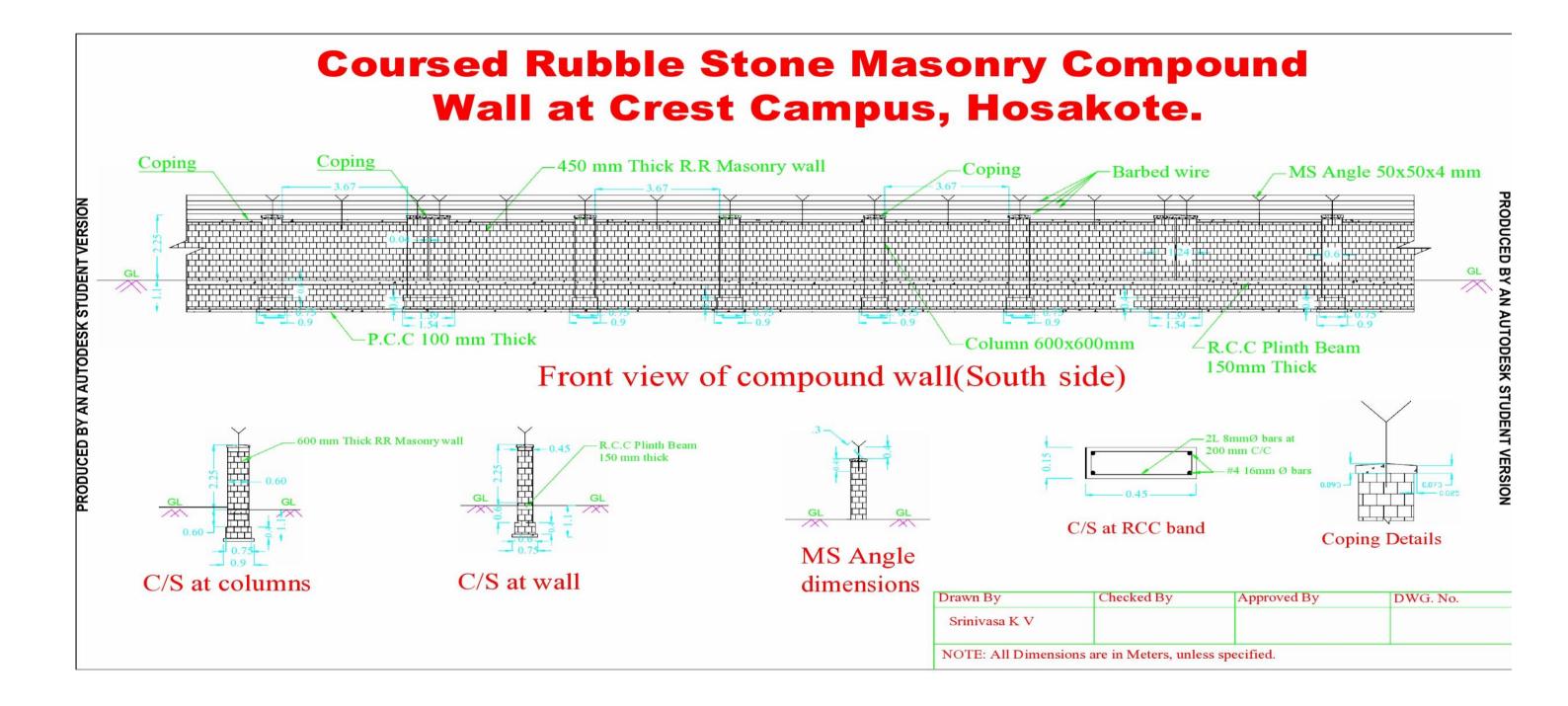
| Sl. No. | Description | Quantity | Quantity Unit | Rate (Rs.) | | Amount (Rs.) | |
|----------|---|----------|---------------|------------|----------|--------------|--|
| SI. NO. | Description | Quantity | | In Figures | In Words | | |
| PART - D | PART - D : R C C Retaining wall | | | | | | |
| 29 | Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 Sqm on plan), including dressing of sides and ramming of bottoms, lift upto 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. | | | | | | |
| 29.1 | All kinds of soil. | 270.00 | cum | | | | |
| 30 | Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating Each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m. | 250.00 | Cum | | | | |
| 31 | Providing and laying in position plain cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level: | | | | | | |
| 31.1 | 1:4:8 (1 Cement : 4 coarse sand (zone-III) : 8 graded stone aggregate 20 mm nominal size) | 38.40 | Cum | | | | |
| 32 | Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. | | | | | | |

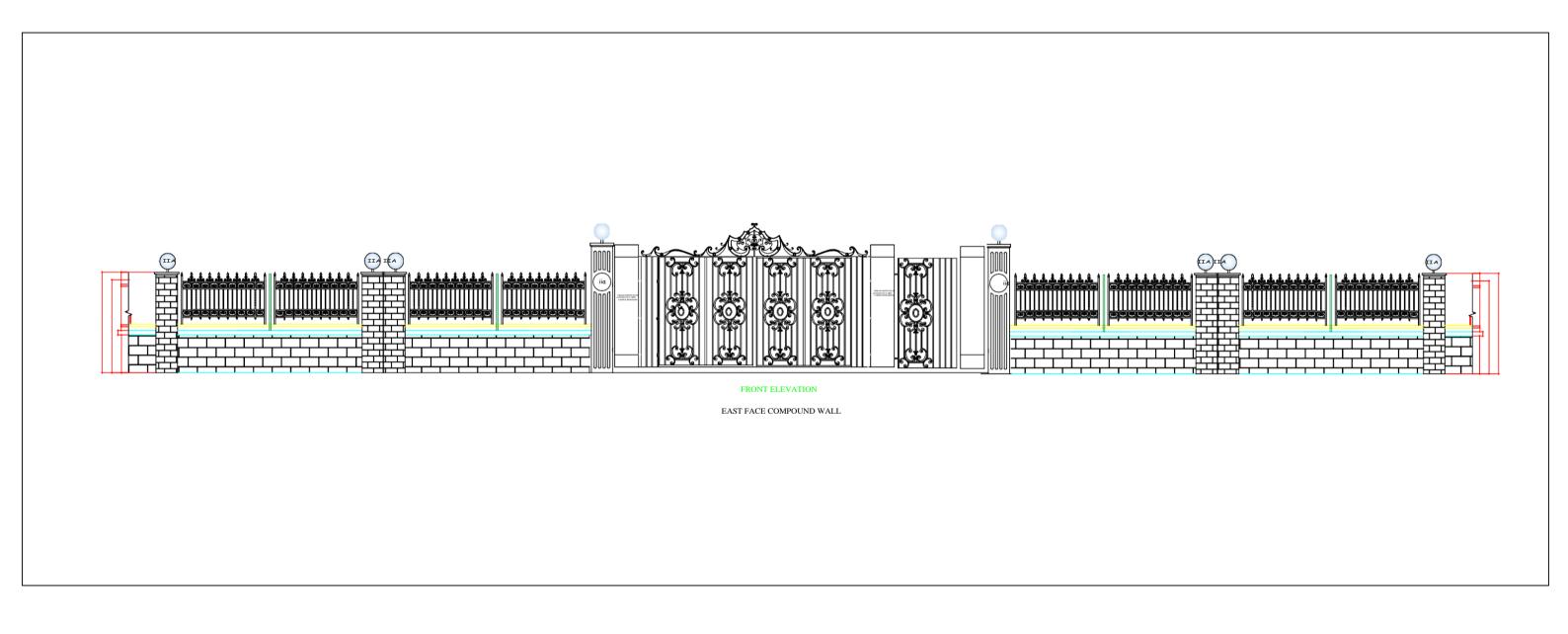
| Sl. No. | Description | Quantity | Unit _ | Rate (Rs.) | | Amount (Rs.) |
|---------|--|----------|--------|------------|----------|--------------|
| | | | | In Figures | In Words | |
| 32.1 | Thermo-Mechanically Treated bars of grade Fe-500D or more | 8,000.00 | Kgs | | | |
| 33 | Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant andtransported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work, including pumping of R.M.C. fromtransit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement, including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer-in-charge.(Note:- Cement content considered in this item is @ 330 kg/ cum. Excess/less cement used as per design mix is payable/recoverable separately). | | | | | |
| 33.1 | All works upto plinth level | 80.00 | cum | | | |
| 33.2 | All works above plinth level upto floor V level | 120.00 | cum | | | |
| 34 | Centering and shuttering including strutting, propping etc. and removal of form for : | | | | | |
| 34.1 | Foundations, footings, bases of columns, etc. for mass concrete | 320.00 | sqm | | | |

| Sl. No. | Description | Quantity | Unit | Rate (Rs.) | | Amount (Rs.) |
|---------------------------------|--|----------|------|---------------------|----------|--------------|
| D1. 140. | | | | In Figures | In Words | |
| 34.2 | Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc. | 750.00 | Sqm | | | |
| | | | | Sub Total Part D (1 | Rs). | |
| | | | | | | |
| Total of Part (A+B+C+D)=E (Rs.) | | | | | | |
| GST% F (Rs.) | | | | | | |
| Grand Total (E+F) (Rs.) | | | | | | |
| | | | | | | |

| (Grand total amount in words | |
|------------------------------|---------------------------------------|
| Rs | |
| | |
| | •••••• |
|) | |
| Date: | |
| Place: | |
| | Signature of the contractor with seal |

VOLUME - III





ALL THE BIDDERS ARE REQUESTED TO COMPLETE THE CHECK LIST WITH NECESSARY DOCUMENTS AND COMPLY ACCORDINGLY

(No tender will be considered without compliance of this check list and liable for rejection)

CHECK LIST

| SL. NO. | Document to be furnished | YES/NO | REMARKS |
|------------|--|--------|---------|
| 1 | Tender document fee (Non Refundable) | | |
| 2 | Earnest Money Deposit (Refundable) | | |
| 3 | Complete tender document duly signed by contractor/authorized representative. Power of Attorney to be attached in case of partnership firm) | | |
| 4 | Please mention the name of the work, tender number, contractor address etc. on cover/envelop | | |
| 5 | Valid Contractor License | | |
| 6 | PAN Details | | |
| 7 | GST Details with last 3 GST paid receipts | | |
| 8 | Relevant Experience Certificate as per tender conditions issued by the officer not less than the rank of Executive Engineer or equivalent | | |
| 9 | Financial Documents like turnover certificate, IT returns and audited balance sheets for last 3 Financial Years, assessment report issued by IT dept. for last 3 years | | |
| 10 | BAR chart for progress of work considering the time for completion | | |
| 11 | Cash Flow Chart | | |
| 12 | Organisation Details | | |

Signature of the Contractor with Stamp