TENDER DOCUMENT
FOR

CIVIL WORKS
(VOLUME 1)

PROJECT:

PROPOSED CONSTRUCTION OF SHRIMAN BHAUSAHEB GANDHI (CBSE) INTERNATIONAL SCHOOL
FOR
Shri SAPDJ Pathshala
SOLAPUR

EMPLOYER:

Shri SAPDJ Pathshala

AT

New Walchand Campus opp. WIT College Solapur

ARCHITECTS:

SHASTRI ASSOCIATES

#1472, 13TH CROSS, 20TH MAIN, SECTOR-1, HSR LAYOUT

BANGALORE - 560102

Ph: 080 8042190650 email:ngshastri@gmail.com

FACE SHEETS

(TO BE FILLED AT THE TIME OF ISSUE OF TENDER DOCUMENT)

1. Name of work : PROPOSED CONSTRUCTION CBSE SCHOOL AT SOLAPUR

2. Total built up area : 1,72,547 Sqft app.

3. M S cover over the Central Amphitheatre : 2900 Sqft app.

4. Tender document issued to :

4. Date & time of issue of blank tender document to the contractor: ----------

6. Last date of receipt of filled up tender documents : ----------

7. Opening of Tender documents : ----------

(TO BE FILLED AT THE TIME OF OPENING THE TENDERS)

1. Whether the contractor has remitted the EMD or not and how? :

2. No. and date & amount of DD :

3. Name & address of Bank :

4. Whether the contractor fulfills all the conditions of EMD :

5. Whether the tender fulfills all the conditions of tender notice & conditions of contract etc., :

6. Whether counter conditions if any are put by the contractor :

Opened by me on this
day ……at…….

Total no. of corrections in the tender:

Place: Solapur

Date:

For Shri SAPDJ Pathshala
Solapur

CONTENTS

#	PARTICULARS OF ITEM	PAGE NO.
1	Special Tender Conditions	4-12
2	General Conditions Of Contract	13-38
3	Appendix	39-40
4	Draft for Formats	41-44
5	Quality control	45-56
6	Contractor's Information	57-66
7	Technical Specifications	67-202

SPECIAL TENDER CONDITIONS

1.0 Special conditions of tender.

1.1 Location and Description of work

1.1.1 Sealed **Item rate Labour rate tender** is invited for the Civil Structural, works of **PROPOSED CONSTRUCTION OF SHRIMAN BHAUSAHEB GANDHI (CBSE) INTERNATIONAL SCHOOL**, **Walchand Harichand marg, cross road of ring road, Solapur**. Bidder should submit the tender bids & in two separate envelopes earmarked the title on the respective packets.

a) Technical bid duly stamped & signed.

b) Commercial bid & drawings duly stamped & signed.

Only those contractors shall be considered for commercial bid who meets the requirements of Technical bid.

1.1.2 You may inspect the site by contacting **Mr. Vaibhav Gandhi –** mobile no. **9822033100**

1.1.3 The bidder is advised to visit and examine the site of works and its surroundings and obtain for himself on his own responsibility all information that may be necessary for submit the tender and entering into a Contract for constructing of the works. The costs of visiting the site shall be at the tender's own expense.

The tenderer and any of his personnel or agents will be granted permission by the Architect/Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the bidder, his personnel and agents, will release and indemnify the Employer and his personnel and agents, from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expense incurred as a result of the inspection.

1.2 Time Limit:

Time is the essence of this contract and the work covered in this contract must be completed in all respects, within the stipulated time. The successful Tenderer will be expected to complete all the works within **18 (Eighteen) months** including monsoon period, from the date of issue the letter of intent to commence the Work. The tender should be based on this time of completion. However, the above-mentioned stress on time based completion shall not entitle the successful tenderer to claim price escalation for the portion of work which remains un-executed after the stipulated completion period.

1.3 Date, place and time for submitting tenders

1.3.1 Tenders shall be closed in sealed covers addressed to **The Administrator, Sarthak, 90 Raghavendranagar, murarji peth, Solapur Maharastra - 413002**

1.3.2 Tenderers, submitting tenders by post must ensure that such tenders are delivered

or sent by Reg. Post so as to reach the above office before the time and date mentioned. Tenders received after the stipulated date and time will not be opened and shall stand rejected.

1.4 Form on which the Tender to be drawn

The Tender shall be drawn only on the form furnished with these Tender Documents and duly signed. Tenders shall be complete in all respects as indicated.

1.5 Procedure for submitting tenders:

1.5.1 The tender documents and accompaniments shall consist of the following duly submitted in a single sealed cover:

1. A covering letter from the Tenderer detailing the various considerations in his tender.
2. A list of all documents accompanying the tender.
3. Schedule of quantities with tender rates and amounts.
4. Tender document
5. Tender Drawings.
6. Detailed outline report with a note on the proposed program of work, as required. A report on all arrangements for carrying out the work detailing phase wise scheduling of manpower (trade wise) and equipment, temporary works proposed to be carried out and arrangements of site facilities.
7. List of similar works executed by the Tenderer and valued at more than Rs. 6.0 crore carried out during the last five years with testimonials of satisfactory completion and also the list of works on hand, detailing the name and value of work, location, present status completion, delays and penalties if any from the respective Employers / Builders / Architects.
8. A list of construction equipment's / materials available with the Tenderer and proposed to be used in these construction works.
9. A certificate of financial support issued by bankers.
10. A copy of the Partnership Deed/Articles of Association.
11. Copies of latest audited statement accounts for the last 3 years.
12. Copy of the latest income tax clearance certificate.

1.5.2 For submitting the tender, the Tenderer shall and be deemed to have read and gained full knowledge of all for actual inspection of the site in respect of the location of the work and all such other requirements to ensure that the rates he quotes are in accordance with the conditions of the work to the required specification and the satisfaction of the Architect/Employer. The submission of the tender by a Tenderer shall thus imply that he has read and understood the above. As such the Employer will not, after acceptance of the tender, pay any extra rates or compensation for any reason whatsoever under the above premises including in the case where Tenderer is later found to have misjudged site conditions or tender conditions or tender items.

1.5.3. The item rates in the tender shall be inclusive of expenses for proper and entire completion of the work and shall among other things include all duties, octroi, cess

/royalty, patent rights, transportation, lead and lifts, equipment's / tools etc., The rates shall be deemed to have included all expenses for observing the various statutory laws, their rules and obligations of the Contractor/Employer in respect of labour, safety, etc, and all such other equipment's of the Government.

1.5.4 All quoted rates shall remain firm and no escalation will be allowed for any reason whatsoever, Should there be any discrepancy in, or any doubt or obscurity as to the meaning of the tender documents, or as to any responsibility / functions of the Contractor, as to the instruction to be observed by him, he must set forth in writing such discrepancy, doubt or obscurity and submit the same to the Employer for clarifications not later than 3 days before the date fixed for receipt of tenders.

1.5.5 All pages of the tender documents and documents accompanying the tender shall be initialed at the lower right corner by the Tenderer or his authorized representative (with power of attorney).

1.5.6 The Tenderer or his authorized representative with this dated signature shall attest all corrections or interpolations in the tender in ink. The tender shall not contain any ensures or overwriting.

1.5.7 It shall be obligatory for Tenderers to keep their offer/tender valid for a period of 3 calendar months from the date of opening the tender.

1.5.8 Rates shall be quoted both in figures and words.

1.5.9 Tenderer is deemed to be familiar with standards specifications of PWD, or of I.S.I. or of National Building Code and construction procedures.

1.6 Liability for Rejection of Tender:

1.6.1 Any tender which does not fulfill any of the conditions or incomplete in any way is liable for rejection.

1.6.2 A tender not accompanied by Income Tax Clearance Certificates renders itself liable for rejection.

1.6.3 If a Tenderer proposes any alteration to the Tender or reserves the right to decline to carry out any work included in Tender, his tender is liable for rejection.

1.6.4 It shall not be obligatory for the Employer to accept the lowest or any tender. The Employer reserves the right to award the whole or part of the work to any Tenderer or cancel the tender altogether, without assigning any reason. Employer may take up the School building works in phases which will not have any objections by the contractors.

1.6.5 Contractor is free to inspect soil test report before quoting available with the site owner

1.7 Award of Work:

1.7.1. The Employer shall be the sole authority to decide the acceptance of the tender. The tender along with letter of its acceptance thereof, shall constitute a binding contract between the successful Tenderer and the Employer, and shall form the foundation of the rights and obligations of both the parties.

1.7.2. A works contract will be issued by client to the successful tenderer. Successful tenderer has to give his acceptance by returning the copy of the order duly signed**.**

1.8 Earnest Money Deposit:

The Tenderer shall submit an **Earnest Money Deposit** by **DD** of **Nationalised bank** of **Rs. 10,00,000.00 (Rupees ten lakhs only)** drawn in favor of **'Shri SAPDJ Pathshala.** The earnest money deposit shall be in the form of a DD / Banker's cheque/ pay orders issued by any Nationalized Bank located in India. No interest will be paid on the Earnest money deposit.

Any tender not accompanied by an acceptable Earnest Money Deposit shall be rejected as non-responsive.

The EMD of the unsuccessful bidders shall be returned as promptly as possible, but not later than 45 days after the expiration of the period of tender validity.

The EMD of successful bidder will be returned within 14 days after issue of defects liability certificate.

The EMD shall be forfeited:

a) if the tenderer withdraws his tender during the period of tender validity

b) if the tenderer does not accept the correction of his tender price

c) in the case of a successful tenderer, if he fails within the specified time limit to

(i) Sign the Agreement, or

(ii) Furnish the required performance security

1.9 Retention Money

1.9.1 Retention Money will be withheld (and kept in deposit with the Employer) at the rate of **5 % of bill value of work done** in each certified R.A. Bill.

1.9.2 On satisfactory completion of the work, (to be certified by the Employer) and its handing over to the Employer, 50% of the retention money shall be refunded back to contractor along with final certification of the bill and remaining after completion of Defect Liability period after rectifying the defects if any .

1.9.3 Retention money shall bear no interest for the entire duration of the contract and defects liability period.

1.9.4 The Employer shall be free to set off Retention money, against expenditure incurred by him in rectification of the defects, in case the Contractor fails to attend to the defects in time satisfactorily.

1.10.1 Measurements and Payments:

1.10.1 Contractor shall prepare running account bills as per the schedule and submitted to the Employer along with detailed measurement sheets. The running account bills to be submitted in duplicate along with soft copy of bill as well as measurement sheet.

1.10.2 Payment for running account bills shall be released within **20 working days** on submission of Bill certified from the Employer's Engineer in charge.

1.11 Variation in quantities of contract schedule items:

It is brought to the notice of the Contractor that there may be variations in the Bill of Quantities. Contractors shall take due note of this. Payment shall be made on measurements and paid for the actual work done. It is stressed that no claims for loss, compensation or escalation on the grounds of increase/ decrease in the quantities indicated in the tender schedule of quantities, will be entertained under any circumstances, nor will the Contractor be entitled to prefer any claims whatsoever in these grounds. If any work is required to be executed, but it is not covered in the contract, the rate for such work items will be arrived and fixed in accordance with procedure given in clause 2.2.8 of the General conditions.

1.12 Tax:

1.12.1 The GST for all the works shall be extra as per the Govt. norms.

1.13 Electricity:

3 phase power shall be provided by the **clients at one point**, Contractor shall make his own arrangements to distribute electrical supply for construction, no claim or compensation on this account shall be entertained. All energy meter and all accessories for distribution of power shall be at contractor's own cost. **The bill for the power consumption for construction activity to be paid by the contractor time to time.** If disconnected due to laxity from contractor, the contractor shall make good all damages and / or penalty levied by authorities.

Irregularity in power supply may have to be faced by the contractor. The contractor should schedule his works accordingly or make alternative arrangement; such as DG back up at his own cost; to ensure there is no hindrance in the progress of work as per the approved bar chart.

1.14 Water:

Water source will be supplied at one point & contractor has to arrange for necessary storage, pipelines, pumping etc for various construction activities and usage within the site. **2% of contractor's every running account bill shall be deducted as expenditure for water.**

1.15 APPROVED SAMPLES:

Approved samples, jointly signed by the Architect, employer and the contractor shall be kept in the Employer's site office for reference & record. All materials incorporated in the works shall confirm to such approved samples. Larger scale drawings shall take precedence over smaller drawings.

1.16 CONTRACT DOCUMENTS:

1.16.1 The several documents forming the contract are to be taken as mutually explanatory/complementary to one another, detailed drawings to be followed in preference over general conditions, specifications over the drawings.

1.16.2 In case of any ambiguity / discrepancy between the schedule of quantities, the specifications and or the drawings, the following order of preference is to be followed for their meaningful application/relevance.

1. Unit rate specifications
2. General specification
3. Drawings
4. Technical specification
5. Special conditions of contract
6. General conditions of contract

In case of discrepancy between special conditions of contract and general conditions of contract the interpretations in the former shall prevail over the latter.

If there are varying or conflicting provisions made within any one document forming part of the contract, the Employer shall be the deciding authority with regard to the true intent of the document provisions.

1.16.3 In the event of a discrepancy in words and figures quoted by a contractor, the description in words shall prevail.

1.16.4 Any error/variation in description, quantity or rate in the Bill of Quantities, or any omission there from shall not vitiate the contract, or release the Contractor from execution of the whole or any part of the works comprised therein according to the drawings and specifications, or from any of his obligations under the Contract.

1.17 Drawings:

1.17.1 All the detailed drawings required for the execution of the work may not be available immediately after awarding the work. Some of the drawings which are available will be supplied in the first instance and the remaining drawings as required progressively and in accordance with the program of work, well in time for procurement of materials and execution. The contractor shall be issued 3 copies of

each working drawings and detailed drawings.

1.17.2 The Contractor shall give adequate notice to the Architect of any further drawings or specifications that may be required for the execution of the work or otherwise under the contract, well in advance. The contractor along with detailed construction program shall also submit a schedule of drawings as required by him.

1.18 Other Conditions:

1.18.1 The Employer shall have a lien over all or any money that may become due and payable to the Contractor, under these conditions and also over the security deposit retention money, against defects liability held by the Employer, under the contract and becoming repayable to the Contractor.

1.18.2 No claim for compensation or escalation from the Contractor shall be entertained in the case of any delay in the supply of materials listed. The decision of the Employer in regard to such extension shall be final. In the event of undue delay in the supply of materials by the Employer, the Contractor, on written instructions of the Employer / Architect, shall procure the .materials, the quality as well as the quantity to be procured being certified by the Employer / Architect. No adjustment in prices will be done in respect of such purchases.

1.18.3 In regard to material supplied by the Employer, the Contractor shall be responsible for maintaining day-to-day accounts of receipts and consumption and returning surplus materials to stores. The materials issued by the employer shall be used only for bonafide permanent works and not for preliminary, or temporary works. Employer's Representative shall certify weekly re-conciliations & stock at site. The Contractor shall take all reasonable care of the materials and shall be liable for any damage or loss caused to the same. He shall permit the employer's representative reasonable access to the store in order to confirm the quantity of the material used in the project.

1.18.4 A schedule of quantities in respect of each work and specifications accompany these conditions. The schedule of probable quantities is liable to alterations, omissions, deductions or additions at the discretion of the Architects. Each item of work is entered in a separate column, all items should totaled in order to show the aggregate value of the entire tender.

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

1.18.6 All BOQ, Specifications and copies thereof furnished by the employer are the property of the Architects. Tenderer to return all these to the Architect after the completion of the contract, if so required by the Architects.

1.18.7 Any treasures, fossils, coins and objects of antiquity, which may be found at site shall be handed over to the employer.

1.18.8 The contractor shall, as and when required in writing by the Architect, remove from the works any temporary building, plant tools, equipment's, goods & material

belonging to or hired by him. If with in a reasonable time the said removal is not effected by the contractor, the employer may, with out being responsible for any loss or damage, remove & sell any such property of the contractor, holding the proceeds, less all costs measured to the credit of the contractor.

1.18.9 Trees, shrubs & Borewells designated by the Architects shall be protected from damage during the course of the work and earth level shall not be changed with in 3ft. of such trees, where necessary, shall trees & shrubs shall be protected by means of temporary fencing.

1.18.10 The contractor at his cost must dispose the unwanted debris at site surrounding / premises regularly as and when directed by Employer/Architect .If not removed time to time, the same debris shall be disposed by the employer and the double the cost for removing the debris shall be deducted from the Contractor's Bill.

1.18.11 The employer may supply cement, Reinforcement steel or any other materials and recover at the basic rate mentioned.

Recovery for cost of the materials supplied to the Contractor will be at basic rates as noted in above for the total quantity supplied, less any surplus. 2.5% wastage shall be allowed, wastage or scrap steel to be classified according to the length of bars. Above 1m will be returnable, less than 1m will be wastage/ contractor's account. Any difference in weight of steel due to Rolling margin will be charged to the Employer's Account.

Wastage allowed/recovery for excess consumption as follows:

Description of materials.	*Wastage allowed*	*% of recovery*
Cement	2.5%	1.5 times of basic cost
Steel	2.5%	1.5 times of basic cost

If Concrete is brought from RMC plant , contractor shall take the prior approval from client and price shall be finalized on mutually agreed terms.

1.18.12 The Architect/Employer are authorized to demand for the break ups/analysis for the quoted items and contractor must submit the same on demand during the process of tender/after the award of the work as the case may be.

1.18.13 Contractor shall ensure and follow the Following Terms:

- Work can be carried out on Holidays / Sundays / after shift hours (night) with prior permissions from Employer and concurrence from Consultants and proper supervision from your end.
- Site barricading with GI sheets and MS frame work on all four sides (minimum 20' height) along the building line has to be done by you as per the instructions of

Engineer in charge/ Architect.

- Strictly follow all the safety precautions at site including regulations stipulated / directed by Employer. Also safety precautionary boards to be displayed at key locations
- All Employees and workmen should be given appropriate safety equipments like helmets, safety belts, shoes etc., and you should enforce its use by them in the work. You shall follow all safety norms as per Employer standards. If safety norms are not followed in the site, the Contractor shall be penalized for the same
- 'Contractors All Risk' (CAR policy) to cover the work for a total value of the work for the entire period of work with Employer as beneficiary.
- Maintain and ensure the following while carrying out the work.
    - a) Aesthetics, b) Squareness, c) Straightness, d) Cleanliness
- To keep the area of working clean and tidy during construction on day to day basis. Good house keeping shall be given high priority. Scrap shall be cleared as and when generated by you at site.
- Ensure that workmen are paid as per the Minimum Wages Act and all your workmen at site shall be covered under PF and ESI and any rules stipulated by Employer.
- Contractor shall be responsible for security of material at site.
- You shall ensure 'No Smoking' inside the building.
- Contractor shall submit his month wise resource planning based on project schedule submitted and this resources will be reviewed each month and accordingly it will be modified by Architect & Contractor is bound to increase resources to catch up backlogs if any.
- Contractor should submit Plant & Machinery & Shuttering Materials list to be deployed to be approved by Architect before start of works.
- The formats for daily, Weekly and monthly progress report will be approved by Architect and contractor should submit reports in accordingly.
- Monthly productivity achieved for different categories to be submitted.
- Employer may provide sufficient place (3Km away from the work site) for installing concrete block batch plant & ready mix concrete plant if the contractor is willing to install their own plants.
- No material shall leave the site without prior permission of the Employer in written.
- The contractor shall give lead time to Employer **atleast 20 days** in advance to procure Materials.
- During Construction it is the contractor's responsibility to request the Employer the material requirement for the **forth coming month** all the material required to be at site to ensure work progresses smoothly without any hindrance due to lack of material availability. The material quality requested should be worked out along with the PMC specifying specification & quality required.

1.18.14 All the marking at the site has to be done with TOTAL STATION EQUIPMENT only.

2. GENERAL CONDITIONS OF CONTRACT

DEFINITIONS AND INTERPRETATIONS

2.1.1 In the `Contract' (as hereinafter defined) the following words and expressions shall have the meanings herein assigned to them, except where the subject or context otherwise requires.

2.1.2 The `Contract' shall mean and notice of Tender, the sealed quotation and acceptance thereof, the Articles of Agreement, conditions of Tender, Conditions of Contract the Appendix, the Specifications, the Priced Bill of Quantities and shall include any special conditions, Annexure, letters amending, altering of stipulating conditions or rates, or specifications in so far, as accepted by the Employer defined hereinafter, and Drawings. All these shall be deemed to form one contract and shall be complementary to one another including correspondence.

2.1.3 The `Contractor' shall mean **M/s** _____having its office at _____ shall include his heirs, legal representative/s, assigns, or successor/s.

2.1.4 The `Employer' / 'Client' shall mean The Registrar, **Shri SAPDJ Pathshala at New Walchand Campus opp. WIT College Solapur.**

2.1.5 The `Architect' shall mean **M/s. SHASTRI ASSOCIATES,** having its office at # 1472, 20th main, 13th cross, sector 1, HSR Layout, Bangalore - 560 102, who are so appointed for this work, or in the event of their ceasing to be the Architects for the purpose of this contract, such other person/s as the Employer shall nominate.

2.1.6 "NOTICE IN WRITING" or "WRITTEN NOTICE" shall means a notice written or typed and addressed to the Employer or the Contractor as the case may be; by Registered Post or by any other means of acknowledged delivery, to the addresses referred to in Clause 2.1.3 and 2.1.4 applicable.

2.1.7 A `Day' shall mean any day of 24 hrs from midnight to midnight, irrespective of the number of hrs Worked in that day.

2.1.8 A `Week' shall mean seven consecutive days, without regard to the number of hrs worked in any day of that week.

2.1.9 `Drawings' means the drawings referred to in the tender and any modifications of such drawings approved in writing by the Architects and any such drawings as may from time to time be furnished or approved in writing by the Architect.

2.1.10 "Act of Insolvency" shall mean any act of insolvency as defined by the Presidency

Towns Insolvency Act or the Provincial Insolvency Act or any act amending such original.

2.1.11 "Excepted Risks" are risks due to riots (otherwise than among Contractor's
2.1.12 employees) and civil commotion (in so far as both these are uninsurable) war (whether declared or not) invasion of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or unsurped power, any acts of God such as earthquakes, lightning, unprecedented flood, etc., over which the Contractor has no control and accepted as such by the Employer.

2.1.12 "Market Rate" in the case of items not covered in the Contract shall be the rate as decided by the Employer on the basis of the direct cost of materials and labour to the contract, prevailing at the time when the work is to be executed plus a percentage of Fifteen percent to cover all overheads and profits.

2.1.13 "Net Prices" If in arriving at the contract amount, the Contractor shall have added to or deducted from the total of the items in the Tender any sum either as a percentage or otherwise, then the net price of any item in deducting from the actual sum arrived at by adding to or deducting from the actual sum appearing in the tender a similar percentage or proportionate sum provided always that in determining the percentages or the proportion of the sum is added or deducted, by the Contractor, the total amount of any prime cost items and provisional sums of money shall be deducted from the total amount of the tender. The expression "Net Rates" or "Net Prices" when used with reference too the contract shall be held to mean rates or prices so arrived at.

2.1.14 i. "Nominated sub-Contractor" shall mean all other specialists merchants, tradesmen and others executing any special work or supplying any who may be selected or approved and employed directly by the Employer.

ii. "Nominated sub-Contractor" shall undertake towards the contractor the like obligations and liabilities are as imposed upon the contractors by the terms of his contract. “Sub contract” shall mean any contract entered in to by the contractor with any such nominated or approved Sub-contractor.

2.1.15 The "Site" shall mean the lands and/or other on, under in or through which the work is to be executed under the contract including any other lands or places which is allotted or used for the purposes of the contract.

2.1.16 "Specifications" means primarily the specifications with these documents and the specifications of the Indian Standards Institution as referred therein.

2.1.17 "Works" shall mean the works to be executed in accordance with the contract or part(s) thereof as the case may be and shall include all authorized extra or additional, altered or substituted works as required for the performance of the

contract.

2.1.18 Where the context so required, words importing persons including firms and corporation and works importing singular only also include the plural and vice-versa.

2.1.19 Scope:

i] The scope of work is to the complete Civil Structural works as called for in the drawings, Bill of Quantities all as per tender document for duly completion of work.

Irrespective of anything else said in this contract, the Employer retains all full powers for the performance / operation of the Contract from his side. The Architect shall act on his behalf.

For the completion of the project, it will be necessary for the other agencies to be employed. The Employer's Representatives and the Architect will co-ordinate all activities and the Contractor shall extend full co-operation so as to achieve speedy completion.

2.2.1 Intents:

i) The work to be carried out under the contract shall include all the items given in the Schedule of Quantities and such other item as may be instructed by the Employer/Architect and shall except as otherwise specified in these conditions include all labour, tools plant equipment, hoisting, setting and fitting in position etc., which may be required in preparation and completion of the works.

ii] Provisional items shall mean all items of works which may be required and for which only approximate quantities may have been included in the Schedule of Quantities.

iii] No work under such provisional items shall be executed without prior instruction in writing from the Employer / Architect.

2.2.2 Architects /his Representatives instructions:

i] The Contractor shall carry out and complete the said works in every respect in accordance with this contract and with the directions of and to the satisfaction of the Architect/Employer. The Architect / Employer may from time to time issue further drawings and/or written instructions, details, directions and explanations which are hereinafter collectively, referred to as `Architect's instructions'.
In regard to:

(a) The variation or modification of the design, quality or quantity of works or the additions or omission or substitution of any work.

(b) Any discrepancy in the drawings or between the schedule of quantities and/or drawings and / or specifications.

(c) The removal from the site of any materials brought there on by the contractor and the substitution of any other material thereof.
(d) The dismissal from the works of any persons employed thereupon.
(e) The opening up for inspection of any work covered up.
(f) The amending and making good of any defects.

ii] The Contractor shall forthwith comply with and duly execute any work comprised in such Architect's instructions provided always that verbal instruction, directions, and explanations given to the Contractor or his representative upon the works by the Architect shall, if involving a variation, be confirmed in writing by the Contractor within a further seven days by the Architect, and if not dissented from such shall be deemed to be Architect's instructions within the scope of the contract. If oral instructions are not confirmed in writing with in 7 days, the contractor shall, nevertheless, comply with the same. However, the employer shall issue the written confirmation at any time prior to issue of the final certificate and the said confirmation shall, there upon, be deemed to have taken effect on the date on which it was orally issued.

iii] If compliance with the Architect's instructions as aforesaid involves work and/or expense and/ or loss beyond issued owing to some breach of this contract by the Contractor, the Employer shall pay to the Contractor on the Architect's Certificate the price of the said work to the extent of the work exempted only and nor for total volume of item (as an extra to be valued as hereinafter provided) and/or expenses and or loss.

2.2.3 Deviations

The Employer/Architect may make any alterations, additions to or omissions from the work as described in the tender documents, including change in the lines, levels, positions and dimensions of any part of the work that may in his opinion be necessary and for that purpose he shall have proven to order the Contractor to do and the Contractor shall carry out the same as provided in this tender document.

2.2.4 Drawings

The Contractor will be supplied with **2 copies** of the construction drawings by the Owner. The work shall be executed in accordance with the specification and the drawings issued for construction'. Drawings will be issued in stages in close coordination with the availability of data and sequence of construction. Only latest revisions of the drawings shall be followed. All old revisions shall be clearly marked `SUPERCEDED' and kept separately or destroyed as directed by Consultant /PMC.One set of drawings shall be available with PMC at site for any cross verification and Records of revision if any.Work has to be executed according to drawings and technical specification.All works shall be recorded in appropriate proforma to be firmed up by the contractor in consultation with the Consultant. Wherever required reference to drawings and clauses of specification shall be recorded in the correspondence.

Records of cement and steel receipts, issue, and consumption shall be scrutinized from time to time by PMC and Owner. Statement of cement and steel receipts,

statement of theoretical consumption and reconciliation accompany every bill. Records of spot levels jointly recorded before the start of the work shall form the basis of all measurements.

2.2.5 Drawings to be kept at site

The Contractor shall keep one copy of the approved drawings furnished to the Contractor, at site neatly laminated/covered with clear plastic sheet and the same at all reasonable times are available for inspection and use by the Employer/Architect

2.2.6 Schedule of Quantity

(i) The Schedule of Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the Standard Method of Measurement of Building Works issued by the Indian Institute of Architects.

(ii) Any error of description or in omission of items from the Schedule of Quantities shall not vitiate this contract but shall be rectified and the value thereof as ascertained under Clause 2.2.33 here of shall be added to or deducted from the contract amount (as the case may be).

2.2.7 Sufficiency of rates.

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the schedule of Quantities and/or the Schedule of Rates and prices which rates and prices shall cover all his obligations under the Contract, and all matters and things necessary and shall obtain clarification from the Architect his intent for each item tendered for.

2.2.8 Variation not to vitiate Contract.

No alteration, omission or variation shall vitiate this Contract but in case Employer through the Architect thinks proper at any time during the progress of works to make any alterations in or additions to or omissions from the works or any alteration in the kind or quality of the materials to be used therein and shall give notice thereof in writing to the Contractor. The Contractor shall not do any work extra or make any alternations or additions to or omissions from the works or any deviation from any of the provisions from the works or any deviation from any of the provisions of the contract stipulation, Specification or Contract Drawings without the previous consent, in writing of the Architect/Employer and the value of such extras, alterations, additions or omissions shall, in all cases be determined by the Architect/Employer. Thereof, and the same shall be added to or deducted from the Contract amount accordingly.

2.2.9. Material specifications/tests.

Cement, aggregates, torsteel, other construction & finishing materials with hardware etc. shall be free issue to contractor. Owner shall purchase and provide

them at site for storage and utilisation. Unloading of the free issue material (within the working day of the receipt of material) is part of scope of contractor. Each RA bill shall have the material reconciliation for it to be approved.

2.2.10. Contractor to provide everything necessary.

The Contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the drawings, schedule of quantities and specification taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from, and if the Contractor finds any discrepancy in the drawings or between the drawings, schedule of quantities and specification, he shall immediately and in writing refer the same to the Employer / Architect who shall decide which is to be followed.

2.2.11 Contractor's Superintendence

(i) The Contractor shall give all necessary personal superintendence during the execution of the work and as long thereafter as the Architect/Employer may consider necessary and until the expiration of the "Defects Liability Period" stated in the Appendix hereto, or if none stated, within 12 months after the virtual completion of the works, the Contractor shall also during the whole time the works are in progress employ a competent representative approved of by the Architect/Employer (which approval may at any time be withdrawn) at his cost who shall be constantly in attendance at the building while the men are at work. Any directions, explanations, instructions or notices given by the Architect to such representative shall be deemed to be given to the Contractor. The Contractor shall maintain a site order book in which instruction from the Architect or clerk of works or Employers representative shall be recorded.

(ii) The Contractor shall provide and employ on the site in connection with the execution and maintenance of the Works.

(a) Only such technical assistants as are skilled and experienced in their respective callings and such sub-agents, foremen and leading hands as are competent to give proper supervision to the work, they are required to supervise and

(b) Such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the works.

(c) Where required by law or regulation of local or other authority such personnel shall be duly licensed by the competent authority to practice their trades professions and callings.

(d) The contractor shall also provide a list of qualified and experienced technical/skilled Personnel proposed to be employed at site.

(iii) The Employer / Architect shall be at liberty to object to and require the Contractor to remove forthwith from the work, any person employed by the Contractor in or out the execution or maintenance of the works who in the

opinion of the Employer/Architect misconduct's himself, or is incompetent or negligent in the proper performance of his duties, or whose employment is otherwise considered by the Employer / Architect to be undesirable and such person shall not be again employed upon the works without the written permission of the Employer / Architect. Any person so removed from the works shall be replaced without delay by a competent substitute approved by the Employer/Architect. No person under the age of 16 years shall be employed at site.

(iv) The contractor shall if required by the Employer/Architect deliver to the Employer/Architect returns in such form and at such interval as the Employer/Architect may otherwise desire in detail the Employer/Architect may otherwise desire, showing in detail the supervisory staff and the numbers of the several classes of labour from time to time daily, weekly and/or monthly as the Employer feels appropriate employed by the contractor on the site.

(v) The Contractor shall maintain and protect public and private carriage ways, footways, kerbs, pipes, ducts, sewers, service mains, overhead cables, etc., and keep approaches to the site clear of mud throughout the execution of the works and make good or pay for the reinstatement of any damage caused there to directly or indirectly by the execution of the works.

2.2.12 Temporary service road etc.,

(i) Unless otherwise specified, the contractor shall provide and bear all expenses and charges for special or temporary service roads required by him in connection with access to the site. He shall after, adapt or maintain the same as required from time to time.

(ii) He shall not object to the use of these roads by other traffic permitted by the employer.

(iii) The contractor will not have any other claim in case of delay by the Employer or removal of trees, or shifting raising or removing of telegraph telephone or electric lines (overhead or underground) other construction if any which may come in the way of the work.

2.2.13 Site Offices, Stores, Accommodation, etc.

Contractor shall make his own administrative arrangement for the work. The employer may allow certain site facilities to the contractor, provided that these arrangements will not interfere with the Employers future construction program, or any of his other requirements. At any rate the contractor will not be allowed to put up any other structures other than those contracted for in the working site, unless specifically permitted by the Employer/Architect . He shall maintain the temporary site facilities as necessary.

Contractor to inform the owner of location of labour colony & size if outside the site.

The contractor shall dismantle and remove from site all such temporary structures on completion of contract or whenever the Architect/Employer may require such dismantling and removal on account of obstruction of work, nuisance value or any other reason.

All construction shall be suitable for all weather use and be reasonably secure from thieves.A covered store for cement stock and a tool store constructed in block work and GI sheet roofing have to be provided.

2.2.14 Progress

(i) Time is the essence of this contract. It shall be clearly understood that the contractor is bound to complete the works in all respect within the time specified in these documents. The contractor shall also make arrangement submitting the following during the project.

a) Submission of daily labour and progress reports
b) Submission of monthly progress reports
c) Submit reports of weekly progress meetings
d) Submission of monthly progress photographs.

(ii) The Contractor's program of work / bar chart submitted by him shall bear a responsible relation to the total time schedule and shall give the forecast of the dates of commencement and completion of the various construction trade/stages of the work. It shall also indicate the time schedule for all preliminary arrangements the contractors intends to make before start of the works.

The schedule shall be in form of GANTT or BAR or CPM/PERT CHART specifying activity relationships and duration critical path and milestones. The date wise program of work shall be submitted to the Architect/Employer/PMC with in one week of award of the work. It shall contain the completion dates of important milestones like that of structure, finishing works and handing over.

The contractor shall prepare and submit a bar chart based constructions program which should indicate:

Expected commencement & completion dates of each work item.

Monthly cash outlay

Scheduling of samples, shop drawings & approvals.

Scheduling of material procurement.

Scheduling of manpower, plant, tools, machinery and formwork.

This program, after due approval by the Employer, will form part of the contract documents

(iii) The progress schedule should be amended on a regular basis, to be decided by the Architect / Employers representatives.

(iv) The Contractor shall appoint adequate manpower for civil engineering work to be

carried out by him to complete the job and shall increase the manpower requirement in order to speed up the job so as to complete the same within the time schedule.

The Contractor should submit within 7 days of award of work, a schedule showing his manpower deployment (with classification by trade) over the duration of the project. The Employer/Architect shall amend this if necessary, in consultation with the contractor and the contractor shall be bound to adhere to revised manpower scheduling.

(v) The contractor shall arrange at his cost and bring to the site the necessary construction equipment's in excellent working condition shall arrange for additional construction equipment if deemed necessary to speed up the job in order to complete the same within the time schedule. No plant, equipment or machinery shall be withdrawn from the side unless permitted by the Employer/Architect .

(vi) No construction material belonging to the contractor such as centering material, mechanical and electrical equipment shall be allowed to be taken out of site without specific approval of the Employer's Employer/Architect.

2.2.15 Setting out of Works.

(i) The Contractor shall be responsible for the true and proper setting out of the works. He shall be responsible for the proper maintenance of all reference pillars, benchmarks, stakes and other evidences existing in the field required in connection with the setting out of works at his own cost till physical completion of all the items of work or prior to that if agreed to by the Architect. The contractor shall employ a qualified surveyor for maintaining of records jointly.

(ii) All such benchmarks, reference pillars etc., shall be subject to checks and approval of the Architect / Employer at all times. Any variations noticed in the work as a result of improper establishment or maintenance of these shall be at the risk and expense of the contractor.

2.2.16 Access to Works

The Employer, Consulting Engineer, Architect and the Financing Agent and their representatives, shall at all reasonable times to have free access to the works and/or to the workshops, factories, or other places where materials are lying or from which they are being obtained and the contractor shall give every facility to them and their representatives, necessary for inspection and examination and test of the materials and workmanship. No person unauthorized by the Architect / Employer / Consulting Engineer / except the representatives of public authorities shall be allowed on the works at any time.

2.2.17 Authorities, Notices and Patents

(i) The contractor shall conform to the provisions of any Act of the Legislature relating

to the works, and to the Regulations and Bye-Laws of any authority, and of any water, lighting and other companies and/or Authorities with whose system the structure is proposed to be connected, and shall, before making any variations from the drawings or specifications that may be necessitated by so conforming, give to the Architect written notice, specifying the variation proposed / made and the reason for making it, and apply for instructions there on. In case the contractor shall not within five days receive such instructions, he shall proceed with the work, conforming to the provisions, regulations, or Bye/Laws in question, and any variation so necessitated shall be dealt.

(ii) The contractor shall bring to the attention of the Architect all notices required by the said Acts, Regulations or Bye-Laws to be given to any Authority and pay to such Authority, or to any Public Office all fees that may be properly chargeable in respect of the works and lodge the receipts with the Architect / Employer.

(iii) The contractor shall indemnify the Employer against all claims in respect of patent rights, and shall defend all actions arising from such claims, and shall himself pay all royalties, license fees, damage, costs & charges of all and every sort that may be legally incurred in respect thereof.

2.2.18 Watching and Lighting

The Contractor shall provide and maintain at his own expenses all lights, guards and watching when and where necessary or required by the Employer for the protection of the works or for the safety and convenience of those employed in the works of the public.

2.2.19 Working during nights and Holidays.

Subject to any provisions to the contrary contained in the contract, none of the permanent works shall be carried out during night or on weekly and authorized holidays without the permission in writing of the Architect & Employer except when the work/s is/are unavoidable or absolutely necessary for the safety of life, property or works, in which case the contractor shall immediately advise the Architect / Employer accordingly. Provided always that the provisions of this clause shall not be applicable in the case of any work, which it is customary to carry out in rotary or double shifts. No extra payment for carrying out the work at night or on holidays. All safety measures and precautions to be taken while working at night.

2.2.20 Assignments and Sub-letting.

The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or sub-let the contract or any part thereof or interest therein without the written consent of the Architect / Employer and no undertaking shall relieve the contractor from active superintendence of the works during their progress.

2.2.21 Nominated Sub-Contractors

(i) All specialists, Merchants, tradesmen and others executing any work or supplying and fixing any goods for which prime cost prices, provisional sums are included in the schedule of quantities and/or specifications, who may be nominated or selected by the Employer are hereby declared to be sub contractors employed by the contractor and are herein referred to as nominated sub contractors.

(ii) No nominated Sub-Contractor shall be employed on, in connection with the works against whom the contractor shall make reasonable objection or (save where the Employer and the Contractor shall otherwise agree) who will not enter into a contract provided.

a) That the nominated sub-contractor shall indemnify the contractor against claims in respect of any negligence by the Sub-Contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant and property of the contractor or under any workmen's compensation act in force.

b) Payment shall be made to the nominated subcontractor within fourteen days of his receipt of the Architect's certificate provided that before any certificate is issued the contractor shall upon request furnish to the Architect, proof that all nominated sub-contractor's accounts included in previous certificates have been duly discharged, in default whereof the Employer may pay the same upon a certificate of the Architect and deduct the amount thereof from any sums due to the contractor. The exercise of this power shall not create privity of contract as between Employer and sub-contractor.

2.2.22 Facilities to other Contractors

The Employer reserves the right to use the premises and any portions of the site of the execution of any work not included in this contract which he may desire to have carried out by the other agencies / persons, and the Contractor is to allow all reasonable facilities for the execution of such work but is not required to provide any plant or materials for the execution of such work except by special arrangement with the Employer. Such work shall be carried out in such a manner as not to impede the progress of the works included in the contract and the contractor is not to be responsible for any damage or delay that may happen to be occasioned by such work. The Architect / Employer will co-ordinate the activities of all the agencies / persons.

2.2.23 Care of Works

(i) From the commencement to the completion of the works the contractor shall take full responsibility or the care thereof and of all temporary works and in the case any part thereof and of all temporary works from any cause whatsoever, save and except the "Excepted Risks" as defined in "General Conditions of Contract: Definitions & Interpretations" shall at his own cost, repair and make good the same, so that at completion, the permanent works shall be in good order and condition and in conformity in every respect with the requirements, of the contract and the

Architect's instructions.

In the event of any such damage, loss or injury happening from any of the excepted risks, the contractor shall if and to the extent required by the Architect, repair and make good the same as aforesaid at the cost of the employer,
The contractor is also liable for any damage caused to the works occasioned by him in the course of any operations carried out by him in the course of any operations carried out by him for the purpose of complying with his obligations under clause.

ii) "Excepted Risks" are as defined in"Definitions and Interpretations".

2.2.24 Insurance & failure to insurance

(i) Without limiting his obligations and responsibilities, the contractor shall provide necessary Insurance in terms approved by the Employer, to cover the following in the joint names of the employer and the contractor and a copy / copies of the policy / policies shall be furnished to the Employer within 15 days from the award of the contract. Contractor should reimburse the amount and no payment is payable against this by the employer.

a] **CONTRACTORS ALL RISK INSURANCE POLICY** covering loss or damage due to fire, lightning, collapse, defective workmanship and/or materials, flood, storm, theft, burglary, malicious damage, subsidence, riots, etc.
b] Third Party Liability
c] Workmen's Compensation in accordance with latest, revised statutory provision;
d] Contractors tools, tackles and machinery;
e] All risks to materials during transit;
f] Any other Insurance required for fully indemnifying the Employer from any claim that may arise on account of the Contractors' operations at site.
g] Sub-contractors are covered under insurance.
h] Insurance on materials supplied by client and dumped on site.
i] Personnel from client side, visiting consultants and their personnel shall be covered under the insurance.
j] This insurance shall be for the entire period of the contract and valid till the work completion certificate is issued.
k] All documents pertaining to insurance shall be submitted to the employer with full details including dates of renewal.

ii) If within a reasonable time from the commencement of the works the contractor shall fail to effect and keep in force the Insurance or any other Insurance he may be required to effect under the terms of the contract, then the Employer may effect and keep in force any such Insurance and pay such premium or premiums as may be necessary for that purpose and deduct the same from time to time from the monies due or which may become due to the contractor in the manner laid down .

2.2.25 Labour and General Laws

(i) The contractor shall employ labour in sufficient force either directly or through approved sub contractors to maintain the required rate of progress and quality specified in the contract and to the satisfaction of the Employer / Architect.

(ii) The contractor shall provide pure drinking or potable water facilities to the workers.

(iii) The Contractor shall pay fair and reasonable wages to workmen, employed by him in the contract undertaken by him. In the event of any dispute arising between the contractor and his workmen on the ground that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Employer who shall decide the same. The decision shall not in any way affect the conditions in the contract regarding the payment to be made by the Employer at the accepted Tender Rates.

(iv) The contractor shall comply with provisions of the Payment of Wages Act, 1936, minimum Wages Act 1948, Employees Liability Act 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, the contract Labour Regulation and Abolition Act, 1970, or any modifications thereof or any other law relating thereto and rules made thereunder from time to time.

(v) The contractor shall indemnify the employer against any payment to be made under the Acts for the observance of the Regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractors.

(vi) The contractor shall be responsible for and shall pay any compensation to his own workmen under the Workmen's Compensation Act 1923 (VIII) of 1923, (hereinafter called "The said Act") for injuries caused to the workmen. If such compensation is paid by the Employer as Principal under Sub-section (i) of section 12 of the said Act on behalf of the Contractor under Sub-Section 2) of the said section. Such compensation shall be recovered in the manner laid down.

(vii) The Contractor shall be responsible for and shall pay the expense for providing medical aid to any workmen whom may suffer a bodily injury as a result of an accident. If the Employer incurs such expenses, the same shall be recoverable from the Contractor forthwith and be deducted without prejudice to any other remedy by the Employer from any amount due or that may become due to the Contractor.

(viii) The Contractor shall provide all personal safety equipment and first aid and apparatus for the persons employed on the site and maintain the same in good condition suitable for immediate use at any time.

(ix) The contractor shall not engage labours that are aged below 18 years.

2.2.26 Nuisance

(i) The Contractor shall not at any time, do, cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to Employers, tenants, or occupants of other properties near the site of work and to the public generally.

(ii) The contractor shall indemnify the Employer in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such nuisance in so far as the Contractor is responsible thereof.

2.2.27 Mile Stone Penalties:

If the contractor doesn't follow the schedule of completion on major mile stone as in the schedule mile stone penalty will be applicable at every stage of project**.**

Delay from the schedule:

Per week: 0.5% of negotiated contract value will be penalized to the contractor

Above 6 week, Client will decide on termination of contract

2.2.28 Failure to Comply with Architects Instruction.

If the contractor after receipts of written notice from the Architect / Employer requiring compliance within five days fails to comply with such further drawings and/or Architect's / Employer's instructions, the Employer may employ and pay other persons to execute instructions and any such work whatsoever that may be necessary to give effect thereto, and all cost incurred in connection therewith, plus 50% as penalty shall be recoverable from the contractor by the Employer on the Certificate of the Architect as a debt or may be deducted by him from any moneys due or may become due to the contractor.

2.2.29 All inclusive rates

This is an Item Rate contract. The Item Rate shall include purchase cost of material of approved make, cost of labor, tools – tackles & plants incidentally required for full execution, testing, commissioning and completion of installation as per specifications & drawings; cost of waste on materials; hoisting, lowering and fixing in position; any other overheads, and cost of sample works and contractors profit. They shall be quoted for all lifts up to all heights given in the drawings for multiple staging, tall centering, scaffolding etc. including extra labor, if required. Nothing extra shall be paid on account of any other reason. All the rates are excluding GST which will be paid as per the Govt. norms.

The Item Rates shall also include costs towards barricades etc if required that may have to be erected as per statutory authorities directions &/or as directed by the Employer/ Architect. Nothing extra shall be paid on this account.

Contractor shall consider all Basic Rates mentioned in the tender document for quoting the item rates. The Basic Rate shall include the rate at which the specified material will be purchased and delivered at site including all cost, various taxes and duties. Contractor shall mention basic rates of materials which are not

mentioned in the tender document

The Item Rates quoted by the contractor shall remain constant till the completion of all works, provided the Basic Rates remain unchanged. The variation in the Basic Rate (both the upward and down ward) will be accommodated by Modified Item Rates brought to the notice before the execution of such affected items by submitting the modified rate analysis to the consultants for their approval. +/- 5% in variation in all the basic rates of major materials mentioned in the tender document to be absorbed by both the parties i.e., Employer & Contractor. If client provides any material, the Basic Rate as quoted for such item will be deducted from contractors Quoted Item Rate for working out Modified Item Rate.

The Consulting Architect's decision on the finalization of rates for any such new, extra, substituted, modified items shall be final and binding.

2.2.30 Advances

Mobilization Advance

Mobilization advance of **5% the total negotiated cost of works** may be paid against the Bank Guarantee and on submission of an undertaking in an approved form to return the amount in the event of termination of contract or cancellation of the project for any reason. The mobilization advance will be recovered from each running account bill on pro-rata basis.

2.2.31 Retention Money

The retention money will be recovered from interim bills at the rate of 5% of gross value of works done. In case of termination of contract the retention money shall be forfeited under this contract.

On completion and during final certification the Employer may consider certifying to return up to 50% of the retention money; only if he thinks that the balance of the retention money is sufficient security for the defects liability period.

The retention money will be interest free and will be returned to the contractor on satisfactorily rectifying all the defects found during the defects liability period.

2.2.32 Submission of Bills

All the bills should be supported by the detailed measurement sheets and should detail out material supplied by the client, account of materials at site, previous payments, adhoc payments received etc., and any other deductible amount and detailed rate analysis for the extra and modified items. The Employer's representative shall check the bill jointly with contractor. If found necessary and advisable the Employer may certify an adhoc payment against the submitted bill. In each interim & final bill previous & present quantities shall be mentioned and measurement sheets of the present quantities shall be attached. The bills & measurement sheets shall be clear & without ambiguity; as a prerequisite for the submission of the bills. Ambiguous bills and bills less than 15 % of the contract value shall not be accepted.

2.2.33 Certificates and Payments

i) The Contractor shall be paid by the Employer from time to time by installments under Interim Certificates to be issued by the his Engineer in charge on account of the work executed, when in the opinion of the Engineer in charge, work to the approximate value named in the Appendix as "Value of Work for Interim Certificates" (or less at the reasonable discretion of the Employer) has been executed in accordance with this Contract subject, however to a retention of the percentage of such value named in the Appendix hereto as "Retention Percentage for the Interim Certificates". All the payments made under interim certificate will be subject to final reconciliation at the time of settlement of final bill/accounts.

ii) And when the works have been virtually completed and the Engineer in charge shall have certified in writing that they have been completed, the contractor shall be paid by the employer in accordance with the certificate to be issued by the Engineer in charge the sum of money named in the Appendix as "Installment after virtual completion" being a part of the said Total Retention Money and the Contractor shall be entitled to the payment of the final balance in accordance with the final certificate to be issued in writing by the Engineer in charge at the expiration of the period referred to as "The Defects Liability Period" in the Appendix here to from the date of virtual completion or as soon after the expiration of such period as the works shall have been finally completed and all defects made good according to the true intent and meaning hereof which ever shall last happen, provided always that the issue by the Engineer in charge of any certificate during the progress of the works or at or after their completion shall not relieve the contractor of his liability under Clause 2.2.2 and 2.2.4, nor absolve the contractor of his liabilities in cases of fraud, dishonesty, or to any matter dealt with in the certificate in case of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. No certificate is evidence that any works or materials to which it relates are in accordance with the contract. The Employer will not be liable to pay to the contractor any interest on the amount so retained by him.

(iii) The Employer shall have power to withhold any certificate if the works or any parts thereof are not being carried out to their satisfaction.

(iv) The Employer may make any correction in any previous certificate that shall have been issued by him.

(v) Payments upon the Engineer in charge's Certificate shall be made within the periods named in the Appendix as " Payment of bills" after such certificates has been delivered to the Employer.

(vi) Whenever any claim for the payment of a sum of money to the Employer arises out of or under this contract against the Contractor, the same may be deducted by the

Employer from any sum then due or which at any time thereafter may become due to the contractor, under this contract, or failing that under any other contract with the Employer or from any other sum due to the Contractor from the Employer or from his retention money, or he shall pay the claim on demand.

(vii) Engineer in charge may certify an adhoc payment up to 75% of the Running Account bill within four days of the submission of the bill to him if he is satisfied with the works executed by the contractor at site. This adhoc payment shall be adjusted during certifying the relevant Running account bill. The Engineer in charge reserves the right to certify the adhoc payment against the running account bill.

2.2.34 Ascertainment of Prices of Extra Items.

(i) In the event the contractor is asked to execute any item of work that is not covered under the contract or Schedule of Quantities and Rates, such items of work will be paid for & valued as per and in order of preference indicated below:

a. At rates applicable in the contract schedule or

b. At rates that may be derived from the rates in the contract scheduled for analogous items.

c. In the event of a & b not being possible, at market rates as may be worked out based on the cost of materials including taxes & transportation + labor + 15% as overheads & profits. + GST as applicable

(ii) While all efforts will be made to finalize the rates before the extra item of work is ordered, the Contractor shall not stop the work on account of non-finalization of the rates.

2.2.35 Payments at Reduced Rates

The rates for several items of work agreed to within shall be valid only when the items concerned are accepted as having been completed fully in accordance with the sanctioned specifications. In cases where the items of works are not accepted as so completed, the Architect may certify payment on account of such items at such reduced rates as he may consider reasonable in either preparation of final or on account bills.

If the Employer deems it inexpedient to correct work which has been damaged or not done in accordance with the contract, the Employer reserves the right to make equitable deductions from contract prices against such work.

2.2.36 Unfixed materials to become property of Employer

Where in any certificate (of which the Contractor) has received payment the engineer in charge has included the value of any unfixed materials intended for and/or placed on or adjacent to the works, such materials shall become the property of the Employer and they shall not be removed except for use upon the works, without the written authority of the Employer. The contractor shall be liable

for any loss or damage to such materials.

2.2.37 Penalty for Bad work and Removal of improper work.

If at any time before the security deposit is refunded to the contractor, it shall appear to the Employer/Architect/PMC that any work has been executed with unsound, imperfect or unskillful workmanship or with materials of inferior quality or articles provided by him for the execution of the work are unsound or of a quality not in accordance with the contract, it shall be lawful for the Employer/Architect/PMC to intimate this fact in writing to the contractor and then not withstanding the fact the work, materials or articles complained for may have been paid for, the contractor shall be bound forthwith to rectify or remove and reconstruct the work so specified and provide other proper and suitable materials or articles at his own cost. In the event of the contractor failing to do so within a period to be specified by the Employer/Architect/PMC in the written intimation aforesaid, the employer may rectify, or remove and re-execute the work or remove and replace the materials or articles complained of, as the case may be at the risk and expense in all respects of the contractor. Should the Employer for any valid reasons, consider that any such inferior work or materials as described above has to be accepted, he may accept the same at reduced rates as he may fix therefore.

2.2.38 Date of Commencement and Completion.

The contractor shall be allowed admittance to the site on the "Date of Commencement" stated in the Appendix, and he shall put all efforts/requisite resources in the form of men, materials and machinery, and forthwith begin the works and shall regularly proceed with and complete the same (except such painting or other decorative work as the Architect/Employer may desire to delay) on or before the "Date of Completion" stated in the Appendix subject nevertheless to the provisions for Extension time hereinafter contained.

2.2.39 Delay and Extension of Time.

If in the opinion of Architect/Employer/PMC the works be delayed

a) By force majure.

b) By reasons of any exceptionally inclement.

c) By reason of proceedings taken or threatened by or dispute with adjoining or neighboring Employers or public authorities arising otherwise than through the Contractor's own default or

d) By the works or delays of other contractors or tradesmen engaged or nominated by the employer or the Architect and not referred to in the schedule of quantities or

e) By reason of civil commotion, local combination of workmen on strike or lockout affecting any of the building traders or

f) in the consequence of the contractor not having received in due time the necessary instructions from the Architect for which he shall have specifically applied for in writing, the Architect in consultation with the Employer shall make a fair and reasonable extension of time for completion of the contract works. In case of such strike as may be given written notice thereof to the Architect, the

Contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of the Architect to proceed with work. The Contractor shall not be entitled to any compensation for escalation on this account.

2.2.40 Suspension of works.

(i) If at any time after the execution of the contract documents, the Employer shall for any reason whatsoever require the whole or any part of the work, as specified in the tender to be stopped for any period or shall not require the whole or part of the work to be carried out at all, he shall give notice in writing of the fact to the contractor who shall thereupon suspend or stop the work totally or partially as the case may be. In any such case, except as provided hereunder the contractor shall have no claim to any payment of compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not so derive in consequence of the full amount of work not having been carried out, or on account of any loss he may be put to on account of materials purchased or agreed to be purchased after issue of such notice or for unemployment of labour recruited by him. He shall not have any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs or instructions which may involve any curtailment of the work as originally contemplated.

(ii) Where, however, materials have already been purchased or agreed to be purchased by the Contractor before receipt by him of the said notice, the contractor shall be paid for such materials at the rate determined by the employer provided, they are not in excess of requirements and are of approved quality and / or shall be compensated for the loss if any, that he may be put to in respect of materials agreed to be purchased by him, the amount of such compensation to be determined by the employer whose decision shall be final and binding.

iii) Any substantial part of the permanent works that has been both completed to the satisfaction of the Architect, and occupied or used by the Employer.

(iv) If any part of the Permanent Works shall have been substantially completed and shall have satisfactorily passed any final test that may be prescribed by the contract, the Architect may issue a Certificate of completion in respect of that part of Permanent Works before completion of the whole of the works and upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete any outstanding work in part of the works during the period of maintenance.

(v) Provided always that a Certificate of Completion given in respect of any section or part of the Permanent Works before completion of the whole shall not be deemed to certify completion of any ground or surfaces requiring reinstatement, unless such certificate shall expressly so state.

2.2.41 Certificate of Virtual completion

The works shall not be considered as completed until the Engineer in charge has certified in writing that they have been virtually completed and the defects liability period commence from the date of such certificate.

2.2.42 Defects After Completion.

Any defect, shrinkage, settlement or other fault which may appear within the "Defects Liability Period" stated in the Appendix hereto or, if none stated, then within twelve months after the virtual completion of the works arising in the opinion of the Employer / Architect from materials or workmanship not in accordance with the contract, shall upon the direction in writing of the Employer / Architect, and with in such reasonable time as shall be specified therein, be amended and made good by the contractor, at his own cost unless the Employer shall decide that he ought to be paid for such amending and making good; and in case of default make good such defects, and all damages, shrinkage, settlements or other faults, and all damages, loss and expenses consequent there on or incidental thereto, shall be recoverable from him by the Employer or may be deducted by the Employer from any money due to the contractor, or the Employer may in lieu of such amending and the contractor a sum to be determined by the Employer/Architect/PMC equivalent to the cost of amending such work plus 50% as penalty and in the event of the amount retained under retention being insufficient, to recover the balance from the Contractor, together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done or material supplied by any sub-contractor employed on the works who has been nominated or approved by the employer as , the contractor shall be liable to make good in the same manner, as if such work or material has been done or supplied by the Contractor had been subject to the provisions of this Clause. The Contractor shall remain liable under the provisions of this clause not withstanding the signing by the Engineer in charge of any Certificate or the passing of any accounts / payments.

2.2.43 Damage for Non Completion

If the Contractor fails to complete the works by the date stated in the Appendix or within any extended time herein and the Engineer in charge certifies in writing that in his opinion the same ought reasonably so to have been completed, the contractor shall pay or allow to the Employer the sum named in the Appendix as "Liquidated Damages" for the period during which the said works shall so remain incomplete and the Employer may deduct such damages from any moneys due to the Contractor. The deduction of such sum shall not however absolve the contractor of his responsibility and obligations to complete the work in its entirety.

2.2.44 Termination of Contract by Employer.

(i) If the Contractor being an individual or a Firm commit any "Act of Insolvency" or shall be adjudged an insolvent or being an Incorporated Company shall have an order for compulsory winding up made against it or pass an effective resolution for

winding up voluntarily or subject to the Liquidator in such acts of Insolvency or winding up shall be liable within seven days after notice to him requiring him to do so to show to the reasonable satisfaction of the Employer that he is able to carry out and fulfill the contract, and to give security thereof, if so required by the Employer.

(ii) Or if the Contractor (whether an individual Firm of Incorporated Company) shall suffer execution to be issued.

(iii) Or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the Contractor.

(iv) Or shall assign or sublet this contract without the consent in writing of the Employer first obtained.

(v) Or shall charge or encumber this contract or any payments due or which may become due to the Contractor thereunder.

(vi) Or if the Architect shall inform in writing to the Employer that the Contractor -

a] Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for ten days after receiving from the Architect written notice to proceed, or

b] Has failed to proceed with the works with such diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or

c] Has failed to remove materials from the site or to pull down and replace the work for five days after receiving from the Architect written notice that the said materials or work were condemned / rejected by the Architect under these conditions, or

d] Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed and performed by the Contractor for five days after written notice shall have been given to the Contractor requiring the Contractor to observe or perform the same, or

e] Has to the detriment of good workmanship or in defiance of the Architect's instructions to the contrary sublet any part of the Contract.

Then and in such of the said cases the Employer in consultation with the Architect may notwithstanding any previous waiver, after giving seven days notice in writing and without affecting the powers of the Architect or the obligations and liabilities of the contract the whole of which shall continue in force as fully as if the works subsequently executed by or on behalf of the Contractor. And further, the Employer in consultation with the Architect, may enter upon and take possession of the works and all plant, tools, scaffoldings, sheds, machinery and other power utensils and materials lying upon the premises or adjoining lands or roads, and use the same by means of his own servants and workmen in carrying on and completing the works or by employing any other Contractors or other person or persons to complete the works, and the Contractor shall not in any way interrupt or

do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the works. When the works be completed or as soon thereafter as convenient the Engineer in charge shall give a notice in writing to the Contractor to remove his surplus materials and plant, and should the Contractor fail to do so within a period of ten days after receipt thereof by him, the employer shall sell the same by public auction, and shall give credit to the contractor for the amount realized after deducting expenses. The Engineer in charge shall thereafter ascertain and certify in writing under his hand what (if anything) shall be due or payable to or by the Employer for the value of the said plant and materials so taken possession of by the Employer and the expenses or loss which the Employer shall have been put to in producing the works to be completed, and the amount which shall be so certified shall there upon be paid by the Employer to the Contractor or by the Contractor to the Employer, as the case may be, and the certificate of the Engineer in charge shall be final and conclusive between the parties.

2.2.45 Termination of Contract by Contractor

(i) If payment of the amount payable by the Employer under Certificate of the Engineer in charge as provided for hereinafter shall be in arrears and unpaid for thirty days after specific notice in writing under this clause requiring payment of the amount as aforesaid or Employer interferes with or obstructs the use of any such certificate, or the Employer commits any "Act of Insolvency", or shall have an order made against him or pass an effective resolution for winding up, either compulsorily or subject to the supervision of the court or voluntarily, or if the Official Assignee or the Liquidator in any such winding up shall be unable within 15 days after notice to him requiring him to do, to show to the reasonable satisfaction of the Contractor that he is able to carry out and fulfil the contract and to make payment or to give security for the same, or if the works be stopped for a continuous period of over six months under the order of the Employer or by any injunction or other orders of any Court of Law, then and in any of the said cases, the Contractor shall be at liberty to terminate the contract by notice in writing to the Employer, through the Architect and he shall be entitled to recover from the Employer, payment for all works executed and for any loss he may sustain upon any plant or material supplied or purchased or prepared for the purpose of the Contract.

(ii) In arriving at the amount of such payment the net rates contained in the Contractor's original tender shall be followed, or where the same may not apply, valuation shall be made in accordance.

2.2.46 House Keeping

All unwanted debris should be cleared from the site. The contractor should obtain permission from the concerned authorities if necessary. In any case the Contractor will not be allowed to stock more than 100 Cum of debris at site. Site & store should be maintained neat and clean. It is the responsibility of contractor to clear all debris generated at site with no extra claims.

2.2.47 Urgent Repairs

If by reason of any accident or failure or other event occurring to or in connection with the works or any part there of either during the execution of the works or during the period of execution of maintenance any remedial or other work or repair shall in the opinion of the Employer or the Employer's representative be urgently necessary for security and the contractor is unable or unwilling at once to do such work or repair, the Employer may by his own or other workmen do such work or repair as the Employer or the Employer's representative may consider necessary. If the work or repair so done by the employer is work which in the opinion of the Employer the contractor was liable to do at his own expense under the contract all costs and charges properly incurred by the employer in doing so shall on demand be paid by the contractor to the employer from any money due or which may become due to the contractor provided always that the employer or the Employer's representative (as the case may be) shall as soon after the occurrence of any such emergency as may be reasonable practicable notify the contractor thereof in writing.

2.2.48 As Built Drawings

The Architect will furnish working drawings and sketches from time to time as required for the execution of the job. The contractor has to return one set of the drawings and sketches with all additions/ alterations as actually made after completion of the works to enable the Architect to get such additions/alterations made during the execution incorporated in the original tracings in order to have these original tracings as "AS BUILT' drawings.

2.2.49 Complete job and site cleaning

The complete job means and includes protecting executed works by carefully & properly supporting, tying, covering with the help of paper, plastic sheets, gunny bags, by laying plaster of Paris or such other means.

The complete job also means & includes uncovering and cleaning of all surfaces, grooves, nooks and corners, redoing properly the damaged surfaces, cleaning of taps, bottle traps, floor traps, gully traps, inspection chambers, flushing systems, leakage, fall-outs of cement mortar, gums and adhesives, paints and polish etc. Cleaning of switchboards, light fittings and satisfactory commissioning of all works and parts. All the surfaces should be washed, vacuum cleaned, polished, dusted thoroughly as applicable and appropriate.

Care should be taken for not disturbing / damaging the works of other agencies as well as furniture, fittings and any fixtures, gadgets etc. brought by the client for installation at site. Any such damage should be made good at the contractor's own cost, as per the direction of Consulting Architect.

ANNEXURES TO BE FILLED BY BIDDER ALONG WITH LABOUR BID

Price schedule -Annexure -A

SL NO	ITEM	UOM	Unit Rate
1	Excavation	M3	
2	Back filling	M3	
3	PCC (includes shuttering, finishing)	M3	
4	RCC (includes shuttering, finishing)	M3	
5	Painting	M2	
6	Rolling Shutter	Nos	
7	Doors	Nos	
8	Windows	Nos	
9	Finishing like vitrified Tiles, granite works etc.	M2	
10	Brick work (Red brick)	M2	
12	Boulder soiling	M3	
13	Fencing	M2	
14	Any other works		

Resources schedule -Annexure -B

SL NO	Equipment	UOM	Capacity
1	Payloaders	Nos	
2	Dump trucks / Tipper	Nos	
3	Excavators	Nos	
4	Concrete mixers	Nos	
5	Transit Mixers	Nos	
6	Concrete Vibrators	Nos	
7	Shuttering material	Nos	
8	Dewatering Pumps	Nos	
9	Scaffolding material	LS	
10	Survey Equipment's	Nos	
11	Welding Machines	Nos	
12	Diesel Generators	Nos	
13	Illumination Sets	LS	
14	Electrical Cablings & Items	LS	
15	Any other equipment's	LS	

Manpower deployment -Annexure -C

SL NO	Description	UOM	Capacity
1	Site In charge	Nos	
2	Engineers	Nos	
3	Supervisors	Nos	
4	Surveyors	Nos	
5	Masonries / Tile layer / Polisher / Skilled worker	Nos	
6	Carpenters	Nos	
7	Helpers	Nos	
8	Semi / Unskilled manpower	Nos	
9	Any other manpower	Nos	

Details of Construction utilities requirement filled – Annexure D

SL NO	Description	UOM	Capacity
1	Construction water	M3/Day	
2	Construction power	MW	
3	Drinking water requirement	M3/Day	
4	Area requirement		
	I.Closed Storage	M2	
	II.Open Area	M2	
	III.Office Area for PMC & self use	M2	

APPENDIX

Sl No	Particular	Description
1	Name of Work	PROPOSED CONSTRUCTION OF SHRIMAN BHAUSAHEB GANDHI (CBSE) INTERNATIONAL SCHOOL AT SOLAPUR
2	Name of Client	Shri SAPDJ Pathshala AT New Walchand Campus opp. WIT College Solapur
3	Name of Architect	M/s Shastri Associates, No. 1472, 20th Main, 13th cross, Sector 1, HSR Layout, Bangalore – 560 102
4	Date of Issue of Tender	The Administrator, Sarthak, 90 Raghavendranagar, murarji peth, Solapur Maharastra - 413002
5	Place of Issue of Tender	
6	Date of Submission of tender	
7	Place of submission of Tender	The Administrator, Sarthak, 90 Raghavendranagar, murarji peth, Solapur Maharastra - 413002
8	Date of opening of tender	
9	EMD in DD, Nationalized bank	Rs. 10,00,000.00
10	Date of Commencement	Within two week from the date of issue of work order.
11	Duration of Completion	18 Months including monsoon period
12	Defects Liability Period	12 months from the date of Completion of work.

13	**Frequency of running bills**	**Running Bills with minimum bill value of 7.5% of the contract value**
14	**Mobilization advance**	**5% of the negotiated contract value against bank guarantee**
15	**Other Advances**	**50% against bought out items on written request of Employer and balance 50% after delivery at site & safe keeping within 7 working days**
16	**Liquidated damages**	**½% per week of the contract value to a maximum of 5% after which Employer reserves the right to terminate the contract and forfeit the EMD**
17	**Retention amount**	**5% will be withheld on the actual work done on each running bill and shall be released after virtual completion against bank guarantee for the same to be given valid up to Defects liability period**
18	**Period of final measurement**	**One month from the date of virtual completion.**
19	**Payments of bills**	**a) Adhoc payment of certified adhoc amount of the interim bill in 5 working days. b) Certified payment after the interim bill checking in 7 working days from bill certification c) Final bill payment within 30 days after final bill certification**
20	**Power and water**	**The entire cost of water & electricity for construction activity and labour sheds shall be borne by the contractor. 2% of contractor's every running account bill shall be deducted as expenditure for water. Expenditure for consumption of electricity shall be paid separately by the contractor**

DRAFT FORMATS

DRAFT OF ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made on_____day of _____, 2026 BETWEEN M/s_____. having its office at_____, represented by its _____(herein after called the "Employer") of the one part and M/s._____represented by its _____(herein after called the "Contractor") of the other part.

WHEREAS the Employer is desirous of **PROPOSED CONSTRUCTION OF SHRIMAN BHAUSAHEB GANDHI (CBSE) INTERNATIONAL SCHOOL FOR Shri SAPDJ Pathshala at SOLAPUR** and has caused drawings and specifications describing the works to be done, to be prepared by **M/s. SHASTRI ASSOCIATES,** # 1472, 20th main, 13th Cross, Sector 1, HSR Layout, Bangalore – 560 102, his Architect and whereas the said drawings, the specification and the schedule of quantities have been signed by or on behalf of the parties hereto AND WHEREAS the contractor has agreed to execute upon and subject to the conditions set forth herein (hereinafter referred to as "the said conditions") the works shown upon the said specification and included in the said schedule of quantities at the rates therein set forth.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1] In consideration of the said contract amount to be paid at the times and in the manner set forth in the said conditions, the contractor shall upon and subject to the said conditions, execute and complete the works shown upon the said drawings and described in the said specifications and / or the schedule of quantities.

2] The Employer shall pay the contractor the said contract amount or such other sum as shall become payable at the time and in the manner hereinafter specified in the said conditions.

3] The term "the Architect" in the said conditions shall mean representative of the firm **M/s. SHASTRI ASSOCIATES** or ceasing to be the Architect for the purpose of this contract, such other person as shall be nominated for the purpose by the Employer, not being a person to whom the Contractor shall object for reasons considered to be sufficient by the arbitrator mentioned in the said conditions provided always that no person subsequently appointed to be the Architect under this contract shall be entitled to disregard or overrule any previous decision of approval or direction given or expressed by the Landscape Architect for the time being.

4] The said conditions, general specifications, schedule of quantities thereto shall be read and construed as forming part of this agreement and the parties hereto shall be respectively abide by, submit themselves to the conditions and perform the agreement as on their part respectively in such conditions contained.

In witness whereof the parties have signed and executed this agreement in the presence of witnesses attesting here under on the day, month and year above written.

Signed by the said in the presence of: ……..

Name: **EMPLOYER**
Address:

Represented by

Occupation:

Signed by the said in the presence of: ……

Name: CONTRACTOR
Address:

Occupation:

BANK GAURANTEE FOR ADVANCE PAYMENT

To

…….

…….

……

Name of Contract: **PROPOSED CONSTRUCTION OF SHRIMAN BHAUSAHEB GANDHI (CBSE) INTERNATIONAL SCHOOL FOR Shri SAPDJ Pathshala at SOLAPUR**

Dear Sirs,

In accordance with the provisions of the condition of contract, Sub-Clause ("Advance Payment") of the above mentioned Contract _____ _____(name and address of Contractor) (hereinafter called "the Contractor") shall deposit with …….. a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of Rs._____ (amount of guarantee in words).

We the_____ (bank or financial institution), as instructed by the Contractor, agree unconditionally and irrevocable to guarantee as primary obligation and not a Surety merely. The payment to …….. on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the not exceeding Rs._____ (amount of Guarantee) _____ (in words)

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

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until …….. or the representative of the Managing Director certified that work as mentioned in the conditions of contract to the extent covered by the advance payment and the same is accepted by the Managing Director as commensurate to the advance paid to the contract.

Yours truly

SIGNATURE AND SEAL:

Name of Bank / Financial Institution

Address:

Date:

QUALITY CONTROL

1. Cement:

a) Recommended tests:

i) Fineness
ii) Soundness
iii) Consistency
iv) Setting time
v) Compressive strength and
vi) Chemical analysis

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 4031-1988 Method of physical tests for Hydraulic cements

Part-2 -Determination of fitness by Blaine air Permeability method.

Part-3 - Determination of soundness.

Part-4 - Determination of consistency.

Part-5 - Determination of initial and final setting time.

Part-6 - Determination of compressive strength.

IS: 4032-1985 Chemical analysis of Hydraulic cement.

IS: 3535-1986 Method of sampling Hydraulic cements.

IS: 8112-1989 Specification for 43 grade ordinary Portland cement.

IS: 12269-1987 Specification for 53 grade ordinary Portland cement.

IS: 12330-1988 Specification for sulfate resisting Portland cement.

Concrete workers

Guide-1992 By Research and Consultancy directorate, A.C.C. Ltd., Mumbai

2. Fine Aggregate:

a) Recommended tests:

i) Particle size and shape

ii) Estimation of deleterious materials and organic impurities

iii) Specific gravity and density

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 383-1990 Specification for coarse and fine aggregate from natural sources for concrete.

IS: 2430-1986 Methods of sampling of aggregates for concrete.

IS: 2386-1990 Methods of tests for aggregates for concrete.

Part-1 - Particle size and shape

Part-2 -Estimate of deleterious materials and organic impurities.

Part-3 -Specific gravity and density.

Part-6 -Mortar making properties of fine aggregate.

Concrete workers

Guide-1992 By Research and Consultancy directorate, A.C.C. Ltd., Mumbai

3. Coarse Aggregate:

a) Recommended tests:

i) Sieve analysis

ii) Flakiness index

iii) Specific gravity and density

iv) Soundness

v) Alkali aggregate reaction

vi) Mechanical properties

vii) Petrographic examination

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 383-1990 Specification for coarse and fine aggregates from natural sources for concrete.

IS: 2430-1986 Methods of sampling of aggregates for concrete.

Is: 2396-1990 Methods of tests for aggregates for concrete

Part-1: Particle size and shape.

Part-3: Specific gravity and density.

Part-4: Mechanical properties.

Part-5: Soundness.

Part-7: Alkali aggregate reactivity.

Part-8: Petrographic examination

Concrete workers

Guide-1992 By Research and Consultancy directorate, A.C.C. Ltd., Mumbai

4. Water:

a) Recommended tests:

i) P-Alkalinity

ii) M-Alkalinity

iii) Inorganic solids

iv) Sulfates

v) Chlorides

vi) Suspended solids

vii) Organic solids

viii) pH value

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

d) Relevant references

IS: 456-1978 Code of practice for plain and reinforced concrete

IS: 3025-1986 Methods of sampling and tests (Physical and chemical) for water and waste water.

Part-1 (1986): Sampling

Part-2 (1983): pH value

Part-15 (1989): Total residue (total solids dissolved and suspended

Part-16 (1989): Total dissolved solids

Part-17 (1989): Total suspended solids

Part-23 (1986): Alkalinity

Part-24 (1986): Sulfates

Part-32 (1988): Chlorides

5. Admixtures:

(Accelerating, retarding, water reducing/workability improvement and air entraining admixtures)

a) Recommended tests:

i) Water content of concrete with and without admixture

ii) Setting time of concrete with and without admixture

iii) Compressive strength of concrete with and without admixture

iv) Change in length of concrete with and without admixture

v) Bleeding of concrete with and without admixture

vi) Workability of concrete with and without admixture

vii) Aircontent of concrete with and without admixture

viii) Heat of hydration of concrete with and without admixture

ix) Chloride content

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

d) Relevant references:

IS: 9103-1979 Specification for admixtures for concrete

IS: 516-1991 Methods of tests for strength of concrete

IS: 6925-1987 Methods of test for determination of water soluble chlorides in concrete admixtures.

6. Fresh concrete:

a) Recommended tests:

i) Slump/compaction factor/Vee Bee test

ii) Setting time of concrete by penetration method

iii) Air content

iv) Analysis for constituents

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

d) Relevant references:

IS: 1199-1991 Methods of sampling and analysis of concrete

IS: 8142-1987 Setting time of concrete by penetration resistance

7. Hardened Concrete:

a) Recommended tests:

i) Compressive strength

- Accelerated curing
- Normal curing

ii) Permeability test

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

d) Relevant references:

IS: 456-1978 Code of practice for plain and reinforced concrete

IS: 516-1991 Methods of tests for strength of concrete

IS: 9013-1987 Method of testing of accelerated cured concrete

IS: 3085-1990 Method of test for permeability of cement mortar and concrete.

8. Reinforcing Steel:

a) Recommended tests:

i) Tensile test on bars welded or otherwise

ii) Bend and rebend test

iii) Bond test

iv) Chemical analysis

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

d) Relevant references:

IS: 1786-1990 Specification of high strength deformed steel bars for concrete reinforcement.

IS: 1608-1991 Methods of tensile testing of steel products

IS: 228-1987 Methods of chemical analysis of steel

Part-1: Determination of carbon by volumetric method

Part-3: Determination of phosphorous by alkali metric method

Part-9: Determination of sulphur

9. Brick work.:

a) Recommended tests:

i) Dimensional tolerances

ii) Brick density and compressive strength

iii) Water absorption

iv) Drying shrinkage

v) Moisture movement

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

10. Wood:

a) Recommended tests:

i) Dimensional tolerances for cut sizes

ii) Water absorption

iii) Shrinkage

iv) Visible tests for knots,cracks,warps,bends,etc.

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards.

d) Relevant References:

IS: 4020-1994

11. Door Shutters:

a) Recommended tests:

i) Dimensions and defects of squareness test

ii) General flatness test

iii) Local planeness test

iv) Impact indentation test

v) Edge loading test

vi) Shock resistance test

vii) Buckling test

viii) Misuse test

ix) Slamming test

x) Screw holding power test

Additional tests on wood particleboard:

i) Determination of water absorption

ii) Determination of swelling in water

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 4020-1994 Door shutters method of test

Part-1: General

Part-2: Measurement of dimensions & defects of squareness

Part-3: Measurement of defects of general flatness

Part-4: Local planeness test

Part-5: Impact indentation test

Part-7: Edge loading test

Part-8: Shock resistance test

Part-9: Buckling test

Part-10: Misuse test

Part-11: Slamming test

Part-12: Screw holding power test

IS: 2380-1977 Method of test for wood particleboards

Part-16: Determination of water absorption

Part-17: Determination of swelling in water

12. Aluminum:

a) Recommended tests:

i) Thickness measurement of member

ii) Coating thickness

b) Sampling and frequency of sampling:

As per guidelines in relevant Indian Standards

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 5523-1991 Method of testing anodic coating on Aluminum

13. Tiles:

a) Recommended tests:
   i) Dimensional tolerance
   ii) Flatness
   iii) Perpendicularity
   iv) Straightness
   v) Water absorption
   vi) Wet transverse strength
   vii) Resistance to wear

b) Sampling and frequency of sampling:
   As per guidelines in relevant Indian Standards

c) Acceptance criteria:
   As per guidelines in relevant Indian Standards

d) Relevant references:
   IS: 1237-1990 Specification for cement concrete flooring tiles

14. Glasses / Mirrors:

a) Recommended tests
   i) Dimensional tolerance
   ii) Visual tests for wave, etc

a) Sampling and frequency of sampling:
   As per guidelines in relevant Indian Standards

b) Acceptance criteria:
   As per guidelines in relevant Indian Standards

15. **Marble:**

a) Recommended tests
   i) Moisture absorption
   ii) Hardness

b) Sampling and frequency of sampling:
   As per guidelines in relevant Indian Standards

c) Acceptance criteria:
   As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 1237-1990 Specification for marbles (Blocks, Slabs & Tiles)

IS: 1124-1990 Methods of tests for determination of water absorption, apparent specific gravity and porosity of natural building stone.

16. Non-destructive Testing of Concrete:

a) Recommended tests:

i) Ultrasonic pulse Velocity test

ii) Rebound hammer test

b) Frequency of test:

About 5% of randomly selected reinforced concrete structural components (in-situ of precast)

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 13311-1997 Non-destructive testing of concrete

Part-1: Method of test for Ultrasonic pulse velocity

Part-2: Method of test for Rebound hammer

The testing of concrete in structures by J.H. Bungey, Surrey University Press, 1982.

17. **Core Test on Concrete:**

a) Recommended tests:

i) Texture of concrete

ii) Compressive strength test

b) Frequency of test:

Core to be taken from walls, slabs and footings whenever in doubt.

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 516-1991 Method of tests for strength of concrete

IS: 456-1978 Code of practice for plain and reinforced concrete.

18. Load Test:

a) Recommended test:

Load testing of selected in-situ panels/pre-cast components (service load test)

b) Frequency of test:

On representative in-situ panels in each type of housing whenever in doubt about 0.5% of the total pre-cast floor roof components

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 456-1978: Code of practice for plain and reinforced concrete

IS: 6441 (Part - 7 & 8): Method of test for autoclaved cellular concrete products subject to load test.

19. Earth-Filling in Building:

a) Recommended tests:

i) Grain size distribution for material selection

ii) Proctor compaction test

iii) Field density by core extraction

b) Frequency of test:

i) One sample from each borrow pit

ii) Three cores for every 1000sqm. in compacted thickness of 30cm

c) Acceptance criteria:

As per guidelines in relevant Indian Standards

d) Relevant references:

IS: 2720-1987 Method of test for soil

Part 2-1987 Determination of water content

Part 4-1990 Grain size analysis

Part 5-1990 Determination of liquid & plastic limit

Part 7-1987 Determination of water content-dry density relation using light compaction.

Part 29-1988 Determination of dry density of soils in Place by core cutter method.

20. Mix Design:

a) Recommended method:

Method outlined in SP 23-1982 - Handbook on concrete mixes.

b) Frequency of design:

On every source or type of the following: -

i) Aggregates

ii) Cement

I ii) Admixtures and for different grades of workability.

c) Acceptance criteria of Mix:

As per guidelines in relevant Indian Standards

d) Relevant references:

SP: 23-1982 Handbook on concrete mixes

SP: 10262-1982 Recommended guidelines for concrete mix design

SP: 456-1978 Code of practice for plain and reinforced concrete

GENERAL REFERENCES

1 Properties of concrete by A.M. Neville, ELBS Publication 1981

2 a) Elements of concrete making, 1991

b) Concrete workers guide, 1992

c) Control tests for quality user, 1992

d) Notes for the cement user, 1992 by Research and Consultancy directorate, A.C.C. Ltd., Mumbai.

3 SP: 24-1983: Explanatory handbook on Indian Standard Code of practice for plain and reinforced concrete.

4 Workshop on testing of fresh and hardened concrete Indian Concrete Institute, 1986

5 SP: 21-1983: Summaries of Indian Standard for building materials

6 National Building Code, 1983

7 Non-destructive testing by Barry Hall, Macmillan Education, 1988

CONTRACTOR'S INFORMATION

SUMMERY SHEET

01	Name and address of contractor/firm	
02	Average annual turnover for the works billing for works in progress + completed for the last five years	Rs……..Lakh/year
03	Net worth (as per d.no.3 of form 5)	Rs……..Lakh/year
04	Total value of outstanding works on current contract commitments (as per form 4)	Rs……..Lakh/year
05	Relevant experience in works for similar nature and complexity Details of works Year of completion/commissioning Value (in lakhs	
06	Whether completion/commissioner certificate of completed work and or satisfactory progress certificate of an ongoing works enclosed	Yes/no

(Signature of the authorized signatory with date and seal)

Note: This summery sheet must be filled up without fail and should confirm to the information contained in the document

FORM-1

GENERAL INFORMATION

01	Name	
02	Address	
03	Registration No. and validity	
04	Class	
05	Telephone Fax Mobile	
06	Contact person details with address	

FORM 1A

STRUCTURE AND ORGANISATION

1. The applicant is
   a) An individual
   b) A proprietary firm
   c) A firm in partnership
   d) A limited company or corporation
   e) A group of firms
   (If yes give complete information in respect of each partner)

2. Attach the organization chart showing the structure of organization including names of the Directors and position of offers

3. Numbers of years of experience
   a) As a prime contractor (Contractor shouldering a major responsibility)
   i) In own country
   ii) Other countries (specify country)

4. For how many years your organization has been in business for similar work under its present name?
   What are your fields when your organization was established?
   Whether any new fields were added in your organization?
   And if so, when?

5. Were you ever required to suspend construction for a period of more than 6 months continuously after you started?

6. Have you ever left the work awarded to you incomplete? (If so give the name of the project and reasons for not completing the work)

7. In which field of construction do you claim specialization?

FORM -2

GENERAL EXPERIENCE RECORD

Name of the applicant:

Annual Turnover data (Relevant works only)	
Year	**Turnover Rs. In lakhs**
2025-2026	
2024-2025	
2023-2024	
2022-2023	
2021-2022	

FORM -3

PERTICULAR EXPERIENCE RECORD

(List only those works which are similar to the proposed works for which qualification is sought)

Name of the applicant:

Sl. No	Name & address of the client	Work description	Date of award	Value Rs. In Lakhs

Note:

1. The details of each works mentioned in the above table must be provided separately
2. Work order/Testimonials will be verified, if required

FORM -3A

DETAILS OF CONTRACTS OF SIMILAR NATURE AND COMPLEXITY

Name of the Applicant:

1	Name of the contractor	
2	Country	
3	Name of Employer	
4	Employer's address	
5	Nature of works and special features relevant to the contract for which the applicant wishes to qualify	
6	Contractor's role (Check one)	Sole contractor or sub contractor
7	a) Value of the total contract Rs. Lakhs at completion or at date of award for current contracts	
	b) Value of your firm position of the total contract in Rs. Lakhs at completion, or at date award for current contracts	
8	Date of award	
9	Date of completion	
10	Contract duration (years and months)	---------- years ----------months
11	Specified requirements	
12	Name and professional qualification of applicant's	

	Engineer in charge of work	
13	Were there any penalties/ fines, stop notices/ compensation/ liquefied damages (yes or no). If yeas, give the amount and explanation	

FORM -4

CURRENT CONTRACT COMMITMENTS

Name of the applicant:

Name of contract	Name of client	Value of firm's portion of total contract Rs. In lakhs	Stipulated date of completion	Value of outstanding work Rs. In lakhs	Estimated completion date

Note:

1. Details of all works, which are at various stages of execution, including works for which work order has been received but work is yet to be commenced or works approaching completion.

2. Details as available at the tile of preparation of this documents have to be provided

FORM -5

FINANCIAL CAPABILITY

	Fax:	Telex:			
	Actual previous five financial years				
Financial information Rs. In lakhs	Name of the applicant:				
	BANKER				
	Name of the Banker				
	Address of the banker				
		Telephone		Contact name and title	
	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026
1. Total assets					
2. Total liabilities					
3. Net worth					
4. Working capital					

Attach 1) Audited financial statement for the last five years
2) Certificate of net worth

Specify proposed financial arrangement to meet cash flow demands of the project, net of current commitments (work in progress)

Sl. no	Source of financing	Amount Rs. In Lakhs
1		
2		
3		
4		

Attach audited financial statements for the last five years

FORM -6

DETAILS OF MACHINARY AND EQUIPMENTS

Sl. no	Machinery	Available with contractor	Remarks
1			
2			
3			
4			
5			

6			
7			
8			
9			
10			
11			

Note: 1). Add additional sheets if necessary

2) Separate enclosures to the bid documents shall be numbered, sealed, signed and stamped

3) The tenderer should mention the relevant annexure members for all additional papers enclosed with document

TECHNICAL SPECIFICATIONS

EARTHWORK EXCAVATION

GENERAL:

This item refers to the clearing of site for construction to start and excavation and filling of all open foundations, wet or dry, for the column footings, trenches, pavements, inspection pits and basements, plinths, areas for leveling, drainage lines, etc., Metalling refers to the aggregate layer below floors, pavements etc.,

The specification covers the general requirements of earthwork. The earthwork shall consist of all works involved in site grading, excavation, shoring, filling around foundations, filling in plinths, disposal of spoils as directed by the Engineer, and such other relevant items. The area to be excavated or filled with the excavated materials shall be clearly demarcated in the field by the Contractor.

The earthwork shall also include, where required, temporary bracing and shoring to maintain excavation etc.

CLEARING THE SITE:

The site of which the structure is to be built as shown on the plan and the area required for setting out and other operations shall be cleared of all obstruction, loose stones, materials and rubbish of all kinds, stumps, brush wood, shrubs and other growth, roots being entirely grubbed up without extra cost. The materials obtained will be the property of the Company and the materials pronounced useful by the Architect shall be conveyed and properly stacked within a lead of 300m and as directed by the Architect.

All holes or hollows, whether originally existing or produced by the removal of loose stones or brushwood, shall be carefully filled up with each well rammed and leveled off up to the level of already filled and existing ground as directed.

Trees on the site shall not be cut unless authorized by the Architect and shall not be damaged during construction. The above work of cleaning the site shall be reckoned to be included in the Rate paid for various items and no extra shall be paid.

The ground over which the cutting is to be done and the ground over which filling is to be formed shall be cleared of all trees, brushwood, loose stones, vegetation, bushes,

stumps and all other objectionable materials. Materials obtained from clearing site shall be disposed off by burning or disposal to areas outside the boundary of the project in such a way that there is no chance of their getting mixed with materials for filling.

For removal of vegetation etc., crawler mounted dozer of adequate capacity shall be used. The work will be supplemented by using manual methods wherever required. The dozer shall have ripper attachment for removal of stumps, roots etc. All trees, stumps etc. falling within excavation and fill area shall be cut to such depth below ground level that in no case these fall within 50 cm of the sub grade bottom.

EXCAVATION:

Excavation shall include careful removal of all materials of whatever nature and whether dry or wet, necessary for the construction of work, exactly in accordance with Lines, Levels, grades and curves shown on the plans or as directed by the Architect. It shall be taken to exact widths and levels of the lowest step of foundation / footing and the sides shall be left to plumb where the nature of the soil permits it. Any shoring, strutting and timbering or cutting of extra widths of trenches required for providing working space shall be done by the contractor. The Contractor shall notify the architect before starting excavation and take cross section levels (for purposes of measurements jointly with the Architect before the ground is disturbed.

Bottom of the foundation shall be leveled both longitudinally and transversally or stepped as directed, should any of the excavation be carried down to a level below the specified level, the contractor shall fill in such extra excavation at his own cost with 1:4:8 ordinary grade concrete will rammed in position until it is brought up to the proper level; filling in with excavated material not being permitted for the purpose. Where such extra excavation is necessary due to removal of loose boulders, the extra excavation and concrete for filling shall be paid under relevant items of Bill of Quantities. The corners of the excavated pits shall be made true and square and all lose debris shall be removed to the satisfaction of the Architect. Before any foundation concrete is places, the Architect shall inspect the foundation trenches. If any loose patches as packets come to light on inspection, these shall be dug out as directed and filled and rammed with 1:4:8 ordinary grade concrete, just before laying the foundation concrete, all bottom of trenches shall be lightly watered and thoroughly rammed.

The method of excavation, sheet piling and or other strutting system and methods shall be in every case be subject to the approval of the Engineer. The contractor shall ensure the stability and safety of the excavations and protect the sides of foundation with proper strutting system.

SHORING:

Any shoring, strutting and timbering required for protecting the sides of excavation and for ensuring the safety of workmen and equipment, shall not be paid for separately. The contractor shall be responsible for the design of the shoring with shall however be strong enough to resist side thrust and prevent slips, blows and damage to adjacent works and properly. It shall be removed as directed after all the items of work for which it is required are completed.

DE- WATERING:

The Rate quoted for excavation shall include bailing or pumping out all water which may accumulate in the excavation during the progress of the work either from seepage, rain or any other cause and diverting surface flow, if any, by bund or other means. The bunds shall be removed after their purpose is served. Pumping out water from any foundation enclosure or trenches shall be done generally in such a manner as to preclude the possibility of any damage to the foundation trenches, concrete or masonry or any adjacent structure. The excavation shall be kept free from water:

a. During inspection and measurement.
b. When placing of concrete or masonry are in progress and until they have come above the Natural water level.
c. Till the Architect considers that the concrete or mortar have set and hardened sufficiently.
d. During back filling and consolidating.

PROTECTION AND SAFETY:

Foundation pits, road blockades, obstruction and similar excavations shall be adequately fenced and marked at night with red lights and a watchmen kept in-charge to avoid accidents. Adequate protective measures shall be taken to see that the foundation excavation does not affect or damage adjoining structures. All measures required for ensuring safety of the excavation, the people working in or near the excavation and of properly and people in the vicinity shall be taken by the contractor at his own cost, he being entirely responsible for any injury to life and damage to property caused by his negligence or accident due to his constructional operations.

The Contractor shall erect and maintain during progress of work temporary fences around dangerous excavations.

DISPOSAL OF EXCAVATED MATERIALS:

All materials excavated from foundation or whatever kind they may be, shall be placed at a distance more than 1.5m as directed by the Architect from the edge of the foundation. All excavated material will remain the property of the employer. Rate for excavation shall include for the sorting out of useful materials and stacking them separately as directed. Materials suitable for filling or other use shall be stacked in convenient places. Materials suitable for filling or other use shall be stacked in convenient places. Materials not useful in any way shall be disposed off. The Architect shall be the final authority as to what is useful rubble. The site shall be left clean of all debris at the completion of the work.

Excavated material required for filling shall be stacked or dumped where indicated by the Engineer. Excavated material not required for filling, unsuitable material(what is suitable and what is unsuitable is left to the sole discretion of the Engineer) and any surplus material from the stacks or dumps retained for filling, shall be removed and spread on the site where and as directed by the Engineer. Dumping of this surplus material shall be in an orderly manner and according to the levels/grades as indicated by Engineer.

CLASSIFICATION OF EXCAVATED MATERIALS:

All materials encountered in the excavated shall be classified into the following classes.

a. Soils shall include Sand, Gravel, Soft Moore, Clay, Silt and other similar soft or loose materials and all material of earthy or sandy nature, small size stones or gravel, soft and hard moorum etc., which can be ploughed or excavated by ordinary spaced, pick, shovel etc., without resorting to barring , wedging and / or blasting.

b. Soft rock shall include rocks such as slate, shale, all decomposed and weathered rock, highly fissured rock, old masonry, concrete foundation and pavements and all boulders less than 0.3 cum which can be removed by barring, wedges etc., but not by ordinary spade, pick shovel etc.

c. Hard rock shall include all rock occurring in masses and boulders larger than 0.3 cu.m in volume, which in the opinion of the Architect can best be removed by blasting but, on account of restriction to blasting at this site, will have to be removed by cold chisels or wedges, line drilling or jack hammers.

The decision of the Architect regarding the classification of soil and rock shall be final and binding.

FILLING:

As filling for the foundations, plinths and area leveling in and around the site of work shall be done from selected material from the excavation. Filling shall be done to the original ground level or the elevation shown on the plan, or as directed by the Architect for filling, the materials shall be placed in layers of 15cm (compacted thickness) moistened and well compacted. The contractor shall make necessary provisions for achieving the same without extra cost.

Only when the excavated each is not adequate or suitable for fill, approved materials from outside will be used for filling, the approved fill materials brought from outside will be paid for at the respective item Rate.

Filling shall be done after the concrete or masonry in the foundation has full set and it shall be done in such as manner as not to cause undue thrust on any part of the structure. For filling in plinth payment will be made separately, at the Rates quoted in bill of quantities.

Back filling around foundations in pits, trenches, plinth and under floors:

All clods of earth shall be broken or removed. Material for backfilling shall generally be obtained from the spoil of excavation. But, the Engineer shall have the option, in case of shortage of good selected earth obtained from excavation, to direct the Contractor to get the filling materials from approved borrow pits within the site. The Contractor shall make necessary access roads to borrow area at his own expense and maintain the same, if such access roads do not exist.

After the concrete or masonry in the foundation has fully set, the spaces around the foundation structure in pits and trenches shall be cleared of all debris, brick bats, motor dropping etc. and filled with earth in layers not exceeding 15 cm each layer being watered, rammed and properly consolidated before succeeding one is laid. Each layer shall be consolidated to the satisfaction of the Engineer. Back filling shall be done in such a manner as not to cause undue thrust on any part of the structures. The final surface shall trim and leveled to proper profile as directed by the Engineer. Decision of the Engineer concerning proper consolidation shall be final and binding.

The plinth and under floors shall be similarly filled with approved materials as described herein before in layers not exceeding 15 cm watered and consolidated with mechanical machines to the
satisfaction of the Engineer. When the filling reached finished level, the surface shall be flooded with water for at least 24 hours, allowed to dry and then rammed and consolidated, in order to avoid any settlement at a later stage. The finished level of the filling shall be trimmed to the level of the filling shall be trimmed to the specified.

Setting out

After clearing the site, the area shall be set out as shown on the plans or as directed in writing. The contractor shall provide all labour, tools, tackles, instruments and materials required for setting out and establishing bench marks and grid pillars. The contractor will be responsible for maintaining bench marks profiles, grid pillars as long as they are required. Levels and sections shall be taken by the contractor in presence of the representative of the Main contractor before the excavation/filling is started. This joint record will serve as the basis of measurement.

Materials

The contractor shall utilize all useful and acceptable material obtained from the cutting from anywhere within the site for filling of low areas anywhere within the site. The contactor shall obtain additional good quality material from approved quarried or from any other source. The filling material should be soil, murum or a mixture of soil, sand, murrum, gravel, small boulders having laboratory dry density of at least 1.44 gm/cc. Rejected material if brought to site will be ordered to be removed at contractors cost. Any objectionable material found in the filling material shall be hand picked and removed.

The contractor shall be responsible for payment of rents, compensation, fees, royalty etc. and these are deemed to be included in the rates. The Main contractor shall remain indemnified regarding any claims that may be made by private owners.

Equipment

Pickaxes, crowbars, phawras and pans may be used for manual work. Scrapers, dozer, graders, dumpers, shovels, trucks, trolleys etc. may be used for mechanized work. Three wheeled 10 tonne power roller or sheep foot roller may be used for compaction. Mechanically driven tankers may be used for watering.

Construction Methods

Before any material is laid on the ground, the same shall be cleared of all rubbish etc. When the filling is to be laid on slopes, shall be ploughed deeply to give proper hold. The top layer of the ploughed surface shall be scarified and watered and compacted before any filling material is laid.

Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations sleeper than 1 vertical

on 4 horizontal, such faces shall be benched as mentioned below immediately before placing the subsequent fill.

Continuous horizontal benches, each at least 300 mm wide, shall be cut into the old slope for ensuring adequate bond with the fresh filling material to be added.

However, when the existing slope against which the fresh material is to be placed in flatter than 1 vertical on 4 horizontal, the slope surface may only be ploughed or scarified instead of resorting to be benching.

However, when the existing slope against which the fresh material is to be placed in flatter than 1 vertical on 4 horizontal, the slope surface may only be ploughed or scarified instead of resorting to benching.

All permanent faces of side slopes of cut and fill formed areas shall, subsequent to any trimming operations, be reworked and sealed to the satisfaction of the Engineer by tracking a tracked vehicle considered suitable by the Engineer, on slope or any other method approved by the Engineer.

The finished side slopes of cut and fill formed areas shall be 2 to 1 (i.e. 2 horizontal to 1 vertical) slope or the slope required by the Engineer.

When the fill level is higher than the adjacent area outside the boundary of the project then the layers shall be laid in suitable slope up to the ground level at the boundary line.

Laying the filling material

Filling material shall be placed in successive horizontal layers of 250 mm consolidated thickness or in thickness less than 250 mm if required by the Engineer extending to the complete area of filling. The extra loose stuff at the edges shall be trimmed after completion of earthwork without extra cost. When boulders, broken stones and hand materials are mixed up with the filling materials. Care shall be taken to see that they are distributed evenly and uniformly into the earth and no hollows are left near them. No stone or hard material shall project above the top of nay layer. Each layer of filling shall be leveled, watered, compacted and tested before the succeeding layer is placed. The surface of the filling at all times shall shed water and prevent ponding.

All clods, lumps, boulders, etc shall be broken to have a maximum size of 75 mm before filling and compaction.

Protection

The contractor shall take the necessary measures and precautions for the protection of the earthwork. Any damage to the earthwork shall be made good at the contractor's cost.

The contractor will have to make his own arrangements so that water is adequately and effectively drained and this arrangement may left after completion of earthworks if so desired.

Rolling

The layers shall be compacted with Power driven rollers of 8 to 10 Tonnes capacity. The roller shall pass at least twice over the same area once in forward move and the second time in backward move.

Finishing

The filling shall be finished and dressed smooth and even in conformity with the alignment, levels, cross-sections and dimensions shown of the drawings with due allowance for shrinkage. All damages caused by rain, movement of vehicles or any other reason shall be made good in the finishing operations.

The contractor shall not excavate beyond the specified levels / dimensions on the drawings.

The finished cut and fill formation shall satisfy the permitted surface tolerance of +20 mm or – 25 mm.

Where the finished surfaces fall outside the above specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer.

Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by scarifying the lower layer and adding fresh material and recompacting to the required density.

Maintenance

The contractor shall be responsible for maintaining the earth work satisfactorily at his cost till finally accepted including making good any damages.

Excess excavation

Any excess depth excavated below the specified levels shall be made good by dozing, grading and refilling with suitable material of similar characteristics to that removed and watered and compacted to achieve specified density.

Compaction

Only the compaction equipment approved by the Engineer shall be employed to compact the different material types encountered during execution. Smooth wheeled, vibratory, pneumatic tyred, sheep foot or pad foot rollers etc. of suitable size and capacity as approved by the Engineer shall be used for the different types and grades of materials required to be compacted either individually or in suitable combinations.

The compaction shall be done with the help of vibratory roller of 8 to 10 tonne static weight with plain or pad foot drum or heavy pneumatic tyred roller of adequate capacity capable of achieving required compaction.

The contractor shall demonstrate the efficiency of the equipment he intends to use by carrying out compaction trials. The procedure to be adopted for these site trials shall first be submitted to the Engineer for approval.

Rollers of adequate capacity shall be used to achieve the required compaction by artificial watering and rolling. Subsequent layer shall be placed after each finished layer is approved. The level of compaction required is 90% of Standard Proctor Density for all areas except where Roads and Building works are to be provided. At such places the required compaction density of Standard Proctor shall be as given below :

Roads : 95%

Buildings

Top Layer : 98%

500mm below top layer : 95%

Below 500mm : 90%

The top layer of filling shall be brought to the specified line, levels and grade as shown in the drawings or as directed.

MODE OF MEASUEMENT:

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following wherever applicable :

EXCAVATION:

Footings:

Areas of Excavation for footing shall be measured equal to the area of the lowest concreted course as shown on the drawing. Depth shall be measured vertically form

ground level to bottom of concreted course or dry rubble packing or sand layer as the case may be.

Plinth beams:

Depth of excavation for plinth beam shall be measured from ground level up to bottom of beam and width equal to width of beam. If a leveling course is ordered, it shall be measured up to the bottom of the leveling course.

Where excavation is made in trenches, measurements for cutting shall be taken by means of tape and staff and the width of concrete or rubble packing as shown on the Drawing shall be considered as width of excavation.

Where excavation is made for leveling the site, levels shall be taken before start and after completion of work and total quantity of excavation computed from these levels in manner approved by the Engineer.

No allowance shall be made for working space, providing slopes etc.,

EARTH FILLING:

Filling shall be measured from cross sections of embankments, levels of which are recorded by means of levels before start of work and after completion of work.

ANTITERMITE TREATMENT

SCOPE:

This specification covers the general requirements for pre-constructional anti termite treatment to buildings to protect against attack by sub terranean termites by suitable chemical treatment sources.

GENERAL REQUIREMENTS:

All the buildings shall be adequately protected against attack by sub terranean termites by suitable chemical treatment measures. The work shall be carried out by a specialist pest control agency approved by the engineer. The work to be out by the specialist firm shall carry a guarantee for the satisfactory performance of the treatment for a minimum period of 10 years.

The contractor shall submit manufacturer's literature, specifications and application instructions for insecticide materials for the reference of engineer.

The treatment shall be carried out generally in accordance with the stipulations laid down by IS: 6313 part ii (Code of Practice for Anti-termite Measures in Buildings –

Part II Preconstruction chemical treatment measures) subject to minimum requirements given in this specification.

The earth filling immediately under the stone soling bottom and sand fills of all foundations and soil along external perimeter of all buildings shall be chemically treated against termite.

The contractor shall furnish all skilled and unskilled labors, plant, tools, tackle, equipment, men, materials, chemicals required for complete execution of the work in accordance with the specification as described herein and / or as directed by the engineer.

MATERIALS :

The chemicals to used as insecticides for the treatment shall be ohloropyriphos 20% EC bearing ISI certification or approved equivalent conforming to the requirement and concentration laid down in latest IS 6313 – Part II

APPLICATION

Latest IS 6313 (Part – II) shall be followed as general guidance for preparation and application of chemicals. The chemical solution shall be prepared by mixing the chemical with the appropriate quantity of water to obtain a chemical emulsion of the correct concentration as stipulated in IS : 6313 (Part – II).

The application shall be as follows:

Dilute 1 part of chloropyriphos 20% EC with 20 parts of water to get 1% emulsion. The prepared emulsion shall be applied by trained operators strictly in accordance with the Manufacturer's Specifications / directions. Health and safely precautions recommended by manufacturer shall be observed during the treatment. The contractor shall protect surfaces not intended to have treatment.

To facilitate proper penetration of the chemical into the soil, a pressure pump of adequate capacity and sprayers shall employed to apply the solution.

RCC FOUNDATIONS & BASEMENT:

The treatment applied essentially to masonry foundations where there are voids in the joints through which termites are above to seek entry into buildings. Hence the foundations require to be completely enveloped by a chemical barrier. In the case of RCC foundations, the concreted is dense being a 1:2:4 (Cement: Fine aggregates: Coarse aggregates, by volume) mix of richer, the termite are unable to penetrate it. It is, therefore, unnecessary to start the treatment from the bottom of excavations.

The treatment shall start at a depth of 500 mm below the ground level except when such ground level is raised or lowered by filling or cutting after the foundations have been cast. In such cases, the depth of 500 mm shall be determined from the new soil level resulting from the filling or cutting mentioned above and soil in immediate contact with the vertical surfaces of RCC foundations shall be treated at the rate of 7.5 liters per Sq.metre.

TOP SURFACE OF PLINTH FILLING

The top surface of the consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 ltrs per sqm of the surface before the stone bed or sand bed is laid. If the filled earth has been well consolidated and the surface does not permit the emulsion to seep through, holes up to 50 to 75 mm deep at 150mm centers both ways may be made with 12 mm dia. mild steel rod on the surfaces to facilitate saturation of the soil with the chemical emulsion.

JUNCTION OF WALL AND FLOOR

Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surfaces from ground level up to the level of the filled earth surface. To achieve this a channel of size 3x3 cm shall be made at all the junctions of walls and columns with the floor (before laying the sand or soling) and rod holes made in the channel up to the ground level at 15 cm. centers and the iron rod moved backward and forward to breakup the earth. The chemical emulsion is poured into the channel at the rate of 7.5 liters per sqmt of the vertical surface and allowed to soak through the holes fully so that the soil is in contact with the chemical. The soil shall be tamped back into the channel after this operation and consolidation to original conditions.

EXTERNAL PERIMETER OF BUILDING

After the building is complete, the earth along the external perimeter of the building should be rodded at intervals of 150mm and to a depth of 300mm. the rods should be moved backward and forward parallel to the wall to breakup the earth and chemical emulsion poured along the wall at the rat of 7.5 liters per square meter of vertical surfaces. After the treatment, the earth should be tamped back into place. Should be earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading.

SOIL SURROUNDING PIPES

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

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 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 liters per linear meter.

TREATMENT UNDER APRON

The soil below the concrete for stone aprons to be provided around the perimeter walls of all buildings shall also be treated with the chemical solution.

TREATEMTNT OVER DPC

Top of concrete damp proof course in external and internal walls shall be given a liberal coat of chemical solution when the concrete is still green.

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 walls so as to prevent entry of termite through the voids in masonry, cracks and services, etc., above the floor level. The soil retained by the walls shall be treated at the rate of 7.5 liters per sqmt of the vertical surface so as to effect a continues outer chemical barrier.

GUARANTEE

The Contractor shall provide a written guarantee in the format given in the next page that the building covered in this contract will be protected from termites for a period of ten years from the date of substantial completion of work covered under this contract.

The Guarantee shall be in legal paper in an acceptable form.

MODE OF MEASUREMENT

The measurement shall be in square meter for the plinth are of the building only.

PROFORMA OF GUARANTEE CERTIFICATE

ANTI-TERMITE TREATMENT

Name of the Firm / Company and its address.

Dear Sirs,

Pest Control Pre-construction Anti-termite Treatment to Factory Building, Ancillary Structures and Facilities of ……..Guarantee for 10 (Ten) Years – regarding.

Agreement No……dated …….

We hereby certify that the foundation (s) and Structure (s) of the…… described in the schedule below, have been pre-treated by us against subterranean termite infestation in accordance with our procedure for pre-treatment set out in our letter (s) dated ….and in accordance with the terms and conditions under which the said work has been awarded to us.

We hereby guarantee that the foundation (s) and structure (s) of the said ……..shall be safe against subterranean termite attack or infestation for a period of TEN YEARS from ……to……..

In the event of the said structure (s) and foundation(s) of the ……..being or becoming subject to subterranean termite attach or infestation at any time during the guaranteed period of ten years, we agree to carryout as often as it becomes necessary, at our cost and expense, all and every treatment that may be necessary to render the said foundations and structures free from such subterranean terminate attack or infestation.

The question whether the foundation (s) and structure (s) of the premises are or become subject to subterranean termite attach or infestation and whether any anti-termite treatment is or has become necessary shall be decided by the ……..and we agree that their decision in this regard shall be final and binding on us.

Yours faithfully,

Signature :

Name of the Company :

Address :

Seal :

CONCRETE WORKS

GENERAL :

a. This item relates to the supply, preparation, placing and curing of all concrete work in plain, and reinforced portions of works referred to under respective items in the bill of quantities.

b. Concrete for the purposes of this specification is broadly classified into two classes, viz.,
   1. Ordinary grade concrete and
   2. Controlled grade concrete.

   These classes are defined separately in these specifications.

c. All operations relating to mixing, placing and curing shall be subject to the approval of the Structural Engineer and the contractor shall provide unhindered access for this purpose for inspection and selection in samples.

d. All materials to be used in the work shall have been approved by the Structural Engineer prior to their incorporation in the work. For this purpose, the contractor shall whenever called upon to do so, furnish samples of materials in adequate quantities and carry out all tests on materials and concrete specimens. Testing shall be done in close liaison with Structural Engineer or his representative and methods of tests shall generally follow the standard methods described in relevant Indian Standard Specification for methods of tests. All the cost of supplying required samples of materials, preparing all samples and carrying out all tests in an approved laboratory shall be borne by the contractor. The contractor shall install a small laboratory at site which shall be equipped to made routine tests on concrete cubes and materials for concrete.

No concrete work shall be cast in the absence of the Architect's representative. Before placing the concrete the Structural Engineer shall have inspected and approved all reinforcement in place form work and centering and arrangements for concreting. At least 24 hours notice shall be given for this purpose. Any concrete placed in violation of this provision shall be rejected.
The requirements for concrete shall be materials, storage of materials, design of concrete mix, sampling and testing, form and formwork, construction joints, preparation and placement of concrete including batching, mixing conveying, depositing and curing, finishing, grouting, inspection, clean-up etc., The concrete shall generally comply with the requirements of latest IS : 456.

Unless otherwise specified, the rates for all RCC will be exclusive of reinforcements. Reinforcements will be paid for separately. Unless otherwise specifically mentioned, the rates for all plain and RCC works shall be inclusive of formwork, centering and shuttering.

MATERIALS :

Cement :

Unless otherwise specified, ordinary Portland cement of 43 grade conforming to latest IS : 8112 shall be used for all concrete works. Test certificates from the manufacturers to show that the cement brought by the contractor to site for use in the works fully complies with the relevant IS Specification shall be submitted to the Engineer at the Contractor's own cost. In addition, field test shall be conducted for every consignment of cement for the purposes of concreted design mix. Cement deteriorated and /or clotted shall not be sued on work but shall be removed at once from the site. Daily record of cement received and consumed shall be maintained by the contractor in an approved form and a copy submitted to the Engineer once a week. Not withstanding the above, the Engineer, for any reasons whatsoever, may at his discretion order to retest, the cement brought to site in an approved testing laboratory and fresh certificate of its soundness shall be produced at the Contractor's own cost. Cement ordered for retesting shall not be sued for any work pending results of re-test.

It shall be stored in a dry place in regular piles not exceeding 10 bags high and in such a manner that it is adequately protected from moisture and contamination. Different consignments shall be stacked separately so that they can be used in the order in which they are received. If necessary, cement shall be screened at the contractor's expense to remove any lumps. No cement which has become damaged shall be used in the work.

Any cement stored at the site for longer that one month shall be re-tested before use, if so ordered, if, on retesting, the cement does not comply with this specification, the consignment from which the sample has been drawn shall be rejected and removed from the site. The cost of removal and subsequent replacement by cement of satisfactory quality shall be borne by the contractor.

Aggregates :

Fine and coarse aggregates shall conform to IS 383. If required, the aggregates shall be washed and screened. Sampling and testing shall be as per IS : 2386.

Each size of aggregate shall be stored on a separate platform and shall avoid mixing and contamination with foreign material. Segregated aggregates shall be rejected.

Cost of stacking, washing, screening and cost of all tests, sampling etc, shall be borne by Contractor.

Fine Aggregate :

Sand shall conform to IS : 383. It shall pass through I.S. sieve 4.75 mm (3/16 B.S) test sieve, leaving a residue not more than 5%. It shall be form a natural source approved by the Engineer. It shall be washed if directed to reduce the percentage of deleterious substances to acceptable limits at Contractors own cost. Sand shall not contain any trace of salt and sand containing any trace of salt shall be rejected.

The fine aggregate for concreted shall be graded within limits as specified in IS : 383 and the fineness modules shall range between 2.60 to 3.20. The fine aggregate shall be stacked carefully on a clean hard dry surface so that it will not get mixed up with up with deleterious foreign materials. If such as surface is not available a platform of planks or corrugated sheets or brick floor or concrete floor shall be prepared.

IS Sieve Designation	Percentage Passing			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10mm	100	100	100	100
4.75	90-100	90-100	90-100	95-100
2.36	60-95	75-100	85-100	95-100
1.18	30-70	55-90	75-100	90-100
600 Micron	15-35	35-59	60-79	80-100
300 Micron	5-20	8-30	12-40	15-50
150 Micron	0-10	0-10	0-10	0-15

Normal sand having specific gravity below 2.5 (saturated surface dry basis) determined in accordance with IS : 2386 (Part-III) " Methods of tests for Aggregates for concrete Part- III- Specific Gravity, density, voids, absorption and bulking" shall not be used without special permission of the Engineer.

Fine aggregate shall not contain injurious amounts of dust, clay lumps, soft or elongated flaky particles, shale, alkali, organic matter, loam, mica and other deleterious substance in quantities in excess of the limits of deleterious materials, given in Table I of IS : 383.

ORGANIC IMPURITIES : All fine aggregates shall be free from injurious amounts of organic matter, Aggregates, when tested in accordance with IS : 2386 (Part-II). " Methods of Test for Aggregates for concrete : "Part II - Estimation of Deleterious Materials and Organic Impurities and producing a color darker than the standard shall be rejected unless, when tested for mortar making properties the mortar develops a compressive strength at 7 and 28 days of not less than 95% of that developed by a similar mortar made from another portion of the sand sample which has been washed in 3% solution of sodium hydroxide followed by thorough rinsing in water, Mortar cubes shall be made and tested in accordance with IS : 2386 (Part-VI) Measuring Mortar Making Properties of Fine Aggregate".

SOUNDNESS : When tested to find cycles of sulphate soundness test in accordance with IS:2386 (Part-V) "Methods of test for aggregate for concrete, Part-V –Soundness" and IS:383 the weighted percentage of loss shall not be more that 8% by weight when sodium sulphate is used and 12% when magnesium sulphate is used.

SCREENING AND WASHING : Natural or manufactured sand shall be prepared for use by such screening or washing or both as necessary to remove all objectionable foreign matter which separating the sand grains to the required size fractions. NATURAL SAND SHALL BE WASHED UNLESS SPECIFIC WRITTEN AUTHORITY IS GIVEN BY THE STRUCTURAL ENGINEER TO USE SAND THAT MEETS SPECIFICATION STANDARDS OF CLEANLINESS WITHOUT WASHING.

Coarse Aggregate :

SOURCES OF SUPPLY : Aggregates shall, where possible, be supplied from a sources that normally produces aggregate satisfactory for concrete work, and if required by the structural Engineer, the contractor shall supply evidence to this effect. If required by the structural Engineer, the contractor shall supply samples to make preliminary tests on concrete cubes made from such aggregates.

Coarse aggregates shall generally conform to the requirements of IS:383 and shall consist of hard, strong, durable particles of crushed stones and shall be free from elongated soft pieces, vegetable matter and other deleterious matter. It shall have no adherent coating. Flaky and elongated particles shall be avoided.

SIZE AND GRADING : Maximum size of coarse aggregates for use in reinforced concrete work shall be limited generally to 20mm (3/4"), for the concrete used in plain concrete work and in massive RCC members having sufficiently wide spacing of reinforcements, use of 40mm (1.5") size graded aggregate may be permitted. In no case shall the aggregate size exceed 1/3 times the thickness of member. The grading of coarse aggregate shall be selected from the standard grading given in Table II of IS : 383. The method of determining the grading of coarse aggregate

shall be according to IS :2386 (Part-I). "Methods of test for aggregate for concrete Part-I. Particle size and shape".

IS Sieve Designation	A						B			
	% Passing for single sized aggregate of nominal size						% Passing of graded aggregate of nominal size			
	63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm	12.5 mm
80 mm	100	-	-	-	-	-	100	-	-	-
63 mm	85-100	100	-	-	-	-	-	-	-	-
40mm	0-30	85-100	100	-	-	-	95-100	100	-	-
20 mm	0-5	0-20	85-100	100	-	-	30-70	95-100	100	100
16 mm	-	-	-	85-100	100	-	-	-	90-100	-
12.5mm	-	-	-	-	85-100	100	-	-	-	90-100
10mm	0-5	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75 mm	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36 mm	-	-	-	-	-	0-5	-	-	-	-

SPECIFIC GRAVITY : Normal aggregate shall have a specific gravity (saturated surface dry basis) not less than 2.6. Determination of specific gravity shall be done in accordance with IS:2386 (Part III) "Methods of Test for Aggregate for concrete : Part-III Specific gravity, Density, Voids, Absorption and Bulking".

DELETERIOUS MATTER : Amount of deleterious matter determined in accordance with IS: 2386 (Part-II). "Methods of Test for Aggregate for concrete : Part-II - "Estimation of deleterious matter and organic impurities" shall not exceed the limits given in Table I of IS : 383.

WASHING : The coarse aggregate shall be washed if required by the Structural Engineer and only clean fresh water shall be used for this purpose.

CARE AND STORAGE OF CONCRETE AGGREGATES:

Aggregate stock piles shall be arranged and used in a manner as to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. To ensure that this condition is met, any test for determining conformance to the requirements of this specification shall be performed on samples collected from the aggregates at the point of batching.

Stock piles shall be build in successive horizontal layers of not more than 1 m thickness, with each layer being completed before the next is started.

The aggregate piles shall be allowed to drain until it has reached uniform moisture content and the last one foot of layer from the stock pile of aggregate shall not be used if the stock piles are on ground.

Water :

Water sued for mixing concrete and curing shall be potable quality, fresh, clean, free from oil, salts, acids, alkali and shall be in accordance with the clause 4.3 of IS 456. The pH value of water shall generally lie between 6 and 8 where water contains excess of acid, alkali, sugar or salt, the Engineer may refuse to permit its use.

The contractor shall produce test results of water proposed to be used on the job for approval by the Engineer for the mixing before casting any concrete.

Reinforcement :

Refer separate specification given elsewhere.

Admixtures :

No admixture shall be used in the concrete unless approved in writing by the Structural Engineer. Approval shall be based on the evidence that with passage of time, neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixtures. Calcium chloride or any admixture containing this compound shall not be used under the circumstances.

Concrete :

Concrete shall be specified in various graded designations as M-10, M-15, M-20, M-25 etc. The letter ‘M’ refers to the mix and the number to the minimum compressive strength in N/Sq. mm to be established by 28 day of 15 cms works cube tests with the probability of not more than 1 test out of 10 failing below that minimum.

The proportions of ingredients for concrete shall be such that in addition to complying with the strength requirement, the concrete shall have adequate workability and property consistency to permit it to be worked readily into the forms and around reinforcement, under the conditions of placement to be employed without excessive segregation or bleeding.

All ingredients shall be proportioned and measured by weight using approved weigh-batching equipment. There shall be full field control of (1) predetermined grading of all

aggregates that go into concrete (2) predetermined proportion of course aggregate, fine aggregate, cement and water for the required strength.

Design Mix :

The contractor is responsible for the design of the concrete mix. The contractor shall design the mix and submit for the approval of the Engineer. No concreting works shall be commenced without the approval of the design mix of concrete.

The Contractor shall make trial mixes using coarse aggregates, sand, water and cement actually available at site to be used for making concrete. Before making trial mixes all the ingredients shall be tested in the field laboratory and should conform to the relevant IS Specifications. Suitable proportions of sand and the several sizes of coarse aggregates for each grade of concrete shall be selected to give as nearly as practicable the maximum density, this is to be determined by mathematical means, laboratory tests, field trials or other means.

The minimum cement contents for design mix concrete of various grades shall be as under :

Grade of concrete	Cement per cum of concrete
M-10	220 Kgs
M-20	325 Kgs
M-25	348 Kgs
M-30	365 Kgs

The mix required to produce, place and compact the specified grade of concrete shall be designed by the Contractor. He shall carry out preliminary tests of specimen at his own cost at field laboratory as per IS : 456 and IS : 516 and he shall furnish to the Engineer a statement of proportions proposed to be used for various concrete mixes and grades of concrete for approval.

The minimum strength requirements shall be as follows :

Minimum compressive strength of 15 cm cubes at 7 days and 28 days after mixing, conducted in accordance with IS : 516.

Grade of Concrete	**Preliminary Test N/Sqmm**		**Work Test N/Sqmm**	
	At 7 days	At 28 days	At 7 days	At 27 Days
M-10	9.0	13.5	7.0	10

M-20	17.5	26	13.5	20
M-25	22.0	32	17.0	25

Once a mix including water cement ratio has been determined and specified for use by the Engineer, the W/C ratio shall be maintained.

Details of design mix concrete approved by the Engineer shall be submitted to the Engineer for record along with the results of sieve analysis and such other tests on cement, aggregates and water etc. The approved design mix shall then be followed for subsequent concreting operations at site till a variation in some characteristics of any ingredient is observed or till a variation in the degree of quality control necessitates a change in the mix.

Batching and Mixing of Concrete :

All materials for controlled concrete shall be batched as per approved design mix in suitable weigh batcher of adequate capacity and of approved design. Mixers for concrete mya be stationary mixers of either the tilting or non-tilting type, or truck mixers of approved design. Through mixing of the concrete is essential and mixers shall be capable of combining the material into a uniform mixture, uniform colour and of discharging this mixture without segregation. The mixers should always be operated at the speed and time recommended by the makers. The mixers shall be maintained in satisfactory operating condition, and mixer drums shall be kept free of hardened concrete. The consistency of the concrete produced from the mixers should have sufficient workability to enable it to be well consolidated, to be worked into the comers of the shuttering and around the reinforcements.

The slump for concrete as determined by slump tests as per Indian standard 1199 latest edition, shall not exceed the maximum slumps indicated below for each type of construction using high frequency vibration unless otherwise approved or directed by the Engineer.

Workability	**Slup in mm**		**Type of Construction**
	Min.	**Max.**	
Medium	40	80	All RCC works

The contractor shall not place concrete having a slump outside the limits specified without the approval of the Engineer.

At least one slump test shall be made for every compressive strength test carried out. More frequent tests shall be made if there is a distinct change in job conditions, or if required by the Engineer.

Transporting :

Concrete shall be conveyed from the place of mixing to the place of final deposit as rapidly as practicable by methods witch will prevent segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. Normally not more than 30 minutes shall lapse between mixing and concrete of the required consistency and plasticity without segregation or loss of slump.

PREPARATION BEFORE PLACING :

All sawdust, clips and other construction debris and extraneous matter shall be removed from the interior of the forms.

Hardened concrete and foreign matter shall be removed from the inner surfaces of all conveying equipment such as barrow, trucks, chutes, etc.,

All surfaces of concrete and semi-porous sub-grade shall be wetted and excess water drained away before the concrete is place on it.

No concrete shall be placed when the temperature of the atmosphere exceeds 38 Deg. C unless adequate arrangements are made for pre-cooling the ingredients and shutters. The arrangements shall be subject to the Structural Engineer's approval.

JOINT AND EMBEDDED PARTS :

CONSTRUCTION JOINTS :

Construction joints shall be made at only these positions shown on the drawing or a locations approved by the Structural Engineer.

The surface of the concrete at all construction joints shall be cleaned of all laitance and loose particles of concrete and thoroughly cleaned. All surface of construction joints shall be roughened either by wire brush just after the concrete has set or by picking so as to expose the coarse aggregate but not to dislodge them. Immediately prior to concreting, the surface of the joint shall be dampened (but not saturated). Placing of a grout layer is not generally recommended.

Whenever special details are given in the drawing for construction joints they shall be strictly adhered to. No payment shall be made for construction joints.

EMBEDDED ITEMS, CUTOUTS, OPENINGS AND RECESSES:

All sleeves inserts anchors and embedded items required for adjacent work or for its support shall be placed prior to concreting.

All other contractors, whose work is related to the concrete are must be supported by it shall be given ample notice and opportunity to introduce and /or furnish embedded items before the concrete is placed.

Voids and slots in sleeves, anchors and inserts shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

Certain embedment relating to other contractor's work shall have to be fabricated and fixed in position on instructions of the Structural Engineer. Payments shall be made under the relevant item in the Schedule of quantities.

CONVEYING:

Concrete shall be handled from the mixer to the place of final deposition as rapidly as possible by methods that will prevent segregation or loss of ingredients. No concrete shall be used which does not reach its position within 30 minutes from the time water is added to the mixer.

Conveying equipment shall be of size and design to ensure the optimum flow of mixed concrete at the delivery and shall be approved. In general, all equipment shall be of non-absorbent materials. Use of long troughs, chutes etc. shall be permitted only with the written approval of the Structural Engineer. In case of such conveyors leads to the production of inferior quality of concrete, the Structural Engineer may order discontinuance of their use and substitution of alternative satisfactory methods of placing. The addition of water at any point of concrete shall be prohibited.

PLACING :

Method of placing shall be such as to preclude segregation and as for as practicable the placing shall be continuous. Special care shall be taken in accordance with latest IS : 456 while laying concrete under extreme weather.

Concrete shall be transported by transit mixers and placed in position without segregation. It is important that the concreted be placed in its final position before the cement reaches its initial set. The concreted should normally be compacted in its final position within 30 min. of leaving the mixer, and once compacted, it insides of the forms should be inspected to see that they have been cleaned and oiled, care being taken to see that the reinforcements do not get contaminated. Temporary openings should be

provided to facilitate inspection, especially at the bottom of columns, to permit the removal of all sawdust, wood shavings etc. Openings should be placed so that the water used to flush the forms will drain away. No water should be left in the forms. The concrete should be spread evenly in the form to avoid segregation and should completely fill all corners of the form work and the space between the reinforcement. Vibrator should not be used for spreading the concrete. Concreting should be carried on without interruption between predetermined construction joints.

COMPACTING:

The object of compacting concreting is to achieve maximum density. The concreted should therefore, be placed al little in excess of its specified depth so that after property compaction its final desired depth is obtained. Manually rodding and tapping the concrete and tapping the form work on its external face shall be continuously carried out at the actual pouring head, while compacting the concrete with mechanical vibrators shall be done sufficient distance away from the pouring head, so that the vibrator is utilized only to compact the concrete and not to spread it. The Engineer may, however, at his absolute discretion, permit concreting by increasing the slump and correspondingly increasing the cement contents at contractor's cost. Except for shallow or inaccessible concrete the vibrator shall be penetrated vertically and at regular distance intervals, not at an angle and not at haphazard intervals. At comers, obstructions, embedded fixtures and congested reinforcement areas, the vibrators shall be manipulated with the utmost care and handled only by the most experienced workmen.

The number and type of vibrator to be used shall be subject to the approval of the Engineer and in general immersion type vibrators shall be used. Consolidation by using immersion vibrator will be in accordance with IS Code : 3558. Sufficient number of reserve vibrators in good working condition shall be kept on hand at aft times, so as to ensure that there is no slacking of interruption in compacting.

Protection of Concrete:

All freshly placed concrete surfaces shall be protected from damages by workmen equipment or any other cause. The surface shall be protected from dry wind and direct sun rays. The Contractor shall provide and use, where directed by the Engineer enough tarpaulins or other suitable materials to cover completely or enclose all freshly finished concrete.

Curing:

As soon as the concrete is hardened sufficiently, it shall be cured by maintaining the concrete in a damp condition by application of wet sacking or other approved moisture retaining covering for a period of 28 days after placing the concrete. In floors curing should be carried out by pending and covering with polythene sheets to reduce

evaporation losses. Extreme care should be taken to ensure that all surfaces are kept in a moist condition and no local area shall be allowed to dry out intermittently. Curing shall be done with potable water free from sediments of any kind.

FAILURE TO MEET SPECIFICATION REQUIREMENTS AND LOAD TESTING OF CONCRETE STRUCTURES :

Concrete structures constructed under this specifications shall meet all applicable requirements as regards appearance, dimensions, strength and durability (Particularly concrete cover to reinforcement). In the event of the failure of the structure to meet the requirements, the Structural Engineer may reject the structure and order its removal and re-building all at contractor's cost or accept the same subject to satisfactory performance under load test conducted generally as per requirements to IS:456. The cost for conducting such tests as well as provision of suitable deflect meters for measurement of deflection shall be borne entirely by the contractor.

As an alternative to load tests, the taking out of cores from concrete in accordance with IS: 1139 and testing the same in accordance with IS:516 and using the test results in conjunction with structural analysis of the structure may also be required by the Structural Engineer. The cost of taking out core samples and testing the same shall be borne by the Contractor. The contractor must provide for hammer testing equipment which shall always be kept at site.

Construction Joints:

Construction joints in exposed concrete wok shall be made only where shown on the drawings or directed by the Engineer and shall be in accordance with the details shown or approved by the Engineer. The procedure given in clause 20.1.4.2 of IS 456 shall be followed for general guidance. All foreign matters shall be removed frolic the concrete before it is allowed to fully harden. The removal shall be effected by scrubbing the concrete surface with wire and with bristle brushes and washing down to expose clearly the aggregate. However care shall be taken to avoid dislodgment of particles of aggregate. If concrete has been allowed to harden excessively the surface shall be chipped over its whole surface and thereafter thoroughly washed. Before fresh concrete is added on the construction joints, the surface of the old concrete shall be thoroughly wetted and covered with a thin layer of cement mortar 1:1.

Construction joints in concrete floors and walls of basement, water tanks or any other structures in contact with water or earth, shall be provided with PVC water stops of approved make coated on either side with hot asphalt. The longitudinal joints, in water stops, shall preferably be not welded or overlapped at least 200 mm.

Sampling and strength test of concrete:

Sampling and testing of concrete shall be conducted in accordance with the latest issue of Indian Standard 1199, 516 and 456.

During the progress of construction compression tests shall be made to determine whether the concrete being produced complies with the strength requirements specified. The test will be made in accordance with Indian Standard 516 latest edition.

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following:

Quantity of concrete in the work, Cum	Number of Samples
1 – 5	1
6 – 15	2
16 – 30	3
31 – 50	4
51 and above	4 Plus one additional sample for each additional 50 Cum or part thereof

NOTE:

A set of six specimens from random mixer batches, shall constitute a test, three being tested for 7 days and three being tested for 28 days strength.

The strength test result shall be the average strength of the three companion test specimens, tested at 28 days, except that, if one specimen in a test shows manifest evidence of improper sampling, moulding or testing the result shall be discarded and the remaining two strengths averaged. Separate procedures shall be established whet: cements other than Portland cement are used.

Normally 7 day and 28 day tests shall be made on specimens. For any mix, a correlation between 7 day and 28 day strengths may be made in the laboratory. Soon after a job starts, a similar correlation will evolve for samples of concrete taken from the mixer. After that correlation has been established, the results of the 7 day tests may be used as an indicator of the compressive strengths which should be expected at 28 days, provided such results are consistent. If 7 day tests show compressive strengths that are too low, measures shall be taken at once, at the Engineers direction, without waiting for the results of the 28 day tests

A. The concrete shall be deemed to comply with the strength requirements if:

a) every sample has a test strength not less than the characteristic value; or

b) the strength of one or more samples though less than the characteristic value, is in each case not less than the greater of;

I. the characteristic strength minus 1.35 times the standard deviation; and

II. 0.80 times the characteristic strength and the average strength of all the samples is not less than the characteristic strength plus

$$\frac{1.65 - 11.65}{\text{number of samples}}$$ times the standard deviation

B. The concrete shall be deemed not to comply with the strength requirements if:

a) The strength of any samples is less than the greater of:

i. the characteristic strength minus 1.35 times the standard deviation and;

ii. 0.80 times the characteristic strength; or

b) the average strength of all the samples is less than the characteristic strength plus

$$\frac{1.65 - 3}{\text{number of samples}}$$ times the standard deviation

C. Concrete which does not meet the strength requirements as specified in para (A) but has a strength greater than that required by para (B) may be accepted as being structurally adequate without further testing by the Engineer in consultation with designer.

In the event that concrete tested in accordance with the requirements of the above clause, fails to meet the specification, the Engineer shall have the right to require any one or all the following:

a) Changes in the concrete mix proportions for the remainder of the work

b) Coring and testing of the concrete represented by the tests which failed as per IS: 456.

c) Load tests on part of structures as per IS: 456.

d) Removal and replacement of any such portions of the structure.

e) Extended curing of the concrete represented by the specimen.

The Contractor shall carryout all such measures as directed at his own expense, if the concrete cannot be accepted due to reasons attributable to the Contractor.

The unit rate of concrete shall be inclusive of all tests and remedial measures.

PLAIN / REINFORCED CONCRETE

Sl. No.	Description of Item		Cement requirement
1.	RCC/PCC of nominal mix 1:4:8 complete (excluding finishing with CP)	1.70	quintals per cum of concrete
2.	RCC/PCC of nominal mix 1:3:6 complete (excluding finishing with CP)	2.20	quintals per cum of concrete
3.	RCC/PCC of nominal mix 1:2:4 complete (excluding finishing with CP)	3.20	quintals per cum of concrete
4.	RCC/PCC of nominal mix 1:1.5:3 complete (excluding finishing with CP)	4.00	quintals per cum of concrete

FLOORING

Sl. No.	Description of Item		Cement requirement
1	40mm thick (IPS) cement concrete flooring 1:2:4 with 20mm and down stone chips finished with a floating cement of neat cement	1.500 quintal per	10 sqm area
2	40mm thick (IPS) flooring with base coat 30mm thick 1:2:4 using stone chips 10mm nominal size and 10mm topping coat 1:1 (1 cement: 1 stone chips 3 to 6mm size) with a floating coat of neat cement	2.320 quintal per	10 sqm area
3	Extra for each additional thickness of 5 mm granolithic layer of 1:2:4 for flooring	0.016 quintal per	10 sqm area

FINISHING

Sl. No.	Description of Item		Cement requirement
1	6 mm thick C.P. 1:4	0.280 quintal per	10 sqm area
2	12 mm thick C.P. 1:4	0.55 quintal per	10 sqm area
3	12 mm thick C.P. 1:5	0.45 quintal per	10 sqm area
4	15 mm thick C.P. 1:4	0.65 quintal per	10 sqm area
5	15 mm thick C.P. 1:6	0.440 quintal per	10 sqm area

MISCELLANEOUS

Sl. No.	Description of Item		Cement requirement
1.	Grouting with		
	CM 1:2	7.18 quintal per cum	
	CM 1:3	5.40 quintal per cum	
2.	Fixing steel windows with 1:2:4 concrete blocks	0.40 quintal per	10 sqm of area
3.	Cement-sand mortar: -		
a)	1:1 (1 cement: 1 sand)	10.2 quintal per cum	
b)	1:2 (1 cement: 2 sand)	6.8 quintal per cum	
c)	1:3 (1 cement: 3 sand)	5.1 quintal per cum	
d)	1:4 (1 cement: 4 sand)	3.8 quintal per cum	
e)	1:5 (1 cement: 5 sand)	3.1 quintal per cum	
f)	01:6 (1 cement: 6 sand)	2.5 quintal per cum	

MASONARY WORKS

Sl. No.	Description of Item		Cement requirement
1.	Random Rubble Masonry in	CM 1:4	1.255 quintals per cum
2.	Random Rubble Masonry in	CM 1:6	0.825 quintals per cum
3.	Coursed Rubble Masonry in	CM 1:5	0.98 quintals per cum
4.	Brick work in	CM 1:5	0.95 quintals per cum of BW
5.	Brick work in	CM 1:6	0.625 quintals per cum of BW
6.	Half brick work in	CM 1:3	1.43 quintals per 10 sqm of area
7.	Half brick work in	CM 1:4	1.06 quintals per 10 sqm of area

FORM WORK:

The formwork shall conform to the shapes, lines and dimensions for all the elements as shown on the drawing. The formwork shall be designed and constructed so that the concrete can be properly placed and thoroughly compacted to obtain the required shape, position and level subject to specified tolerances. The designed formwork arrangement shall be got approved by the Engineer. Approval of the proposed formwork by the Engineer will not diminish the Contractor's responsibility for the satisfactory performance of the formwork, nor for the safety and co-ordination of all operations.

Formwork for architectural shapes for columns, ring, beams, circular or spherical walls, shell roofs or bottoms in the case of water reservoirs or any other structure shall be made from approved wrought and put up timber or steel plates and frames.

The form work to be used shall be of an approved system type. Wooden props are strictly prohibited.

Erection of Formwork:

The following shall apply to all formwork.

The contractor shall obtain the approval of the Engineer for the design of forms and the type of material used before fabricating the forms.

All shutter planks and plates shall be adequately backed to the satisfaction of the Engineer by a sufficient number and size of walers or framework to ensure rigidity during concreting. All shutters shall be adequately strutted, braced and propped to the

satisfaction of the Engineer to prevent deflection under deadweight of concrete and superimposed live load of workmen, materials and plant, and to withstand vibration and wind. No joints in props shall be allowed

Vertical props shall be supported on wedges or other measures shall be taken where the props can be gently lowered vertically during removal of the formwork. Props for an upper storey shall be placed directly over those in the storey immediately below and the lowest props shall bear on a sufficiently strong area.

Care she!! be taken that all formwork is set plumb and true to line and level or camber or batter where required and as specified by the Engineer.

If formwork is held together by bolts or wires, these shall be so fixed that no iron will be exposed on surface against which concrete is to be laid. In any case wires shall not be used wish exposed concrete formwork. The Engineer may at his discretion allow the Contractor to use tie-bolts running through the concrete and the Contractor shall decide the location and sine of such tie-bolts in consultation with the Engineer Holes left in the concrete by these tie-bolts shall be filled as specified by the Engineer at no extra cost. No through tie will be permitted in all cases where water is likely to be retained and gas tightness of the structure is to be ensured.

Provision shall be made in the shattering for beams, columns and walls for a port hole of convenient size so that all extraneous materials that may be collected could be removed just prior to concreting.
Formwork shall be arranged as to permit removal of forms without jarring the concrete Wedges, clamps and bolts shall be used wherever practicable instead of nails.

An approved mould oil or other material shall be applied to faces of formwork in contact with the wet concrete to prevent adherence of concrete. The use of oil which darkens the surface of the concrete shall not be allowed. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position. The formwork shall be kept thoroughly wet during concreting-and the whole time that it is left in place

Formwork for beams and slabs shall be so erected that the shuttering on the side of the beams and soffits of slabs can be removed without disturbing the beam bottoms.
Immediately before concreting is commenced, the formwork shall be carefully examined to ensure the following:

Removal of all dirt, shavings, sawdust and other refuse by brushing and washing.

The tightness of joints between panels of sheathing and between these and any hardened core.

The correct location of tie bars, bracing and spacers, and especially connections of bracing.

That all wedges are secured and firm in position.

That provision is made for traffic on formwork not to bear directly on reinforcing steel.

The Contractor shall obtain the Engineer's approval for dimensional accuracies of the work and for the general arrangement of popping and bracing. It is imperative that for scaffolding heights of 3.6 M and above, timber posts or steel scaffolding be used with adequate bracings in horizontal and vertical planes. The Contractor shall be entirely responsible for the adequacy of propping and for keeping the wedges and other locking arrangements undisturbed through the decentering period.

Formwork shall be continuously watched during the process of concreting. If during concreting any weakness develops and formwork shows any distress the work shall be stopped and remedial action taken.

Exposed Concrete Work:

Exposed concrete surfaces shall be smooth and even, originals as stripped without any finishing or rendering. Where directed by the Engineer, the surface shall be rubbed with Carborundum stone immediately on striking the forms. The Contractor shall exercise special care and supervision of formwork and concreting to ensure that the cast members are made true to their sizes, shapes and positions and to produce the surface patterns desired. No honeycombing shall be allowed. Honeycombed parts of the concrete shall be removed - by the Contractor as directed by the Engineer and fresh concrete placed without extra cost, as instructed by the Engineer.

All materials, sizes and layouts of formwork including the locations for their joints shall have the prior approval of the Engineer.

Camber:

Forms and false work shall be generally cambered as indicated in the drawings or as instructed by the Engineer. However, for beams upto 5 M span and slabs upto 4 M span camber is not normally required to be provided.

Age of Concrete at removal of formwork :

Unless otherwise permitted in writing by the Engineer, the minimum period of keeping formwork in position after concreting the members in normal circumstances and where ordinary Portland is used shall conform to the Indian Standard Specifications and shall be as follows :

a) Walls, columns and vertical faces of all structural members	24 to 48 hours as may be decided by the Engineer.
b) Slabs (Props left under)	3 days
c) Beam soffits (Props left under)	7 days
d) Removal l of props under slabs	
i. Spanning up to 4.5 m	7 days
ii. Spanning over 4.5 m	14 days
e) Removal of props under beams and arches	
i Spanning up to 6 m	14 days
ii. Spanning over 6 m	21 days

For other cements, the stripping time recommended for ordinary Portland cement may be suitably modified.

The Engineer may vary the above period if he considers it necessary. Immediately after the forms are removed, they shall be cleaned with a jet of water and a soft brush

Stripping of Formwork:

Formwork shall be removed carefully without jarring the concrete, and shall be eased off carefully in order to allow the structure to take up its load gradually and curing of the concrete shall be commenced immediately. Immediately after the shattering is removed, all the defective areas such as honeycombed surfaces, rough patches, holes left by form bolts etc. shall be brought to the notice of Engineer who may permit patching of the defective areas or reject the concrete work. Rejected concrete shall be removed then replaced by Contractor at his own cost. After removing loose materials, the surface shall be prepared and saturated with water for 24 hours before patching is done with 1:1.5 CM. The use of epoxy for bonding fresh concrete shall be carried out as directed by Engineer. Concrete surfaces to be exposed shall, where required by the Engineer, be rubbed down with Carborundum stone to obtain a smooth and even finish. Where the concrete requires plastering or other finish later the concrete surface shall be immediately hacked lightly all over as directed by the Engineer. No extra charge will be allowed to the Contractor for such work on concrete surfaces after removal of forms.

In the case of folded plates and shell roofs the contractors should take approval for the pattern of centering and sputtering along with programming for deshuttering.

Repropping:

For multistoried buildings the floors may need repropping to support the loads of the upper floors under construction. The extent of such repropping shall be as directed by the Engineer. Such repropping shall not be paid for separately and the cost of such repropping shall be deemed to have been included in the Contractors rates.

Reuse of Forms:

The Engineer may ir. his absolute discretion order rejection of any forms he considers unfit for use for a particular item, and order removal from the site of any forms he considers unfit for use in the works.

Hacking-out :

Immediately after removal of forms, the concrete surfaces to be plastered shall be roughened with a brush hammer or with chisel and hammer as directed by the Engineer to make the surfaces sufficiently coarse and rough to provide a key for plaster.

This shall not be paid for separately and shall be deemed to have been included in the Contractor's rates.

No payment shall be made for temporary formwork used in concreting, nor for formwork required for joints or bulkheads, in floors, or elsewhere, whether such joints are to be covered later with concrete or mastic or other material.

Inspection:

All materials, workmanship and finished construction shall be subject to the continuous inspection and approval of Engineer. Materials rejected shall be replaced by Contractor immediately at his own cost.

Cleanup:

Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris, scraps of wood etc. resulting from the work shall be removed and the premises left clean.

READY MIX CONCRETE: Reference - IS 4926-1976

TERMINOLOGY
For the purpose of this standard, the definitions in 1.1 to 1.4 shall apply.

Ready Mixed Concrete - Concrete delivered at site or into the purchaser's vehicle in a plastic condition and requiring no further treatment before being placed in the position in which it is to set and harden.

Agitation - The process of continuing the mixing of concrete at a reduced speed during transportation to prevent segregation.

Agitator - Truck mounted equipment designed to agitate concrete during transportation to the site of delivery.

Truck mixer - A mixer generally mounted on a self-propelled chassis capable of mixing the ingredients of concrete and of agitating the mixed concrete during transportation.

TYPES

Concrete-mix - Concrete shall be produced by completely mixing cement, aggregates, admixtures, if any and water at a stationary central mixing plant and delivered in containers fitted with agitating devices.

MATERIALS

Cement - The cement used shall be ordinary Portland cement or low heat Portland cement conforming to IS-269-1976* or Portland slag cement conforming to IS 455-1976+ or Portland-pozzolana cement conforming to IS: 1489-1976+ or rapid hardening Portland cement conforming to IS 8041E-1976## as may be specified by consultant at the time of placing the order. If the type is not specified ordinary Portland cement shall be used.

Fly ash when used for partial replacement of cement, shall conform to the requirements of IS: 3812 (part I)-1966.

Water used for concrete shall conform to the requirement of IS: 456-1964.

Admixtures shall only be used when so agreed to between the purchases and the manufacturer. The admixtures shall conform to the requirements of IS 456-1964 and their nature, quantities and methods of use shall also be specified. Fly ash when used as an admixture for concrete shall conform to IS: 3812 (Part II)-1966.

Measurement and Storage of Materials - Measurement and storage of materials shall be done in accordance with the requirements of IS: 456-1964.

BASIS OF SUPPLY

The ready mixed concrete shall be manufactured and supplied on the following basis.
Specified strength based on 28-day compressive strength of 15-cm cubes tested in accordance with IS: 456-1964.

When the concrete is manufactured and supplied on the basis of specified strength, the responsibility for the design of mix shall be that of the manufacturer and the concrete shall conform to the requirements specified in 7.

MEASUREMENT OF READY MIX CONCRETE

The basis of purchase shall be the cubic metre of plastic concrete as delivered to the purchaser.

The volume of plastic concrete in a given batch shall be determined from the total mass of the batch divided by the actual mass per cum. of concrete. The total mass of the batch shall be calculated either as the sum of the masses of all materials, including water, entering the batch or as the net mass of concrete in the batch as delivered. If the

purchaser wishes to verify the total mass of the batch, this shall be obtained from the gross and tare masses of the vehicle on a stamped weigh bridge. The mass per cum. shall be determined in accordance with the method given in IS: 1199-1959.

GENERAL REQUIREMENT

In addition to the requirements specified in this standard and subject to such modifications as may be agreed to between the purchaser and the manufacturer at the time of placing order, the ready-mixed concrete shall generally comply with the requirements of IS: 456-1964.

The minimum quantity of cement and the details regarding proportioning and works control shall be as per tender clause.

When a truck mixer or agitator is used for mixing a transportation of concrete, no water from the truck-water system or from elsewhere shall be added after the initial introduction of the mixing water for the batch, except when on arrival at the site of the work, the slump of the concrete is less than that specified; such additional water to bring the slump within required limits shall be injected into the mixer under such pressure and direction of floor that the requirements for uniformity specified in Appendix A are met.

Unless otherwise agreed to between the purchaser and the supplier, when a truck mixer of agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be complete within 1.5 hours (when the prevailing atmospheric temperature is above 20 ° C) and within 2 hours (when the prevailing atmospheric temperature is at or below 20°C) of adding the mixing water to the dry mix of cement and aggregate or of adding the cement to the aggregate, whichever is earlier.

Temperature - The temperature of the concrete at the place and time of delivery shall be not less than 5 ° C. Unless otherwise required by the purchaser, no concrete shall be delivered, when the site temperature is less than 2.5°C and the thermometer reading is falling.

The temperature of the concrete shall not exceed 5 C above the prevailing shade temperature, when the shade temperature is over 20 C. The temperature of concrete mass on delivery shall not exceed 40 C.

Sampling and testing: Adequate facilities shall be provided by the manufacturer for the purchaser to inspect the materials used, the process of manufacture and the methods of delivery of concrete. He shall also provide adequate facilities for the purchaser to take samples of the materials used.

Sampling and testing - Unless otherwise agreed to between the purchaser and the supplier, the sampling and testing of concrete shall be done in accordance with relevant requirements of IS: 456-1964, IS: 1199-1959and IS: 516-1959.

Consistency or workability - The tests for consistency or workability shall be carried out in accordance with requirements of IS: 1199-1959 or by such other method as may be agreed to between the purchaser and the manufacturer.

Strength Test - The compressive strength and flexural strength tests shall be carried our in accordance wit the requirements of IS: 516-1959 and the acceptance criteria for concrete whether supplied on the basis of specified strength or on the basis of mix proportion, shall conform to the requirements of Table 5 and other related requirements of IS: 456-1964.

Cost of Testing - Unless otherwise agreed to between the purchaser and the manufacturer, the cost of the tests carried our in accordance with the requirements of this specification shall be borne as follows:

By the manufacturer if the results show that the concrete does not comply with the requirements of this standard.

By the purchaser if the results show that the concrete complies with the requirements of this standard.

Manufacturer's Records and Certificates - The manufacturer shall keep batch records of the quantities by mass of all the solid materials, of the total amount of water used in mixing and of the results of all tests. If required by the purchaser, the manufacturer shall furnish certificates, at agreed intervals, giving this information

VACUUM DE-WATERED CONCRETING

PREPARATION:

The surface to receive flooring shall be clean, free from dirt and free from foreign material. Any undulations or mortar remaining on the floor shall be trimmed. Base course shall be trimmed. The base shall be cleaned and watered before laying the floor. Work includes at all depths and heights. The finished surface shall be kept wet for a maximum period of one week.

CONCRETING

GENERAL:
Concreting shall have a concrete base of M20 of specified thick.
Flooring shall have hardtop on the concrete base.
Flooring shall be laid in strips, the size of which is mentioned on the drawings.

MATERIALS:

Cement	- Portland
Sand	- River sand
Aggregate	- Max. Size 10 to 20mm
Water	- Potable
Nitohardner (Optional)	- @3kG/Sqm

EXECUTION:

Mix cement, sand and aggregates in proportion 1:1.5:3 thoroughly with water to get an appropriate consistency. Prepared concrete shall be laid immediately after mixing. The base shall be free from water and other foreign materials, dust and dirt. A coat of cement slurry of the consistency of thick cream shall be brushed on the surface of the base course. The concrete shall then be spread over this base evenly and leveled carefully to the required thickness. Low areas shall be filled with concrete and humps removed. De-vacuumisation shall be done for removing the voids. The whole concrete surface shall be leveled, compacted by ramming and trowelling. Prepared surface shall be allowed to set.

Hardener screed:

Hardtop to be prepared as per the specifications with Nitohardner and one part of dry cement. The heard top shall be provided over concrete base immediately after it is set, compacted and leveled with a steel trowel. The surface shall be trowelled to bring the hardener coat to a leveled surface. Excessive trowelling shall be avoided. After the initial set further compaction shall be done by steel trowelling. Final brushing shall be made before the topping becomes too hard.

CURING:

Curing shall commence as soon as the surface is hard enough to receive the water. The surface shall be covered with sacks or sand and shall be kept continuously wet for a period of at least one week.

PRECAST CONCRETE:

All precast concrete shall be cast over vibrating tables or by using form vibrators. Exposed surfaces of precast members shall be finished as called for on the drawings. All jointing surfaces shall be wire brushed and hosed down until the aggregate is free from cement slurry. Castellations shall be provided wherever called .for. Leave grouting holes, grooves, inserts, projections, reinforcements, lifting hooks, etc., to conform to the erection procedure. All edges and delicate projections likely to be damaged during handling and erection shall be protected by means of wooden cover fillets, until placed in position

MATERIALS:
The materials used for the construction shall conform to IS 456 latest

MOULD
The mound used for manufacturing precast components normally consists of two parts, (a) bottom mound, and (b) side mounds. The bottom mound can be made out of timber,

masonry, concrete, steel, FRP, plastic or any other material acceptable to the Engineer. The side mounds similarly can be of timber, steel, FRP, or physic. When using masonry or concrete moulds, the top surface shall be finished to the required accuracy and made smooth.

In case of masonry mounds, the use of chicken mesh or fibre reinforcements in the top surface will help in making the mould last longer for higher efficiency.

In the case of cored units the voids can be- created either by an extrusion process, by inflated tubes, Mild steel tubes, timber, cardboard / hard paper or any other materials.

The castellation / depressions / roughening of required depth shall be provided in the sides of the precast units. Suitable provisions in the side shutters of the mound may create better keying between in situ concrete and precast concrete units at the joints.

REINFORCEMENT COVER:

Minimum cover for the reinforcement for precast units shall be as follows;

a) For reinforcement in the flange, 12 mm clear in aft directions. This shall be increased to 15 mm when surfaces of precast members are exposed to corrosive atmosphere and

b) For main reinforcement in the rib, 20 mm or diameter of bars whichever is greater. in case of corrosive atmosphere, this shall be increased to 25 mm, or diameter of bar, whichever is greater.

It shall be ensured that the reinforcement cages am not in any way distorted during storage, handling, placement and casting. In the case of mass production in large precasting factories, the use of reinforcement ladders and mesh made by using a resistant welding machine will be advantageous for improving

CONCRETE:

The concrete mix used shall be minimum of M-15 grade in accordance with is: 456 latest but M 20 and above grade of concrete is preferred for reinforced concrete units. The concrete mix as specified in the drawings shall be used for respective units in accordance with IS: 456 latest.

CASTING & CURING OF UNITS :

Mechanical vibration either through mould/table vibrators or screed vibrators is essential to ensure good compaction. Needle vibrators can be used for compacting concrete in the ribs and screed vibrators for compacting concrete In the flange. For larger factories, concrete placing machine, which level, vibrate and finish the concrete units can be advantageously utilized for this purpose

Curing shall be done as per IS 456 latest if necessary, low pressure steam curing may be provided to get early stripping / release strength.

SAMPLING AND TESTING OF UNITS

Sampling:

Sampling shall be done in accordance with latest load test: Load tests shall be carried out in accordance with IS 456 latest. All the units passing the load test can be used in wet constructions.

TRANSPORTATION AND ERECTION OF PRECAST ELEMENTS:

Lifting Hooks
Wherever lifting hooks I holes are used these shall be provided at structurally advantageous points (for example, 1/5 of the length from the end of the element) to facilitate demoulding and erection of the precast unit. The lifting hooks can be formed out of normal Mild steel reinforcing bars with adequate carrying capacity to carry the self weight during demoulding, handling and erection. After erection, the hooks can either be cut or bent down inside the screed or joint concrete that will be laid subsequently.

Lifting and removal of precast units shall be undertaken without causing shock, vibration or undue bending stress to or in the units. Lifting and handling positions should conform to the Engineers directions.

Stacking of Units
After removal from moulds the precast units shall be stacked over supports placed at about 1/6 of span from ends. Care shall be taken to see that no support is placed at the centre of span. Care also shall be taken to see that the main reinforcement is always at the bottom of stacked units.

TRANSPORTATION:

The units shall be transported always with the main reinforcement at the bottom. For transporting and erect trig the units, rope slings shall be tied near the ends at 1/5 of the length from either end of the unit. In case the units are transported In trolleys, the over-hang of the units from the trolley shall not be more than 1/5 of the length. The unit shall be lifted manually or with the help of chain pulley blocks or mechanically with a hoist or a crane.

PLACING AND ALIGNING:

The ups shall be placed and aligned side by side across tile span to be covered. While pawing the units, care shall be taken to sac Mat they have the speckled bearing on supporting wad! / beam. Placing of units shall be started from one end Of the building.

BEARING:

The precast units shall have a minimum bearing of 75 mm on the beams and 100 mm on the conventional masonry wall.

CURING OF IN SITU CONCRETE IN JOINTS:

The in situ concrete in the joint shall be cured for at least 7 days in accordance with IS 456 latest. The concrete shall then be allowed to dry for at least a week. A coat of cement study may be applied to the joints to fill me hairline cracks that might have developed. Joints shall be finished as specified in the drawings.

FIXTURES:

Designers shall indicate provisions for fixtures like fan hooks / inserts / electric conduits, etc., to be incorporated within the precast units or the in situ joints I screed concrete.

In case of concealed wiring, conduits may be placed within the joints along the length or within the screed before concreting. If adequate thickness is available this may be concealed within the floor / roof finish.

Holes, openings and fixtures required to be provided Within me precast units shall be fixed accurate with adequate embedment at the precasting stage. Dulling of holes I cutting of edges shall not be made unless permitted by the Engineer.

DEFECTS IN CONCRETE :

Immediately on removal of form work, the surface of the concrete shall be examined by the contractor and any honeycombs or other imperfections shall be brought to the notice of the Engineer. The acceptability or otherwise of such defective concrete shall be at the sole discretion of the Engineer Ado may direct the contractor to repair the defective work or ask for demolition and replacement of such defective work at the risk and cost of the contractor.

PROTECTION OF CONCRETE:
All concrete shall be protected from damage by workmen, equipment, overload or any other cause. All edges, comers and projections of concrete members likely to be damaged shall be protected by means of cover fillets or as directed by the Engineer.

EQUIPMENT FOUNDATION :

The contractor shall provide concrete foundations for the various equipments in accordance with the drawings. All concrete for equipment foundation shall be of specified grade as per drawing Bolts, inserts and other anchoring features shall be left in their correctly assigned position to templates prepared for this purpose at the time of casting. Where it is not possible to leave bolts, etc., in position, pockets of suitable sizes shall be left in the concrete foundations to receive the bolts. Pockets shall be formed by suitable form work as directed by the Engineer. Bolts shall be grouted by expanding cement mortar, non-shrink grouting compound and finished neat.

It is essential that the Engineer who is in-charge of the construction of all concrete work, whether plain or reinforced shall be well experienced in this class of work and shall superintend personally the whole construction and pay special attention to:

a)Quality Control in respect of selection of materials, proportioning and mixing, etc.
b)Placing and consolidation of concrete.
c)Accuracy in cutting, bending, placing and binding of reinforcement.
d) Accuracy in fabrication, assembly and erection of form work.
e) Casting, handling, transportation and erection of precast members.

MODE OF MEASUREMENT:

The method of measurement for various items in the tender shall be generally in accordance with the IS: 1200 subject to the following :

Cement Concrete in P.C.C. & R.C.C. items shall be measured exclusive of reinforcement and plaster thickness but shall include necessary costs of shattering, centering, hire charges of all equipment, curing, hacking and fair finish. Reinforcement and plaster shall be measured and paid separately.

Items like R.C.C. precast Jalli, R.C.C. Pipes and other such items which are normally manufactured in factories as well as those items which have been specifically mentioned in schedule of quantities shall be measured inclusive of reinforcement.

No deductions will be made for openings upto 0.1 Sqm. and no extra labour for forming such opening or voids shall be paid.

Columns shall be measured from the top of the footing and shall be measured through including flare of the column in case of flat slab construction.

Beams shall be measured from face to face of columns/beams and shall include haunches, if any The depth of the beams (other than raft foundation beams) shall be measured from the top of the slab to bottom of the beam.

In case of combined footings and raft foundation, the exposed portion of beam rib shall be measured as beam and the remaining portion measured in footing/raft slab.

Slabs (other than in raft foundation) shall be measured in bays (clear of beams) with deductions for column portion.

Chajja : Only projected portion snail be measured in square revere.

Staircase : Measurements shall be in Cum. Staircase comprising of step, soffit slab, landing slab shall be measured and paid under this item. Side parapet walls, railings, finishing of risers and treads M.S..reinforcement and plastering etc. shall be paid separated under respective items.

STEEL REINFORCEMENT

GENERAL :
This item covers the requirements for supply and installation of all steel reinforcement in reinforced concrete.

MATERIAL :

Classification of Steel Reinforcement
Material Specifications :
Items of Steel reinforcement in the Bill of quantities are classified according to the following types of steel.
a. Mild steel reinforcement : Shall cover all hot rolled mild steel bars conforming to IS:432 (Part I) Grade I.
b. High yield strength deformed bar reinforcement : Shall cover, unless stated specifically in the specifications or drawings, either hot rolled deformed steel bars conforming to IS:1149 or cold twisted deformed steel bars conforming to IS:1786.
Fabric reinforcement where called for shall be of hard drawn mild steel wire mesh conforming to IS: 1566. Bars shall be free from deleterious materials, mill scale, loose rust, oil or paint.

IS STANDARDS:

IS - 299	Specification for Ordinary, rapid hardening and low heat Portland Cement
IS - 455	Specification for Portland blast furnace slag Cement
IS - 1489	Specification for Portland pozzolona Cement
IS - 4031	Method of physical tests for hydraulic Cement
IS - 650	Specification for Standard sand for testing of Cement
IS - 383	Specification for Coarse and Fine aggregate for use in mass concrete
IS - 515	Specification for natural and manufactured aggregate for use in mass concrete.
IS - 2387	Method of test for aggregates for concrete.
IS - 516	Methods of test for strength of concrete.
IS - 1199	Methods of sampling and analysis of concrete
IS - 3025	Methods of sampling and test (physical and chemical) for water used in industry.
IS - 432	Specification for Mild steel and medium tensile bars and hard drawn steel wire.
IS - 1139	Specification for hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement.
IS - 1566	Specification for plain hard drawn steel wire fabric for concrete reinforcement
IS - 1785	Specification for plain hard drawn steel wire for prestressed concrete.
IS - 1786	Specification for cold twisted steel high strength deformed bars for concrete reinforcement.
IS - 2080	Specification for high tensile steel bars used in prestressed concrete
IS - 303	Specification for Plywood for general purposes
IS - 4990	Specification for plywood for concrete shuttering work
IS - 1629	Rules for grading of cut size of timber
IS - 2645	Specification for integral cement water proofing compounds
IS - 1791	Specification for batch type concrete mixers
IS - 2438	Specification for roller pan mixer
IS - 2505	Specification for concrete vibrators , immersion type
IS - 2506	Specification for screed board concrete vibrator
IS - 2514	Specification for concrete vibrating tables
IS - 3344	Specification for pan vibrators
IS - 4656	Specification for form vibrators
IS - 2722	Specification for portable swing weigh batchers for concrete (single & double bucket type)
IS - 2750	Specification for steel scaffoldings.
IS - 456	Code of practice for plain and reinforced concrete
IS - 1343	Code of practice for pre-stressed concrete
IS - 457	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
IS - 3370	Code of practice for concrete (Part I to IV structures for storage of liquids
IS - 3935	Code of practice for composite construction

IS - 3201	Criteria for design and construction of precast concrete trusses.
IS - 2204	Code of practice for construction of reinforced concrete shell roof.
IS - 2210	Criteria for the design of R.C. shell structures and folded plates.
IS - 2751	Code of practice for welding of mild steel structures are folded plates
IS - 2502	Code of practice for bending and fixing of bars for concrete reinforcement
IS - 3558	Code of practice for use of immersion vibrators for consolidating concrete
IS - 3414	Code of practice for design and installation of joints in buildings
IS - 4014	Code of practice for steel tubular, scaffolding
IS - 2571	Code of practice for laying in-situ cement concrete flooring

CERTIFICATES OF TEST FOR REINFORCEMENT:

For each consignment of bar reinforcement used in the works, the contractor shall, if required by the Structural Engineer, supply a certificate of tests performed by a recognized testing laboratory or the manufacturer and give the ultimate strength, yield stress and elongation and the results of cold bend test. All the tests shall be conducted in accordance with the applicable and relevant Indian Standard Specification. If so required by the Engineer, the contractor shall arrange to get the chemical composition of the bars tested and obtain a certificate of test results.

All the costs of sampling and testing shall be borne by the contractor.

STORAGE HANDLING AND PROTECTION:

Reinforcing steel different varieties and sizes shall be stored separately and in a manner which will permit easy identification and prevent mixing up of different sizes and types.

Reinforcing bars shall be stored at the site in such a manner as to prevent rusting and contamination of the surface by deleterious materials like dirt, oil, grease, paint, etc., When placed in the work, all reinforcement shall be free of loose mill scale, rust and any deleterious matter. However, removal of tight adhering mil scale and mild rust is not necessary.

Steel reinforcement shall always be protected from damage due to impact and rough handling.

FABRICATION & BENDING:

Based on the “Approved for Construction” drawing showing reinforcement details, the contractors shall prepare bar bending schedule and submit the same, for the approval of the engineer. .

The contractor shall submit bar bending schedules for approval of the Engineer prior to commencement of fabrication. These shall indicate the accurate dimensions and bending of bars as called for on the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and ensuring minimum cover as called for on structural drawings.

All reinforcing steel within the limit of a days pour shall be in place and firmly wired atleast one day prior to the date of pour to permit inspection. The contractor shall also ensure that all conduits embedment and inserts are in position before placing concrete.

Bars shall be cut to size and bent to shape in according with the appropriate dimensions shown in the drawings. When an overall or an internal dimension of bent bar is specified, the tolerance unless otherwise specified, shall be as in Table XI of IS :2502.

Any excess in length supplied over the total of length of the various portions of the bar between ends, including the specified tolerance or not shall be taken up in the end anchorage's or in that portion of the bar indicated by the Structural Engineer.

All reinforcement bars shall be made straight before bending. Bars shall be bent cold gradually by machine or any other means approved by the Structural Engineer except in case of mild steel bars larger than 28mm. If a proved by the Structural Engineer, mild steel bars greater than 28mm dia and conforming to IS:432 only may be bent hot at cherry red heat (not exceeding 850 Deg.C). Bars bent hot shall be allowed to cool gradually in air and shall bars shall not be hot bent.

Bars having cracks or splits shall be rejected. Bars incorrectly bent once shall not be used without the approval of the Engineer.

All reinforcement shall be furnished in full length indicated in the drawing. Splicing of bars expect those shown on the drawings will not be permitted without the written authority of the Structural Engineer. No payment will be made for steel in the laps for splices in bars provided for contractor's convenience or at his request.

At a tension splice, the minimum clear distance between bars shall be maintained. Splices in adjacent tension bars shall be staggered. At a compression splice each side of lapped bars may be in contact but the minimum clear spacing between the splice and an adjacent splice shall be that specified for adjacent unspliced bars.

In no case shall the clear distance between two adjacent bars be less than the diameter of the bar (larger of the diameters to be considered in the adjacent bars

are of different diameters) or 6mm more than the maximum size of coarse aggregate used in the concrete.

The depth of the crank is correct as per the drawing or the Bar Cutting and Bending Schedule.

The rods are placed in exact positions. The bars should not be bent or straightened in any manner that will injure the material

Hooks where indicated shad be either a complete semi- circular turn With a radius of not less than four and not more than six bars diameters, plus an extension of atleast four bar diameters at the free end, or a 90 degree bend having a radius of not less than ^4 bar diameters plus an extension of 12 bar diameters, as shown or implied on the drawings.

No reinforcement shall be bent when in position in the works without approval whether or not it is partially embedded in ardened concrete.

LAPPING:

As far as possible bars of maximum length available shall be used. Unless otherwise specified or shown on the drawings, all laps shall be 50 times the diameter of bar. Not more than 33% Thirty Three Percent) of the bars shall have lapped joints at the same location.

PLACING & FASTENING :

All steel reinforcement shall be accurately placed in position shown on the drawing and firmly held during the placing and setting of concrete. Bars shall be tied together with mild steel 16 swg (1.625mm) or 18 swg(1.219mm) dia annealed binding wire (conforming to IS:280) at all intersections except where the spacing of intersections is less than 30cm in each direction when alternate intersections shall be tied. Binders shall tightly embrace the bars with which they are intended to be in contact and shall be securely held. Placing of bars on layers of fresh concrete as the work progresses shall not be permitted. Adjusting bar spacing in concrete already poured shall not be permitted after such time when the re-vibration of the surrounding concrete is no longer effective.

Distance of the bars from the formwork shall be maintained by approved concrete spacer blocks, ties, hangers and other approved supports. Metal chairs which are in contact with the exterior surface of concrete where specially allowed shall be galvanized or painted with epoxy. Layers of bars shall be supported at correct spacing by precast mortar blocks or other equally suitable devices approved by the structural engineer. The mortar for the precast blocks shall have the same composition as the concrete in which it is embedded and shall have cured for at

least 28 days before being place in position. The use of pebbles, pieces of broken stone or bricks, metal pipe or wooden blocks will not be permitted.

No reinforcement shall be bent when in position in the work without the approval of the Structural Engineer, whether or not it is partly embedded in concrete. Workmen will not be permitted to crimp or bar extensions until the concrete has sufficient strength so as not be damaged and no movement of the bar is possible.

CLEANING, PLACING & FASTENING:

All reinforcement shall be cleaned to remove loose mill scale loose rust, oil and grease or any other harmful matter immediately before placing the concrete. Dowel bars will be provided where shown on drawing or where required.

All steel reinforcement shall be accurately placed in position shown on the drawing tied with gauge Gl annealed steel wire and firmly held during the placing and setting of concrete.

The vertical distance required between successive layers of bars shall be maintained by providing space bars, inserted at such intervals that main bars do not perceptibly sag between adjacent space bars.

WELDING AND COUPLING :

Field Welding of reinforcing bars will not be permitted without the written consent of the Structural Engineer. Such approval will require identification of the type of steel used. Where welding is permitted it shall be at suitably staggered locations and at such places where the stress in steel in service does not exceed 75 % of the maximum permissible stress.
All welding shall be carried in accordance with IS : 2751. Only qualified welders shall be permitted to carry out such welding.

The welding procedure shall be approved by the Engineer and tests shall be made to prove the soundness of the welded connection.

Rate quoted for steel reinforcement work shall be deemed to include the cost of such weldings wherever specified

Procedure of welding mild steel reinforcing bars shall generally follow the requirements of IS:2751 “Code of Practice for welding of Mild steel Bars used for Reinforced Concrete Construction”. Welders employed for this work shall have passed relevant qualification tests for welders, specified in IS:2571. Welding of bars other than hot rolled mild steel conforming to IS:432 shall not be permitted.

Whenever plans call for the use of couplers to join bars, such couplers to join bars, such couplers shall have sufficient cross section to transmit the full strength of the bars. The ends of bars to be joined by coupling shall be upset for a sufficient length so that the effective cross section after cutting the screw threat shall not be less that the normal cross section of the bar.

COVER FOR REINFORCEMENT

Cover for reinforcement shall be in accordance with ISI: 456-1978 and as per the instructions in structural drawings.

Footings, retaining walls and similar members in contact with earth but not cast against earth	- 50 mm
Slabs	- 15 mm
Walls, ribs	- 20 mm
Beams:	
For main bars	- Min.25 mm or dia. of the bar
For stirrups	- 15 mm
Columns	- 40 mm
Columns less than 20 cms	- 25 mm
Water tanks:	
In contact with water	- 40 mm
In contact with air	- 20 mm

For tensile, compressive, shear or other reinforcement in a slab not less than 13 mm., nor less than the diameter of such reinforcement.

For any other reinforcement not less than 13 mm., nor less than diameter of such reinforcement. For giving the necessary covers, concrete cover blocks of same strength of concrete proposed for the structure shall be used. All cover blocks shall be secured firmly so that they are not disturbed during compaction.

SPACERS CHAIRS AND OTHER SUPPORTS

Provide necessary supports to maintain reinforcement in its correct position. Provide spacer bars of same diameter as longitudinal bars but not less than 25mm diameter between two layers at 1.5 mm centers except where bundled bars are detailed.

PRECAUTIONARY MEASURES

Do not insert bars into placed concrete. Do not damage forms and form linings, if any when fixing reinforcement.

ADJUSTMENT AND CLEANING

Check reinforcement prior to and during placing concrete with particular attention to the top reinforcement in Cantilever sections.

Ensure that reinforcement is clean and free from corrosive pitting, loose rust, loose mill scale, oil and other substances, which may adversely affect reinforcement concrete, or the bond between the two.

Protect the projecting reinforcement from weather where the rust staining of exposed concrete surfaces may occur.

INSPECTION:

No concrete shall be deposited until the structural engineer has inspected the reinforcement in place and approved the same. Concrete placed in violation of this provision will be rejected.

The quoted price per ton of steel reinforcement in place shall cover full compensation for furnishing the material, labour, tools and tackle, plant and equipment, supporting devices and all other incidental work required to complete the work as per the above specification.

Welded or coupled joints where required by the Structural Engineer or indicated on drawings shall be counted and classified according to the diameter of bar joints and paid for at the same rate as a lap length of the relevant bar.

MODE OF MEASUREMENT:

The method of measurement for various items in the tender shall be generally in accordance with the IS: 1200 subject to the following:

Reinforcement shall be measured in lengths of bars as actually placed in position on standard weight basis, no allowance being made in the weight for rolling margin. Wastage and binding wire shall not be measured. Authorized overlaps and splices shall only be measured.

STRUCTURAL STEEL WORK

GENERAL:

These specifications relate to the requirements of supplying, fabricating, erection and painting of structural steel used in the work.

A. WORKS INCLUDED

1. Anchorage in cast-in-situ concrete.

B. RELATED WORK

1. Grouting base plates and bearing plates
2. Metal fabricators
3. Asbestos cement roofing sheets

REFERENCES

IS- 226- 1975 - Structural Steel (standard quality) (fifth revision)

IS- 696- 1972 - Code of practice for general engineering drawings (second revision)

IS- 813- 1961 - Scheme of symbols for welding

IS- 816- 1969 - Code of practice for use of metal arc welding for general construction in mild steel (first revision)

IS- 961- 1975 - Structural steel (high tensile) (second revision)

IS- 962- 1967 - Code of practice for architectural and building drawings (first revision)

IS- 1030- 1982 - Carbon steel castings for general engineering purposes (second revision)

IS- 1149- 1982 - High tensile steel rivet bars for structural purposes

IS- 1929- 1961 - Rivets for general purposes (12 to 48 mm diameter)

IS- 1977- 1975 - Structural steel (ordinary quality) (second revision)

IS- 2062- 1984 - Weldable structural steel (third revision)

IS- 7215- 1974 - Tolerances for fabrication of steel structures

SHOP DRAWINGS

INCLUDE:
Shop drawings for trusses, bracings, purlins, columns, ties, base plates, crane girders, etc. Indicate profiles, sizes, spacing and locations of structural members, connections, attachments, fasteners, cambers, loads and designs of joints.

Indicate welded connections using standard welding symbols and net weld lengths.Indicate the method of erection, shop and field joints. Indicate and identify all transportable parts and sub assemblies, associates with special erection instructions, if any.

Provide design calculations for splices, joints, other details not specifically detailed in design drawings on fabrication drawings considering standard detailing practices and developing full member strengths.

Submit 3 sets of shop drawings to Architect for approval. Allow three weeks for Architect to approve Shop Drawings.

MATERIALS

Structural steel members.
Structural tubing.
Bolts, nuts and washers.
Welding materials.
Primer.
Shear studs.

FABRICATION

Fabricate structural steel members in accordance with IS 800 Section V and approved shop drawings.

Defective material used shall be replaced by the Contractor.

Fabricated items delivered at site shall be suitably protected from any damages.

FINISH

Clean, prepare and shop prime structural steel members. Do not prime surfaces to be field welded or bolted or in contact with concrete.

EXECUTION

Erect structural steel in accordance with IS Specifications.

Make provision for erection loads and for sufficient temporary bracing to maintain the structure in proper plumb and in true alignment until completion of erection and installation of permanent bracing.

Do not field cut or alter structural members without approval of Architect.

After erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.

Members shall be cut mechanically by saw or shear or by oxy-acetylene flame and not by electric metal arc.

Cut edges shall be ground as per IS 823.
Cutting tolerances shall be
For members connected at bolt ends: + or - 1 mm.
For other members: + or - 3 mm.

All bolt holes shall be drilled and to the sizes specified in drawings.

Tolerance for spacing between two holes: + or - 1 mm.

Tolerance between two perpendiculars of any oval hole: + or - 1 mm.

Bolt holes for field joints shall be drilled in the shop to the required diameters and tested.

Drilling holes for standard sizes if varies can be reamed to next higher sizes. The tolerance for hole reaming shall not exceed 15% of the total number of holes for one joint.

PREPARATION OF MEMBERS FOR WELDING

Proper jigs and fixtures shall be used to ensure correct positioning of structural members during assembly.

Sharp edges, rusting of cutting edges, notches, irregularities and fissures due to faulty cutting shall be chipped and ground.

Edge preparation for welding shall be done properly taking care of cleaning, providing dry surface, removing grease, dust or dirt, foreign matter, etc.

Finished dimensions of structure shall be ensured after taking into account the shrinkage and distortions during welding.

WELDING

Personnel:

Welders shall be fully trained, experienced and certified by the recognised welding institutes. Welder's qualification tests shall be as per IS 823 and approved by Consultants.

Execution:

Welding shall be done in accordance with IS 823. Welded parts shall be marked with welder's identification. Protect the welded parts, electrode wires against wind and rain. Discontinued seams shall be melted before resuming welding operation. Welding seams shall be cooled slowly and not by any other quick methods. Before welding a second layer over the existing layer of weld, the layer shall be cleaned metal bright by light chipping and wire brushing.

Approval:

Welded parts shall not have any deformations. Welded joints should compensate for contractions due to welding. Defective welds must be rectified. Weld seams shall correspond to design shapes and dimensions. Weld seams shall not have cracks, fusion, under cuts, rough surfaces, burns, blowholes and incomplete penetration. Approval of finished elements, inspections and tests shall be as per Annexure.

IDENTIFICATION

Structural members prior to dispatch for erection shall be marked with a weather proof light colored paint. The size and thickness of members shall be so chosen as to facilitate easy identification.

Structural members small in size shall be bundled or crated and shall be marked with metal tags for bundles and painted on crates for identification with particulars of the bundle / crate size, weight, etc.

MODE OF PAYMENT

Payment of structural steel members including bolts, nuts, washers, gusset plates, etc., will be done on weight basis. The weight of members will be assessed from the final fabricated and approved drawings .The weight of members shall be as per IS handbook. Sections other than mentioned in IS hand book shall be taken as per manufacturers information. No rolling tolerance will be allowed. Built up of members will be paid as per the actual weight of the members. Gusset plates shall be paid to the nearest rectangle enclosing the shape and no deduction shall be made for any skew cuts. The rates for structural steel work to include all the welds, bolts, anchors, washers, etc., which are not measured separately and paid for. Payment do not include any other related temporary works connected with this work including welds, shims, wedge plates, etc.

Rate to include any trimming, straightening, edge preparation, preparation of shop drawings, approval of shop drawings and one coat of red oxide zinc chromate primer and also including any handling, re handling, loading and unloading, transport to the site of work and returning surplus material to the Project Manager at the place requested by him.

Rate to include necessary scaffolding, temporary support, tools and tackles, touching up primer coat grouting etc.,

GROUTING

To level, align and plumb the structural steel work and the base of stanchions by providing steel shim plates.

To align anchor bolts in foundation to the required level, location and orientation by using templates.

To clean the underside of base plates, pockets to receive grout by using compressed air.

To use cement mortar 1:2, 1 of cement and 2 of sand, non-shrink grout under base plates.

To use grade M 30 concrete / free flow Grouting compounds (Conbextra or equivalent) to fill up the grout pockets left for fixing anchor bolts.

To pour the grout under a sufficient head and tam until the voids are thoroughly filled and the grout overflows.

TOLERANCES

Steel work for line and level	+ or - 3mm
For structural steel for plumb	3.5mm for 10M
And not more than	7mm for 30M

To follow any tolerance criteria provided on the drawings.

MASONRY WORKS

GENERAL:

The specification covers the general requirements for stone and brick masonry.

Applicable Codes:

The latest revision of the following Indian Standards and Codes, unless otherwise specified, shall be applicable to all brickwork and block work:

Sl.No.	BIS Code No.	Part	Title
1	1077		Specification for Common Burnt Clay Building Bricks
2	2116		Specification for sand for Masonry Mortar
3	2212		Code of Practice for Brickwork
4	2250		Code of Practice for Preparation and Use of

			Masonry Mortar
5	SP 27		Handbook of Method of Measurement for Building Works
6	432		Specifications for Mild Steel and Medium Tensile Bars
7	2185		Specification for cement concrete Block
8	2572		Code of practice for construction of concrete walls
9	9103		Specification for Admixture of concrete

MATERIALS:

Cement:

Ordinary Portland cement of 43 grades conforming to IS: 8112 (latest) shall be used for all masonry works. Cement shall be fresh when delivered at site.

Sand:

Sand shall conform to IS : 383 & IS: 2116. Sand shall be hard, durable, clean and free from dirt, clay, organic matter or other impurities. Sand shall not be too fine nor too coarse and shall fall within the grading zones I to IV given in Table 111 of IS: 383. The silt content of sand shall not exceed 5% by volume.

Stones:

Stones shall be the type specified and shall be of hard granite be salt or trap stone, of uniform colour and texture. It shall be hard, sound, durable, free from flaws, cracks, injurious veins, decay and weathering and shall be freshly quarried from an approved quarry. Discolored or distorted stones with boulders skin or earth or porous matter or stones with round surface shall not be used.

The crushing strength of the rubble for use in the stone masonry should not be less than 150 Kg/Sqcm.

The stones, when immersed in water for 24 hours, shall not absorb water by more than 5 percent of their dry weight when tested in accordance with IS : 11 24.

Bricks:

Bricks shall conform to the requirements of IS: 1077.

All bricks shall be chamber burnt and of first class quality sound, hard, well bums throughout but not over burnt, of regular uniform size, shapes and colour (generally deep red or copper) homogenous in texture and free from flaws and cracks. They shall have plane rectangular faces with parallel sides and square! straight and sharply defined

raisers. Brick shall not be broken, cracked, stratified, under burnt, over burnt or soft. A fractured surface shall show a compact fine Drained, uniform and dense texture free from lumps of lime, laminations, cracks, air holes, grit, soluble salts causing Fluorescence or other defects which may in any way impair the strength, durability appearance and usefulness of the brick. A clear metallic ringing sound shall be emitted when two bricks are struck together. After 2^4 hours immersion in cold water, water absorption by weight sheik not exceed 20 percent of the dry weight of the brick. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 600 mm. The minimum compressive strength of bricks shall be 50 Kg/Sq cm.

Bricks shall be a uniform deep red or copper colour, thoroughly burnt without being vitrified, regular in shape and size. They shall have sharp and square sides and edges and parallel faces to ensure uniformity in the thickness and height of the courses of brickwork.

The nominal size of the brick shall be 230mm x 115mm x 70mm (nominal) unless otherwise specified. The bricks shall be provided with frogs. The water absorption shall not be more than 20 (twenty) percent by volume.

The tolerance permitted in the accepted size of the bricks shall be plus or - 3 mm in any dimension. Representative samples of bricks shall be submitted to the Engineer for approval before supply to site and the approved samples shall remain with the Engineer. All bricks proposed to be used shall conform to the approved samples in all respects Any brick found not up to the specification shall be removed immediately from the site at the Contractor’s cost.

TESTING

Samples of Bricks taken at random from stacks/Trucks by the Project Manager shall be got tested for strength, water absorption, etc. at contractor’s expense.

SAMPLES

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

SOAKING OF BRICKS

All bricks shall be thoroughly soaked in clean water immediately before use. They shall be placed in specially prepared vats, tubs or tanks for not less than one hour. The Project Managers’ may amend this time after trials at site. After they have been soaked, the bricks shall be kept on wooden planks or brick platforms to avoid earth being smeared on them.

Water:

Water used for mixing mortar and curing shall be clean and free from oil, acid, salt and other injurious materials and shall be in accordance with clause 4.3 of IS : 456. Vaster fit for drinking will generally be found suitable.

Mortar Mixing:

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

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

Concrete Blockwork :

Hollow or solid concrete blocks shall conform to IS 2185 and shall be regular in size and shape and of the specified strength.

Blocks shall be property cured before being brought to Site and shall have a texture such that plaster and/or render will readily adhere to it.

The Contractor shall supply samples for the approval of the Engineer and all blocks supplied shall conform strictly to the approved samples.

Half or three quarter size blocks may be used wherever required to make up lengths of walls but broken blocks shall not be used.

Precast concrete screen or special blocks or ‘jail’ work for decorative purposes shall be as specified on the drawings or as directed by the Engineer. Sample blocks shall be submitted to the Engineer for approval and blocks supplied shall strictly conform to the approved samples.

Mortar for Brickwork and Block work:

Mortar shall be prepared in accordance with IS 2250. Mixes for cement mortar shall be as specified for the respective items of work.

Cement shall be ordinary Portland cement.
Sand shall be natural sand in accordance with IS 383, passing a 4.75mm size IS sieve, and shall be free from clay, shale, loam, alkali, organic and other deleterious matter and shall be of sound, hard, clean durable particles. Sand shall be approved by the Engineer and, if so directed, shall be thoroughly washed until it is free of any contamination.

Gauge boxes for sand shall be of such dimensions that one complete 50Kg bag of cement forms one until.

For the preparation of cement mortar the ingredients shall first be thoroughly mixed dry. Water shall then be added and the mixing continued until a uniform mix of the required consistency is achieved.

Cement mortar shall preferably be machine mixed, though hand mixing in troughs may be allowed with the approval of the Engineer. Mortar so mixed shall be used within 25 (Twenty Five) minutes of mixing. Mortar left unused within the specified period shall be rejected and disposed of by the Contractor to the Satisfaction of the Engineer. Re-tempering of mortar shall not be permitted.

The Contractor shall arrange at his own cost for tests on mortar samples, if so directed by the Engineer.

Workmanship for Brickwork:

Workmanship shall conform strictly to IS 2212.

Bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. Cement mortar for brickwork shall be as specified in the respective item of work.

Brickwork 230 mm thick and over shall be laid in English Bond unless otherwise specified. Brickwork 115 mm thick shall be laid in Stretcher Bond.

A layer of mortar shall be spread over the full width of a suitable length of the lower course and bricks pressed into the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.

Bricks shall be laid so that all joints are well filled with mortar. The thickness of joints shall not be less than 6mm and not more than 10mm. Face joints shall be raked to a minimum depts. Of 12mm by raking tools during the progress of work when the mortar is still green so as to provide a proper key for pointing, plastering or rendering. When pointing, plastering or rendering is not required joints shall be uniform in thickness, struck flush and finished at the time of laying.
Brickwork shall be plumb, square and true to lines and the dimensions shown on drawings. Vertical joints in alternate courses shall laid directly one over the other and be in line. Horizontal courses shall be leveled.

The thickness of brick courses shall be kept uniform. For walls greater than 230mm thick, both faces shall be kept in vertical planes. All interconnected brickwork shall be carried out at one level (so that there is uniform distribution of pressure on the supporting structure) and no portion of the work shall be left more than one course lower than the adjacent work. Where this is not possible the work shall be raked back according to bond (and not saw toothed) at an angle not exceeding 45 Degree but in no case shall the difference in levels between adjoining walls be allowed to exceed 1.25 meters.

Faces of brickwork shall be cleaned daily and all mortar droppings cleaned off and removed. Top surfaces of each course shall be thoroughly cleaned before other coursed are laid. If mortar in lower courses has begun to set joints shall be raked out to a depth of 12mm before laying is continued.

Brickwork shall be built tightly against columns, floor slabs or other structural members.

Where drawings indicate that structural steel columns are to be fireproofed with brickwork, brickwork shall be built closely against all flanges and webs with all spaces between the steel and brickwork filled solid with mortar. Steel members partly embedded in brickwork and not described as fireproofed with concrete shall be covered with a coat of mortar not less than 12 mm thick unless otherwise directed by the Engineer.

Miscellaneous inserts in brickwork, e.g. sleeves, wall ties, anchors, conduits, structural steel, steel lintels and the like shall be installed by the Contractor and these items shall be deemed to be included in the quoted rates for brickwork. The supply of such inserts by the Contractor will be paid separately in accordance with the relevant items of the Bill of Quantities.

Openings, arches, chasses, pockets and the like shall be provided as shown on the drawings to receive windows, louvers, doors frames and the like.

Wall ties and flashings shall be built into brickwork in accordance with the drawings and Specifications. It shall be clearly understood that the rates quoted by the Contractor shall be deemed to includes for leaving openings, forming arches, cutting chases, pockets and the like in brickwork for various trades.

Workmanship for Blockwork :

Block work shall be plumb, square and properly boned with broken joints. The thickness of the courses shall be uniform with courses horizontal. All connected work shall be carried out at tone level and no portion of the work shall be left more than one course lower than the adjacent work.

Blocks shall be laid so that all joints are well filled with mortar. Joints shall not be less than 6mm and not more than 8mm thick. Face joints shall be raked to a minimum depth of 10mm by ranking tools during the progress of work when the mortar is still green so as to provide a proper key of pointing, plastering or rendering. When pointing, plastering of rendering is not required joints shall be struck flush.

For pointed block work or block work without plaster or render approved, smooth textured concrete blocks shall be used.

Faces of block work shall be cleaned daily and all mortar droppings cleaned off and removed. Top surfaces of each course shall be thoroughly cleaned before other courses are laid. If mortar in lower courses has begun to set joints shall be raked out to a depth of 12mm before laying is continued.

Where blocks are to be used for load bearing walls the uppermost course of blocks supporting slabs or other structural members shall be solid or treated as directed by the Engineer.

Miscellaneous inserts in block work, e.g. sleeves, wall ties, anchors, conduits, structural steel, steel lintels and the like shall be installed by the Contractor and these items shall be deemed to be included in the quoted rates for block work. The supply of such inserts by the Contractor will be paid separately in accordance with the relevant items of the Bill of Quantities.

Opening, arches, chases, pockets and the like shall be provided as shown on the drawings to receive windows, louvers, doors frames and the like.

Wall ties and flashings shall be built into block work in accordance with the drawings and Specifications. It shall be clearly understood that the rates quoted by the Contractor shall be deemed to include for leaving openings, forming arches, cutting chases, pockets and the like in block work for various trades.

HALF BRICK WORK

This work shall be set in cement mortar as specified. Unless otherwise specified the walls will be provided with R.C.C. binders reinforced with 2 nos. of 8 mm mild steel / for

steel bars with M.S. tie bars at 1 metre interval from floor level. The cost of half brick work shall include the cost of reinforcement and form work for binders. RCC band shall be of size 1 15mm wide x 80mm high and shall be continuous, unless where broken by openings in walls.

Measurement of Brickwork :

Brickwork one brick thick, i.e. 230mm, and above shall, unless otherwise described in the Bill of Quantities, be measured and paid for on the basis of rates quoted per cubic meter.

Brickwork less one brick thick, i.e, less than 230mm, shall be measured and paid on the basis of rates quoted per square meter.

Brickwork in steps and such other mass works and/or encasement work shall be measured and paid for on the basis of rates quoted per cubic meter.

Miscellaneous inserts, e.g. sleeves, ties, anchors, conduits, pipes and the like in or through brickwork shall be installed by the Contractor and the cost shall be deemed to be included in the quoted rates for brickwork. The supply of such items by the Contractor will be paid separately in accordance with the relevant items of the Bill of Quantities.

Quantities measured and paid for shall be those actually executed after making all necessary deductions for openings and the like.

Measurement of Blockwork :

Blockwork of specified thickness shall be measured and paid for the basis of rates quoted per square meter.

Where reinforcing bars are specified to be laid in horizontal courses they shall be measured and paid for separately on the basis of quoted rates for reinforcement per tonne.

Miscellaneous inserts, e.g. sleeves, ties, anchors, conduits, pipes and the like in or through blockwork shall be installed by the Contractor and the cost shall be deemed to be included in the quoted rates for blockwork. The supply of such items by the Contractor will be paid separately in accordance with the relevant items of the Bill of Quantities.

Quantities measured and paid for shall be those actually executed after making all necessary deductions for openings and the like.

CURING:

All fresh brick work/ block work shall be protected from the effects of sun, rain, etc., by suitable covering. All brick works shall be kept constantly moist on the faces for at least10 days.

SCAFFOLDING:

Unless otherwise instructed by the Engineer, double scaffolding having two sets of vertical supports shall be provided for all building work. The supports shall be sound, strong and tied together with horizontal pieces over which scaffolding planks shall be fixed. The contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to with stand all loads likely to come upon it. No wooden scaffolding is allowed. Poles and platform other items should be steel / stronger / similar materials. Shuttering should be out of new Marine ply for beams & Staircase and should be out of MS sheets for Slabs & Columns.

SIZE STONE MASONRY:

Size stones shall be of hard granite, desalt or trap stone obtainable from approved quarry. The stones shall be clean and wetted before they are used.

Height of course, shall not be less than 15 cms. and all courses shall be of uniform height. Unless otherwise instructed the depth of higher courses should not be more than the depth of lower courses. Bed and sides shall be hammer or chisel dressed from the face 75 mm and 35 mm respectively.

No face stone shall be less in depth than in height or shall tail into the work to a length less than I've height. Stones shall break joints atleast had the height of the course. Faces of stones shall be hammer dressed and bushing not be more than 25 mm. Thickness of joints shall not be more than 20 mm. edges of face stones of exposed faces shall be chiseled true to both longitudinal and vertical lines. Exposed faces of corner stones to be line dressed 50 mm wide.

Bond or through stones shall be provided not exceeding 2.0 metro in each course and shall be staggered. Bona sty:, shall be from the front,. back of the wails. For wall ups 60 cms thick, bond stones shall be in one piece and for walls over 60 cms. thick they shall either be in one piece Of available locally or be in the series of headers. Each header overlapping the adjoining one by not less than 150 mm. Alternatively pond stones may be provided with 9"*9" header. bond or through stones shall be marked as directed to enable their being easily detected even after having been built in position.

The interior or filling shall be with flat bedded stones laid in mortar. Chips, spells shall be used to avoid thick mortar joints and shall not exceed 10% of the quantity of stone

masonry. Care is to be taken that no dry work a. hollow spaces shall be left any where In the masonry.

UNCOURSED RUBBLE MASONRY:

The stones as received from quarry are to be set in work after knocking off weak comers and edges with mason's hammer. They are to be laid carefully so as to break joint as much as possible and shall be solidly bedded in mortar. No joint shall exceed 20 mm chips of stone and spells shall be wedged into the work wherever necessary to avoid thick beds or joints of mortar No dry work or hollow spaces shall be allowed, every stone whether large or small shall be set flush in mortar, smaller stones used in filling being carefully selected to fit snugly the interstices between the larger ones. The face stone shall be selected from the mass of quarry stones for proper size good beds and uniform colour and shall be laid as far as possible without pinning in front. One through stone shall be provided for every sq.m. of facing and shall run back into full depth of the work. The quoins for exposed corners unless otherwise specified shall be of selected stone neatly dressed with hammer and chisel to form required angle and laid header and stretcher alternatively.

RANDOM RUBBLE MASONRY

The face stone shall be laid absolutely without pinnings on the face. Every stone shall be carefully fitted so as to form neat and close joints and if necessary the edges shall be dressed with chisel so as to ensure close joints work. The thickness of joint will be as specified for each work and in no case more than 20 mm. The thickness of joint should be uniform on the face variation being within 25%. Mortar in joints should be scraped 12 mm deep for pointing.

The stones shall be roughly chisel dressed to ensure equal size on face as far as possible. They shall be of uniform colour and they shall be carefully laid and solidly bedded in mortar and shall tail back and bond well into the backing and shall not be of greater than either breadth of face or length of tail into the work.

One header or through stone shall be inserted for every square metro of face and shall run right through the wall. Stones shall be arranged to break joints as much as possible and long vertical lines of joining shall be avoided in face work. The quoins unless otherwise specified shall be of selected stones neatly dressed with hammer chisel to 'own required angle and laid header and stretcher alternatively. The masonry work has to be kept wet for 10 days.

In the case of cement mortar, the proportion specified is on volume basis. But cement shall be weighed on the assumption that one cubic metre of cement weighs 1440 kgs. The Engineer may also require the cement to be measured by volume but on the same

assumption. Weep holes for Retaining wall shall be provided at the rate of one weep hole per one Sq.metre.

PLASTEING WORKS

This Specification covers the general requirements for wall and ceiling plastering.

The contractor shall furnish all materials labour scaffolding equipments, tools, plant and incidentals necessary and required for the completion of all plaster and wall finishes, subject to approval by the Engineer.

Plaster as herein specified shall be applied to all internal and external surfaces where called for. Glazed tile dado, terrazzo dado and other wall finishes shall be provided where indicated on drawings and schedule of finishes. Areas called for on drawings and typical shall be considered to apply to appropriate adjoining areas whether shown on same drawings or not and whether indicated or not.

All plaster work and other wall finishes shall be executed by skilled workmen in a workmanlike manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the Engineer.

PLASTER WORK:

The primary requirement of plasterwork shall be to provide absolutely water tight enclosure, dense, smooth and hard and devoid of any cracks on the interior and/or exterior. The contractor shall do all that is necessary to ensure that this objective is achieved. All plastering shall be finished to true plane, without any imperfections and shall be square with adjoining work and form proper foundation for finishing materials such as paint etc.

Masonry and concrete surfaces which call for applications of plaster shall be clean, free from efflorescence, damp and sufficiently rough and keyed to ensure proper bond, subject to the approval of the Engineer.

Wherever directed by the Engineer, all joints between concrete frames and masonry in filling shall be expressed by a groove cut in the plaster. The said groove shall coincide with the joints beneath as directed. Where grooves are not called for, the joints between concrete members and masonry in filling shall be covered by 24 gauge galvanized

chicken mesh strips 400 mm wide or as called for an drawing/documents which shall be in position before plastering.

CHASING & BREAKAGES:

All chasing, installations of conduits, inserts boxes etc., shall be completed before any plastering or other wall finish is commenced on a surface. No chasing or cutting of plaster or other finish on a surface shall be permitted. Broken corners shall be cut back not less than 150 mm on both sides and patched with plaster of paris as directed. All corners shall be rounded to a radious of 8 mm or as directed by the Engineer.

SAMPLES:

Samples of each type of plaster & other wall finish shall be prepared well in advance of undertaking the work for approval by the Engineer.

PREPARATIONS OF SURFACES:

The joints in all walls, both existing and freshly built shall be raked to a depth of 15 mm, brush cleaned with wire brushes, dusted and thoroughly wetted before starting plastering work. Concrete surfaces to receive plaster shall be roughened by hacking over the entire surface so that the skin of the concrete is completely removed, as approved by the Engineer to ensure proper key for the plaster.

PLASTER TO WALLS:

Plaster to internal faces of walls shall be 12 to 15 mm thick comprising of one part cement and five part clean fine sand or as specified in the item specification. The external surfaces of external wall shall have plaster of 12 -15 mm thickness comprising of one part of cement and five parts of clean fine sand or as specified in the item specification to form base for vapour barrier.

MORTAR MIXING:

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

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

APPLICATIONS:

Plaster application shall be commenced only after the preparatory work is approved by the Engineer. Correct thickness of plaster shall be obtained by laying plaster screeds (gauges) at intervals of 1.5 mtrs. as directed. Mortar shall be firmly applied, spread evenly well pressed into the joints, rubbed, smoothened with straight edge, wooden float and trowel and finished as approved by the Engineer to give a smooth, true and even surface.

CURING:

Finished plaster shall be kept wet for at least 10 days after completion. In hot weather, walls exposed to such shall be screened with matting kept constantly wet or by any other approved means.

CEILING PASTER:

Plaster to ceilings, soffits or stairs flight slabs and similar locations, where called for, shall be 12 mm thick and comprise of one part of cement and three parts of clean fine sand or as spec fled in the item.

PREPARATION OF SURFACE:

The surfaces to be plastered shall be prepared as called for earlier. The surface shall be brushed, swept clean and thoroughly wetted before plastering.

The joints in all walls, both existing and freshly built shall be raked to a depth of 15mm, brush cleaned with wire brushes, dusted and thoroughly wetted before starting plastering work. Concrete surfaces to receive plaster shall be roughened by hacking over the entire surface so that the skin of the concrete is completely removed, as approved by the architects to ensure proper key for the plaster

APPLICATIONS:

Plaster application shall be commenced only after the architect approves the preparatory work. Correct thickness of plaster shall be obtained by laying plaster screeds (gauges) at intervals of 1.5mtrs as directed.

Mortar shall be applied firmly, pressed to the surface rubbed and finished to a smooth and even surface subject to the approval of the Engineer.

CHICKEN MESH TO WALLS:

Galvanized chicken mesh (24 gauge, 12 mm size) shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations 150 mm on either side of the junction in double fold or as called for, properly stretched and nailed, ensuring equal thickness of plaster on both sides of the mesh. The rate includes in the plaster works.

CEMENT MORTAR:

Cement mortar shall be of proportion specified for each type of work. It shall be composed of Portland cement of 43 grade and sand. The ingredients shall be accurately gauged and shall be evenly mixed together in a mechanical mixer. Care should be taken not to add more water than necessary. If hand mix is allowed it shall be done on waterproofed platform. The gauged materials shall be put on platform, and thoroughly mixed dry. Water shall then be added and the whole mixed thoroughly until the mix is homogeneous and of uniform colour, quantity of mortar mixed should not be more than what can be consumed in half an hour of mixing.

Cement mortar mix are specified as 1:2, 1:3, 1:4, 1:5 etc. The first figure will mean one part of Portland cement by volume, the second figure will mean so many parts of sand by volume. For example, cement mortar 1: 4 would mean one part of cement and four parts of sand. Cement & sand must conform to relevant IS specification.

Plaster shall not in any place be thinner than specified. Any extra thickness of plaster required to be plastered in the case of brick masonry or extra thickness required due to raking of the joints or filling up depressions formed in concrete surface during the course of roughening or due to bad casting or centering shall not be paid separately, but shall be covered by the general rate for plastering.

The rate for plastering shall include the cost of scaffolding (NO WOODEN SCAFFOLDING IS ALLOWED), platform, swing etc. needed for carrying out the plaster work and shall cover the extra !abour for plastering the joints, sills and soffits of openings. No extra payment shall be made for roughening the surface to obtain key for plastering work.

Internal Plaster or Render :

12mm thick single coat cement sand mortar shall be dashed on to prepared wall and ceiling surfaces and finished smooth by trowelling on the surface with neeru (lime cream)

In case more than 12/10 mm thick plaster is to be rendered to the RCC/Brick/Block surfaces, either due to any irregularities in surface finishes and / or any difference arising out of non-standard brick/block sizes, and/or due to poor workmanship, then the plaster has to be rendered in layers not less than 6mm thick and not exceeding 15mm thick each. This plaster is deemed to include for above provisions.

Internal plaster shall also be applied to door and window jambs and the undersides of lintels and the like. The rate for wall plastering shall include the cost of packing, providing GI mesh, & plastering all the chasings for providing conduits, providing switch boxes, providing distribution boards etc.

External Plaster or Render :

20mm two coat cement and sand mortar shall be applied to external surfaces as specified. The first coat shall be 14mm thick and the second coat 6mm thick. The layer shall be dashed against prepared surfaces with a trowel to obtain an even surface. The second layer shall then be applied and finished leaving a trowel finished even and uniform surface.

External Sand Faced Plaster or Render:

20mm two coat cement and sand mortar shall be applied to external surfaces. The first or the scratch coat shall be approximately 14mm thick and shall be carried out continuously without break to the full lengths of walls or natural breaking points , such as doors , windows and the like. The scratch coat shall be applied to prepared surfaces with heavy pressure to produce a true and even surface and then lightly roughened by cross scratch lines to provide a bond for the finishing coat. The scratch coat shall be cured for at least 7 (seven) days and then allowed to dry.

The second coat shall be 6mm thick and shall not be applied until at least 10 (ten) days after the application of the scratch coat. Before the application of the second coat the scratch coat shall be uniformly dampened. This coat shall be applied from top to bottom in one operation and without joints and the finish shall be straight, true and even. Only approved white sand shall be used for the second coat and for finishing work. Sand for finish shall be of even coarse size and shall be dashed on the surface and sponged.

Where 32mm thick plaster or render is specified for the purpose of providing beading, bands and the like work shall be carried out in either two or three coats as directed by the Engineer.

The rate shall include the cost of providing 40mm wide drip molds at the external ceiling and chajja portions. The rate shall include the cost of providing 12mm thk 50mm wide plaster band for the parapet coping.

Waterproof Finishes:

Where specified or directed by the Engineer the Contractor shall incorporate approved waterproofing admixtures obtained from reputed manufacturers in to the mortar for plaster work and render.

Quantities to be used and the method of incorporation shall be strictly in accordance with the manufacturer's instructions subject to the satisfaction of the Engineer. Admixtures shall not contain calcium chloride unless specifically approved by the Engineer and shall conform to IS 2645.

LIME FOR RENDERING

This wall be prepared out of best quality fat lime slaked at site with fresh water not less than one week or more than two weeks before use. All impurities, ashes, improperly burnt stuff shall be screened and picked out before slaking. Slaked lime shall be screened through to remove all un-slaked materials, stones etc., so that only a fine creamy paste is available for rendering. Slaking lime is diluted with just sufficient water to give a thick consistent liquid suitable for effective covering of base surface. Before the base coat sets the lime rendering is applied and finished smooth and the entire plastered surface is truly plane.

ROUGH CAST PLASTER

GENERAL

The specification for sand faced plaster shall also apply to rough cast plaster, subject to the following:

BASE COAT

The first coat of plaster shall be of cement mortar 1:4 mixed and applied according to the relevant provisions of IS 1661. The finished thickness shall be 12mm for brick masonry and concrete surfaces and 15mm for stone masonry. The plaster shall be laid by throwing the mortar by using a strong whipping action and pressing to form a good bond. The surface shall be roughened.

SECOND COAT

The second coat shall be the roughcast mixture consisting of aggregate, which may vary in size from 5mm to 8mm and may consist of specially graded mixture mixed with fine sand and cement. The proportion of cement to sand to aggregate shall be 1:1: 3. It shall be flung upon the first coat with large trowels to form an over protective coat. The second coat must be applied while the first coat is still soft and plastic. The work shall generally conform to requirements IS 1661. The thickness of the coat shall be about 12mm.

CEMENT RENDERING

External cement rendering shall be the smooth cast, with mixture consisting of cement mortar of 6mm thick, and may consist of specially graded mixture mixed with fine sand

and cement. The proportion of cement to sand to aggregate shall be 1:3. It shall be flung upon the concrete surface with large trowels to form a protective coat. The joints shall be finished neatly.

MODE OF MEASUREMENT:

The method of measurement for various items in the tender shall be generally in accordance with the IS: 1200 subject to the following:

All plastering work shall be measured in square meters unless otherwise described.

Net area of surface plastered shall be measured. No deductions will be made for ends of joists, beams, posts, etc. and openings not exceeding 0. 5 sqmt. each and no addition shall be made for reveals, jambs, soffits, sills, etc. of these openings

Work under this item shall be measured by taking the projected surface of the area plastered or rendered less deduction for openings. doors, windows, fan openings and the like. Plasterwork or render carried out on door and window jambs, around openings and the like shall be measured and added to the general areas. Drip mould shall be provided at the edges of external plastered exposed soffits, viz. chajjas and no extra shall be paid for it. It shall be included in plaster item itself. Wherever wattas are required they will not be measured separately but included in the surface areas as measured here above.

FLOORING AND DADOING WORKS

SCOPE

This specification covers the general requirements for flooring and dadoing of various types of finishes including supplying, installation, finishing, curing, testing, protecting, maintaining until handing over.

GENERAL REQUIREMENTS

Before the operation for laying any floor is started, the surface of base concrete shall be thoroughly cleaned of all dirt, loose particles, caked mortar droppings, by scrubbing with coir or steel wire brushes. If so directed by the architects the surface shall be roughened by chipping or backing at close intervals. The surface shall then be cleaned with water and kept wet for 12 hours and surplus water shall be removed by mopping before the topping is laid.

The Contractor shall furnish all skilled and unskilled labour, plant, equipment, scaffolding, materials etc., required for complete execution of the work in accordance with the drawings and as described herein and / or as directed by the Engineer.

The Contractor shall follow all safety requirements / rules during execution of the work.

The Contractor should have adequate experience in execution of such works. Alternatively, he should engage specialized agency for executing the work after obtaining approval from the Engineer.

All works shall be carried out as per relevant Indian Standard Specifications, as per the instructions of manufacturer and as directed by Engineer. The Contractor shall carryout all works including preparation of base, chipping extra concrete, roughening of surface and skin removing, cleaning, screening, levelling, curing, protecting the slab / tile by using pop over plastic sheet etc.

The commencement, scheduling and sequence of the finishing works shall be planned in details and must be specifically approved by the Engineer, keeping in view the activities of other agencies working in the area. However, the Contractor shall remain fully responsible for all normal precautions and vigilance to prevent and damage whatsoever till handing Over to the Owner.

Only approved make, colour, size of tiles / slabs to form any pattern in combination of any specified colour shall be used.

CODES AND STANDARDS

Some of the important applicable Indian Codes for this section are listed below. Latest editions of these codes shall be followed:

IS : 1237	:	Cement concrete flooring tiles
IS: 4457	:	Ceramic unglazed vitreous add resisting tiles
IS : 5491	:	Code of practice for laying of in-situ Granolithic concrete flooring topping
IS: 13753	:	Dust- pressed ceramic tiles with water absorption of E 10%.
IS: 13755	:	Dust pressed ceramic tiles with water absorption 3% of E 6% (Group B II.a)
IS: 269	:	Specification for ordinary and Low Heat Portland Cement.

IS: 383 : Specification for Coarse and Fine Aggregates.

IS: 777 : Specification for Glazed Earthenware Tiles.

Special Materials

Materials required for individual finishing items are specified under respective items. In general, all such materials shall be in accordance with the relevant IS Codes where applicable. In all cases these materials shall be of the best indigenous quality unless specified otherwise.

The materials for finishing items must be procured from well-reputed approved specialized manufactures and on the basis of approval of samples by the Engineer. The materials shall be ordered, procured and stored Ceil in advance to avoid possible delays to the construction program.

STORAGE OF MATERIALS

Storage of cement aggregates and water shall be as specified under concrete works.

BASE CONCRETE

The base concrete may be deposited as per specification and as directed. Before placing the concrete the sub-base shall be properly wetted and well rammed. The concrete shall then be deposited between the forms where necessary, thoroughly compacted and the surface finished level with the top edges of the forms. The surface of base concrete shall be left rough to provide adequate bond for the topping. Two or three hours after the concrete has been laid in position, the surface shall be brushed with a hard brush to remove any scum or laitance and swept clean so that coarse aggregate is exposed.

WORKMANSHIP

Workers specially experienced in particular items of finishing work shall carry out the work. Where such workers are not readily available, experienced supervisors recommended by the manufacturer shall be engaged with the prior permission and based on approval of the Engineer. In particular cases, Engineer may desire the installation of finishing items by the manufacturer. This arrangement shall be made by the Contractor.

PREPARATION OF THE BASE SURFACE

For all types of flooring, skirting, dada, the base (base concrete / structural slab / masonry wall I concrete wall etc.) to receive the finish shall be adequately roughened, joints raked, thoroughly cleaned of all dirt, grease, loose particle, caked mortar droppings, and laitance, if any by scrubbing with coir or steel wire brush before the operation of laying the topping is started. Where the concrete is hardened so much that roughening the surface by wire brush is not possible, the entire surface shall be roughened by chipping or hacking and the skin removed. The surface shall be thoroughly cleaned and soaked with water, atleast for twelve hours and the surplus water shall be removed by mopping immediately before the topping is laid in position.

The prepared surface has to be approved by the Engineer before commencing the finishing work.

GRANOLITHIC FLOORING

General

The work shall be carried out in accordance with Indian Standard Specification 5491 latest.

The flooring shall be of specified thickness and shall consist of CC 1:1.5:3 granolithic flooring. Floor finish shall be divided into suitable panels so as to reduce and avoid the risk of cracking. The granolithic flooring shall be laid with the specified strips in panels not exceeding 20 Sqm in plan. The screed strips shall be fixed on the base concrete dividing it into suitable panels not exceeding 20 Sqm in plan. The intermediate panels shall be filled in after one or two days. If glass or aluminium or other metal strips are provided for effective separation of panels, the topping may be laid in all the panels simultaneously or as specified.

Laying

Before the operation of laying the topping is started, the surface of base concrete shall be prepared as described earlier, screed strips shall be fixed over the base as divided.

The flooring concrete shall be of using 6 to 10 mm graded crushed granite stone. The ingredients shall be thoroughly mixed with sufficient water to obtain the required plasticity. The free water on the surface of the base shall be removed and a coat of cement slurry of the consistency of thick cream shall be brushed on the surface.

The prepared concrete shall be laid immediately after mixing on the fresh grouted base. The concrete shall be spread evenly and levelled carefully and compacted. Then the surface shall be tested with the straight edge and mason's spirit level to detect any inequalities in the surface. Low places shall be filled, humps removed and the whole surface again levelled. The layer shall be thoroughly compacted to the finished thickness by ramming and power trowelled and allowed to set. Just sufficient trowelling shall be made to give a level surface. The surface should not be over trowelled as excessive trowelling will bring the cement to the surface which shall be strictly avoided. When the initial set takes place further compaction by power trowelling shall be done and final trowelling shall be done well before the topping becomes too hard.

The surface shall be trowelled three times at intervals so as to produce a uniform, hard and smooth surface. No mortar or cement will be allowed to be added in this process.

The screed strips should be removed the next day after the concrete has been deposited in the panels and the edges of panels shall be examined for any honeycombing or undulation which, if found, shall be repaired straight and smooth by cement mortar; if the intermediate panels are not to be filled the next day, the screed strips shall then be cleared and put back against the edge of panels till the concrete in the alternate panels is to be deposited. When the concrete is being deposited in the alternate panels the screed strips shall be removed. When the concrete is being compacted in new panels, care shall be taken to avoid damage to the panels already laid. When desired by the Engineer, the surface while still 'green' shall be intended by pressing strings. The markings and forming a groove shall be of even size and depth, in straight lines and the panels shall be of uniform and symmetrical pattems.

Curing - As soon as the surface is hard enough, it shall be covered with sacking or sand and kept continuously wet for a period of atleast one week.

Protection - The surface shall be protected with a layer of pop to a required thickness over a plastic sheet.

CERAMIC TILES

Types of Ceramic Tile

a) Glazed Ceramic Tiles

Glazed ceramic tiles shall be highly pressed, single fired, red body, top glazed white or coloured, plain or with designs.

The body of glazed ceramic tiles should consist of high grade clay and minerals and well pressed in hydraulic presses and glaze should be a combination of different minerals. Varied combination of the body materials, glaze coating and the firing temperature will

give tiles of varied strength, abrasion resistance, surface hardness, antiskid properties. The top surface shall be glazed with stable gloss / semi gloss / matt finish of uniform colour and texture and free from flaws, cracks, chips, craze, specks, crawling or other imperfections. These shall be sound, true to shape with true and straight edges, non-absorbing and non-fading. A fractured section shall appear fine Drained in texture, dense and homogenous. The edges and the underside of the tiles shall be completely free from glaze so that these may adhere properly to the surface below.

The under side of tiles shall have ribs or indentations for better anchorage with the base mortar / adhesive specified

The group and quality of tiles specified in the bill of quantities and as shown on the drawings shall be used as directed by the Engineer even though the group of tiles specified below:

Floor Tiles:

These tiles should have high strength, good resistance to wear and tear, low water absorption and sufficient antiskid properties and shall conform to IS: 13755 and ELLA EN177 (European Standard) Based on the properties of the glaze and their hardness, floor tiles are categorized abrasion resistance wise as

Group - II to V 1\r. According to the intensity of foot traffic, the tile group shall be selected and used as given below.

Group II tiles shall be used for areas destined to medium foot traffic, to be trod on with leather or rubber footwear.

Group III tiles shall be used for areas destined to frequent-foot traffic with medium abrasion.

Group IV tiles shall be used for areas destined to a strong passage and intensive foot traffic with heavy abrasion.

Group V - Floor tiles having very high Abrasive Resistance shall be used for areas destined to high intensive foot traffic with heavy abrasion.

Wall tiles

Ceramic wall tiles shall be single fast fired tiles having medium water absorption and high strength characteristics. These tiles should have high glaze and better adhesion to wall and shall conform to IS: 13753 and EN 159 standards. Wall tiles shall be glossy / semi glossy / matt glaze finish, white or coloured, plain or printed, special printed and

premium printed. These tiles shall be sound, uniform colour, true to shape with true and straight edges and non-fading.

Vitrified (Unglazed) Ceramic Unpolished/ Polished Tiles

These tiles are of different shades having monolithic body which is pressed in very high tonnage press and fired to high temperature. The tiles shall be homogeneous and compact through out the entire body with very high strength, low porosity and extreme surface hardness, high resistance to abrasion resistant to chemicals etc. and shall conform to IS: 4457 and EN 98 standards. The tiles shall be sound, non-absorbing flat and true to shape with straight edges. The tiles shall be with smooth surface or textured anti-skid finish surface. The tiles should be free from any warping, deformation any chipping and any scratches. The tiles shall be in absolute level. The under side of tiles shall have ribs or indentations for better anchorage with the base mortar / adhesive as specified.

Polished vitrified ceramic floor tiles shall be homogeneous heavy and tough with highly reflective polished surface but non-slippery. The tiles shall be in different shades and shall have uniform colour, size and thickness.

Samples

Samples of each type / design / finish / print / size / colours of tiles shall be submitted well in advance to the Engineer for approval at Contractor cost.

Approved sample tiles will be retained by the Engineer. All tiles procured should be exactly as per approved samples. Tiles shall be procured from a single approved source The manufactures who can provide products of consistent quality and physical properties. The manufacturer of tiles should be an approved company specializing in ceramic tiles.

Tiles of approved make, colour, design, finish, size etc. as stipulated in item description and /or as shown in the drawings only should be procured and used on the works.

Storage of Materials

The delivery of tiles shall be in original containers with seals unbroken. Adequate precaution shall be taken to prevent accidental damage to tiles while unloading and these shall be stored under cover in a manner approved by the Engineer. Adhesives shall be stored as per the manufacturers instructions.

Laying and Finishing of Floor tiles

Preparation of base shall be as specified under head Preparation of Base Surface".

The under bed for flooring shall be of 20 mm average thick cement mortar 1:4 (1 part cement and 4 parts sand) or as specified in item specification. The bedding shall be laid evenly over the surface, tamped and corrected to desired levels and allowed to harden enough to offer a fairly rigid cushion to tiles. Before fixing the tiles, the bed mortar shall be roughened by scratching diagonal lines at closed intervals and grey cement slurry of honey like consistency shall be applied over the bedding. Tiles shall be well soaked in water washed clean and Eked in cement grout one after the other, each tile being gently tapped in its position with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. Where the full tiles cannot be fixed these shall be cut (sawn) to the required size and their edges rubbed smooth to ensure straight and true joints. When grouting the tiles special care shall be taken to prevent scratch. After the tiles have been laid, surplus cement grout shall be cleaned off. The joints shall be cleaned off the prey cement grout with a wire brush or trowel to a depth of ^5 mm and all dust and loose mortar removed. Joints shall then be flush pointed with grout of white cement mixed with “Roff Rainbow Tile Mate” or approved equivalent, to match the colour of tiles as per Manufacturers specification. The 4'.ocr shall then be 'kept wet for 7 days. After curing, the surface shall be washed with mild hydrochloric acid and clean water. The finished floor shall not sound hollow when tapped with a wooden mallet.

Laying and Finishing of Wall Tiles

Preparation of wall surface shall be as specified under head "Preparation of Base Surface"

A 12 mm thick plaster of cement mortar 1:3 mix or as specified in item shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at closed intervals and curved property.

The tiles should be washed clean and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar and for pointing the tiles.

If specified in the item, chemical adhesive of approved make shall be used for setting the tiles in the bedding mortar.

For maintaining uniform gap and alignment plastic spacer should be used.

The tiles shall be tamped and corrected to proper plan and lines. The tiles shall be set in the required pattern and jointed true to plumb. The joints shall be as fine as possible. Top of skirting or dado shall be truly horizontal and joints truly vertical except where otherwise indicated or as directed by Engineer.

Skirting / dado shall rest on the top of the flooring where full size tiles cannot be fixed these shall be cut (swan) to the required size and height as specified and their edges rubbed smooth.

The joints shall be cleaned off with wire / coir brush or trowel and all dust and loose mortar removed. Joints than shall be flush pointed with grout of white cement mixed with “Roff Rainbow Tile Mate” or approved equivalent to match the colour of tiles as per manufacturer specification. The work shall then be kept wet for 7 days.

After curing, the surface shall be washed with mild hydrochloric acid and clean water. The finished work shall not sound hollow when tapped with a wooden mallet.

The surface shall be protected with a layer of pop to a required thickness over a plastic sheet.

CEMENT BASED COLOUR AND PATTERNED TILES

Cement tile to be used for external and internal applications shall be manufactured using very high quality raw materials, high strength cement, colour pigments etc. to withstand all conditions of sever intensity in terms of temperature, vagaries of the nature, traffic, extreme heat and cold etc. and shall conform to IS 1237.

The tiles shall be heavy, dense, and homogeneous in texture with high strength and surface hardness, high resistance to abrasion and low porosity . Thickness of floor tiles shall be 22 mm and wall tiles shall be 12 mm.

Tiles of approved make, colour, design, plain, chequered or grooved pattern etc. as shown on the drawings, as specified in the Bill of Quantities shall be used in the works as directed by the Engineer. Laying of tiles in an pattern in combination of any colour tiles in any colour tiles desired by the Engineer shall be c arry out without any extra cost.

Samples: Samples of each type / design / finish / print / size / colors of tiles shall be submitted well in advance to the Engineer for approval at Contractor cost.

Approved sample tiles will be retained by the Engineer. All tiles procured should be exactly as per approved samples. Tiles shall be procured from a single approved source.

Tiles of approved make, colour, design, finish, size etc. as stipulated in item description and / or as shown in the drawings only should be procured and used on the works.

Storage - Tiles shall be stacked and stored as per instructions of the manufacturer.

Laying and Finishing of Floor Tiles.

A bedding of 20 mm thick with cement mortar 1:4 (one part of cement and four parts of coarse sand) or as specified shall be laid over the prepared base after setting the levels for the floor.

Neat cement slurry of honey like consistency shall be spread over the leveled base mortar.

The tiles after wetting the reverse side, shall be fixed in the cement grout one after the after the other, each tile being gently tapped with a wooden mallet to obtain perfect levels.

The laid surface shall be cleaned with water immediately with wet sponge.

It shall be ensured that the cement grout which squeezes through joints does not settle on the tile.

The joints, after cleaning, shall be pointed with white cement mixed with colour equipment of tile finish like “Roff Rainbow’ make or approved equivalent. The surface shall be cured for 7 days.

The surface shall be maintained by cleaning the tiles regularly with water and detergent.

Laying and finishing of wall tiles – Laying of wall tiles shall be in the same manner as described above for floor tiles.

The surface shall be protected with a layer of pop to a required thickness over a plastic sheet.

SHAHABAD, TANDUR, KOTA AND KADDAPA FLOORING

Stones as described shall be of approved quality, free of defects hard, sound, durable and uniform thickness and approved by the Engineer. Edges shall be chisel dressed and the top surface shall be machine polished with joints running true and parallel from side to side. The contractor shall provide the Engineer with samples for approval and only approved stones shall be brought on to the site.

The sizes of slabs shall be as called for in the drawings and shall be normally 40/20 mm thick. They shall be of colour as approved by the Architect. They shall have the top surface machine polished before being brought to site. All edges shall be machine cut to have the slabs to required correct sizes and the edges shall be ground smooth and even

to full depth. A straight edge laid along the side of the slab shall be in full contact with it. All angles and edges of the slabs shall be true and square and free from chipping.

A bed of cement mortar 1:4 shall be laid and properly leveled to an average thickness of 25mm and the surface should be kept slightly rough to form a satisfactory key for the slabs. Neat cement paste of honey like consistency shall be spread over mortar bed over such an area so that the paste will not harden before laying slabs. Slabs shall be soaked in water for 15 minutes and allowed to dry. The slabs shall then be fixed as per approved pattern with thin coat of cement paste on back of each slab. They will be tapped with a wooden mallet till it is properly bedded in level with adjoining slabs. Joints shall not be more than 1.5mm wide. The surplus cement grout that may have come out of the joints has to be wiped off gently and joints cleaned. The joints shall be filled up with grey or white cement with an admixture of pigments to match the shade of the slab. The flooring shall be cured for 14 days. Then it shall be polished according to IS: 1443, except that:

The stone slabs shall be laid either parallel or diagonal to the adjoining wall, as shown in the drawing. Thoroughly wetted stones shall be laid on lime concrete mortar bedding not less than 12mm and not more than 25mm thick in the proportions of one part of cement, two parts lime and six parts sand. Mortar shall be evenly spread over sub-surfaces and covered with a bed of cement at the rate of 5 kg per square metre over areas that can be covered with stones within half an hour.

Stones shall be laid on cement beds one after another, each stone being gently tapped with a wooden mallet until property bedded and level with adjoining stones. Joints shall be perfectly straight and uniform in thickness. Stones shall be laid perfectly level unless otherwise specified or directed by the Architect. After laying joints of stones shall be struck smooth.

Floor stones laid adjoining walls shall project at least 12mm under plaster or render, skirting or dados. Cut pieces shall be avoided as far as possible.

After laying flooring shall be covered with a layer of damp sand and allowed to cure undisturbed for 7(seven)days. Design traffic shall not be allowed on the floor for at least 14(fourteen)days after laying stones. Following curing each and every stone shall be lightly tapped with a small wooden mallet. Should this give a hollow sound such stones, together with any cracked or broken stones, shall be removed and replaced with new stones to proper lines and levels. To ensure that such replaced stones match those laid earlier laid the Contractor shall order sufficient extra tiles to meet this requirement.

For skirting and dado vertical surfaces shall be thoroughly cleaned and evenly and uniformly covered with approximately a 12mm thick coat of cement mortar (1:4)

Backs of stones for skirting and dado shall be covered with a thin layer of neat cement paste and tiles gently tapped against walls with a thin layer of neat cement paste and tiles gently tapped against walls with a wooden mallet. Work shall be done from the bottom of the surface proceeding upwards. Joints shall be as close as possible and the work shall be truly vertical and flush.

Flooring and dado shall be measured in square metres after making deductions for openings and the like. Skirting shall be measured in square metres for specified widths. Quoted rates quoted for flooring, skirting and dado work shall be inclusive of forming angles and corner pieces.

Protection – The surface shall be protected with a layer of pop to a required thickness over a plastic sheet without any extra cost.

GRANITE FLOORING / DADOING

The slabs must be of uniform thickness as specified the variation in the thickness not exceeding 2 mm and must be from the same source. They shall be of uniform texture and colour free of any veins streaks. All the edge shall be chiseled true to line, square and shape. The brushes in the joints are not more than specified thickness.

Rough Finish

The surface should be rough dressed/one line dressed/two lines dressed/three line dressed finish using palmane tools as specified.

Rough dressing

The stone surface to be chisel dressed to one plane by removing all bushings so that the maximum depression is not more than 6 mm.

One line dressing

This is done after the rough dressing is completed by point chiseling so that the variations are not more than 4 mm. Work includes rough dressing also.

Two line dressing

This is done after one line dressing is done by chiseling so that variations are not more than 2.5 mm. Work includes rough and one line dressing also.

Three lines dressing

This is done after two lines dressing is over by chiseling so that the variations are not more than 1.5 mm. Work includes rough, one line & two line dressing also.

Palmane dressing:

After the three line dressing is over the surface is smoothened by using a special palmane tool to further even out the 3 line dressed surface so that the maximum variation in surface evenness is not more than 1.0 mm. Work includes rough, one line, two line & three line dressing also unless otherwise stated.

Mirror Finish

The surface will be polished by grinding using manual or mechanical process to give a smooth, even, perfect plane surface or as may be directed. The polished surface should reflect light like a mirror free from scratches and depressions.

Protection

Granite slabs in flooring shall be protected with layer of pop to a required thickness over a plastic sheet without any extra cost. The pop and plastic sheet shall be removed and one coat of polishing to be carried out if required before handing over.

MARBLE FLOORING / DADOING

Marble slabs of approved shade, variety, size and thickness as specified in the item shall be used. They shall be of selected quality, dense, uniform and homogeneous in texture and free from cracks or other structural defects. The exposed face shall have no veins or unsightly stains and defects. They shall have uniform milky white or coloured shade or patterns of colours approved by Engineer. Samples shall be got approved by the Engineer before ordering the slabs. The surface shall be fine polished and sides machine cut, true to square.

Marble shall be hard, sound, dense and homogeneous in texture with crystalline and course g rains. It shall be free from stains, cracks, decay and weathering. The place of quarrying, colour and quality and thickness should be as specified. Every stone must be machine cut to a specified size in any direction and shape chisel dressed on all sides so as to be free from waviness and to give truly vertical,, horizontal, radial and circular joints as required. Chisel dressing shall also be done on exposed faces to remove any waviness. The sides and top surfaces of marble slabs shall be machine rubbed with coarse sand before using. Marble slabs in borders, joints and soffits of entrances, openings and skirting shall be in full width. Marble slabs in tread and risers of steps shall be in single pieces with rounded edges or angular edges as may be described. All the exposed edges of these are to be machine cut and polished smooth along with exposed faces. In all cases samples shall be got approved.

Flooring slabs will be set in cement mortar 1:4 proportion 20 mm thick and white cement slurry under marble stone slab. In other places slabs will be set in CM 1:3 – 12 mm thick

Polishing will be rough, medium, nice, acid wash and tin – oxide as per Industry manufacture's specification and as approved by the Engineer including fixing with brass / copper clamps 12 mm diameter and 100 mm long caulked into slab, let into the brick masonry walls and cement grouted.

When a single course of marble slab is to be fixed as in dado etc., the slab shall be fixed as described below.

Mortar pads of 1 : 2 C.M. of uniform width shall be struck on to the wall at close intervals and the marble slabs shall be pressed on to them firmly. The remaining cavities if any, shall then be filled with thin grout of cement mortar of the same proportion. The sound coming, on gently tapping of the slab will indicate if there are hollows. When the hollow cannot be filled with grout and the finished slab continues to give a hollow sound on tapping, the slab shall be removed and reset.

For fascia work where more than one course is required, the marble slabs shall be fixed in the same way as described above except that at horizontal joints of the slab, adjacent slabs shall be held together by a wrought iron/copper pin passing through a hole drilled into the slabs. In addition, wrought iron/copper hold fasts/dowels shall be provided to anchor the slabs to the wall. The hold fasts shall be counter-sunk into the joints of the slab and it shall be located at a specified intervals subject to a minimum of one for each slab for each horizontal joint.

The facing shall be fixed truly in plumb and in perfect line or curves as shown on the plans. The courses and joints shall be as directed by Engineer. The surface shall be protected from sun and rain and cured for ten days and shall be finally polished.

FINISHES:

1. Flame finish: The granite slabs are mirror polished first and the polished surface is flamed with torch which will remove the loose particles on the top surface & creates antiskid surface.

2. River Finish: The marble/ granite slabs are mirror polished first and the polished surface is flamed with torch which will remove the loose particles on the top surface & creates antiskid surface. This antiskid surface is then again polished with diamond studded metal brush to eliminate sharp edges created by the flaming. This polishing will be done with 7 types of brushes.

Protection

Marble slabs in flooring shall be protected with a layer of pop to a required thickness over a plastic sheet. The top POP layer and plastic sheet shall be removed and one coat of polishing to be carried out if required before handing over.

VITRIFIED TILE FLOORING

Vitrified tile flooring in areas where called for shall be of make, approved by the architect. They shall be vitrified homogeneous tiles of approved colour where called for. The tiles shall be of approved colour, size and shape and shall be laid to the pattern approved by the architect. The tiles shall be of uniform colour, true to size, shape, edges, free from crazing other defects. The tiles shall be of approved size unless otherwise called for. The tiles shall be soaked in water for at least two hours before and shall be laid over a bed of 20mm thick cement mortar 1:3 (1cement: 3 screened sand) leveled to a true surface. The surface of the bedding mortar shall be left rough to provide bond for the tiles. A floating coat of thick cement slurry shall be laid over the screed to proper levels and the tiles set over the same firmly to correct line and levels.

The joints shall be 3mm wide uniform and straight and filled and finished neat with cement paste pigmented to the shade of the tile. The joints shall be finished neat as directed and shall be straight, regular and uniform. On completion, the surface shall be washed with water and dilute acid, rubbed with fine saw dust and left clean. The finished floor surface shall be true to required levels.

Skirting of specific height as mentioned. The wall surface shall be properly chipped cleaned. Tiles shall be cut to the required height such that wastages are minimum. Tiles shall be set in Cement mortar 1:3, neatly pointed with matching pigment. The fixed tiles shall be cleaned as described above. The tiles laid shall be true to the line.

CONCRETE PAVERS AND FLAG STONES (BAR FACE, FLAG STONES, INTERLOCKING PAVERS)

Concrete pavers and flag stones to be laid are of approved make, design, colour & shape by the consulting architects. Concrete pavers are made of M40 grade concrete and with compressive strength of 450Kg/sqcm. The size of the tiles to be as specified by the architects with a minimum tolerance of 0.5mm for length & breadth and 3mm for thickness. The blocks should be of uniform size, colour and shape. The concrete pavers and flag stones are to be laid over the sand bed or 25mm thk cement mortar as detailed by the architects. When the concrete pavers are laid over the sand bed there should be 1.5mm gap between the blocks which will be again filled with sand.

The minimum under layer for the concrete pavers is 50mm thk sand bed.

PRE CAST KERB

Pre cast kerb to be used should be of approved make, shape and size without any damages to the edges of the kerb.. Pre cast concrete kerbs to be made of M40 grade

concrete. The size of the kerb shall be as per Architect's design and details. Length of kerb shall be 600mm. Pre cast kerbs to be laid over 25mm thk 1:4 cement mortar.

MODE OF MEASUREMENT

The method of measurement for various items shall be generally in accordance with the IS : 1200 subject to the following :

Floor
Flooring shall be measured from skirting to skirting and where the wall surfaces are plastered or provided with dado it shall be measured from plaster to plaster or dado to dado. The measurements shall be in square meter.

Skirting & kerb:-
The measurement for skirting shall be in running meter. The height of skirting shall be specified in bill of quantities.

Dado:-
Dadoing shall be measured from finished floor level to specified height in the Bill of Materials. The measurements shall be in square meter.

NOTE:
If the approved brands mentioned above are not available, equivalent make as may be approved by the Engineer only to be used on the work.

VACUUM DEWATER FLOORING

This specification covers the method and procedure to be adopted for vacuum dewatering the concrete flooring to improve the quality of concrete floors.

The vacuum dewatering process consists of levelling, compacting and vacuum dewatering the concrete flooring by using vibrating screed, vacuum pumps, suction mats, filter pads, accessories etc. The sequence of operation shall be placing of concrete, vibration, vacuum treatment and floating and the operations shall follow immediately behind each other

The Contractor shall have persons well experienced in the vacuum dewatering process and in the operation of all related equipments. HI process equipment to be used shall be in good working condition and shall be subject to the approval of the Engineer.

The work should be planned well in advance with a view to determine areas to be concreted daily, the required number of equipment, size of vacuum mats, length of vacuum hoses, arrangement of rails, screeds etc.

The area to be concreted shall be thoroughly cleaned, reinforcement checked and got approved by the Engineer. Then the specified grade of concrete shall be placed in position without any segregation and properly vibrated.

Immediately after placement of concrete, the vibrating screed, fixed at the proper position to achieve the required specified finished level, shall be allowed to run over the concrete on a true surface to level the concrete. For better consolidation proper surcharge of concrete should be maintained in front of the leading edge of the screed and the vibrating screed shall be allowed to move forward rapidly. The concrete surface shall be screeded high by 2% of the slabs thickness to compensate for the compaction caused by ale Vacuum dewatering process. (Slabs which have an aggregate hardener shall have compensation made to maintain elevations.

Immediately after levelling, the concrete shall be covered with filter pads and suction mats in strict accordance with the recommendation of the Manufacturer to have the slab fully dewatered. The suction mat shall extend 1 00 mm beyond the edge of the filter pad on all sides. The pads shall extend to within 100 mm of the edges of concrete slab, and the mats shall cover entire slab. Before connecting the hose on the suction mat to the vacuum pump, the edges of the mat shall be smoothed to enable an airtight seal to be created. A vacuum shall then be applied to the mat. After a minute the gauge on the vacuum pump should indicate a minimum vacuum of 0.70 atmospheres (24.0 in Hg) and if not, the mat must be checked for leakage. For concrete that dewaters readily the vacuum should then be maintained at C.70 - Ohio atmosphere (24.0 - 25.5 in Hag). For concrete which dewaters less efficiently (eg. Air-entrained concrete) the vacuum shall then be reduced to 0.50 - 0.60 atmospheres (1 5.0 - 1 8.0 in Hg). After approximately 10 minutes the vacuum can then be increased to 0.80 atmospheres.

The vacuum shall be maintained for atleast 3 minutes per 25 mm of concrete thickness at 0.80 atmospheres. (Where aggregate hardeners are specified, sufficient moisture shall be maintained to meet Manufacturer's requirements. The suction maw and filter pads shall then be removed' and moved to the next section, in a leapfrog manner.

Stop the vacuum dewatering when light foot prints only are left in the concrete when stepped upon. A suitable suction time can also be- checked with a Proctor-apparatus which should show 1.5 - 2 Kp/Sqcm.

Upon removal of the suction mats and filter pads the concrete shall be power floated without delay until all imprints from the vacuum process are removed. If crusting occurs, the floating operation must be delayed till the concrete carries the machine.

The higher speed is recommended for the floating operation. The passes with the floating disc should be made in the junction of two mats in order to avoid risk cracking.

The waiting time after the floating operation depends on concrete temperature and humidity and vanes from 10 minutes to 2 hours.

The trowelling operation cannot take place before the concrete has hardened enough to carry the machine ie. the trowelling blades will not leave any marks on the concrete. Repeated trowelling, with intervals between the passes, which are adapted to the setting of the concrete, greatly improves the surface characteristics. The surface will be more wear resistant and less dusty.

At least two passes are recommended for floors which are not to be covered.

Vacuum dewatered concrete should be cured like any quality concrete in order to achieve a good final result. Use curing compounds, plastic sheets or wet burlap.

The contractor has the responsibility for achieving the quality of concrete specified by controlling the concrete mixes, placing, vacuum process finishing and curing. The concrete technician in charge must be present at the site when work is in progress.

The contractor shall be responsible for mix adjustments, performing necessary tests, correcting deficiencies and trouble shooting in general.

The contractor shall be required to maintain control charts showing individual test results for aggregate gradation, slump, air content, cement content and compressive strength.

MODE OF MEASUREMENTS shall be in square meter. The unit rate to include cost of all material, equipment, labour etc.

STEEL DOORS

This specification covers the general requirements for manufacture and erection of steel doors, steel sliding doors and steel rolling shutters and other miscellaneous steel works.

GENERAL:

The contractor shall furnish all materials, labour, operations, equipments, tools & plant and incidentals necessary any required for the completion of all metal work in connection with steel doors, windows and other glazings, railings, flashings, inserts, hangers and other items of metal works as called for in the drawings, specifications and bill of

quantities cover the major requirements only. Anything called for in the tender documents shall be considered as applicable to the items of work concerned. The supply and installation of additional fastenings, accessory features and other items not specifically mentioned, but which are necessary to make a complete functioning installation shall form a part of this contract.

All metal work shall be free from defects, imparing strength, durability and appearance and shall be of the best quality for purposes specified made with structural properties to withstand safely, strains, stresses to which they shall normally be subjected.

All fittings shall be high quality brass chromium plated or as specified and as per approval of Engineer.

SHOP DRAWINGS:

The contractor shall submit shop drawings and / or samples of each type of doors, windows, railings and other items of metal work called for to the Engineer for his approval atleast thirty days ahead of their use at site and to conform to the C.P.M. Chart. The shop drawings shall show full size sections of doors, windows and other components, thickness of metal, details of construction, hardware as well as connection of doors, windows and other metal work to adjacent work/supports. Samples of all joints and methods of fastening and joining shall be submitted to the Engineer for approval well in advance atleast thirty days before commencing the work.

SAMPLES:

Samples of all typical metal work such as, doors, windows, railings and other metal components as called for shall be fabricated, assembled and erected or submitted to the Engineer as directed by him, for his approval at least thirty days in advance of their use at site.

APPROVED MANUFACTURER:

All doors, windows railings & other metal works as called for shall be manufactured by a manufacturer/fabricator approved by the Engineer. The entire work shall be carried out by workmen skilled in the kind of work as called for in a shop fully equipped to cary out all phases of fabrication in accordance with the best accepted practices and as approved by the Engineer.

INTERNAL DOORS:

Internal door frames where called for shall be of pressed mild steel sections as per IS:4351 of the size and details as shown on drawings or other documents. The sections

shall be pressed from 18 gauge mild steel sheet unless otherwise specified to the profile shown, by means of a mechanical press of adequate capacity. The pressed section shall be true to profile and also true to dimensions called for.

The frame members shall be of one piece and the corners of the frames shall be mitred, electrically welded and ground smooth. Mechanical jointing of members may be accepted subject to approval of the jointing arrangement by the Engineer.

Necessary provisions shall be made in the frames for fixing silencers, tower bolts, door closers and other hardwares. Slots for receiving lock and latch shall be shop punched and not made at site. The size and the location of the slots shall match the type of lock specified and at the height shown on the drawings / documents, hinges of specified type, make and size shall be fixed to the fames in the fabrication shop. The hinges shall be so fixed that the hinge flap is flush with the face of the frame. A reinforcing metal plate of 16 mm thickness with holes drilled and threaded to receive machine screws from the hinges shall be welded to the frames at hinge locations as shown on the drawings. Holdfasts where called for shall be of mild steel flats of shapes and sizes as shown on the drawings/documents and shall be welded to frames.

The frames shall be phosphated and then given a coat of red oxide zinc chromate primer. The surfaces shall be as specified under ‘PAINTING’ as approved by the Engineer. Base ties of mild steel angles shall be provided for all door frames to retain the size and shapes of the frames during transportation, handling, storage at site and erection.

FITTINGS :

Hinges, locks tower bolts, rubber buffers, door closers and other fittings shall be provided as given in Bill of Quantities.

UNLOADING AND STACKING :

The fabricated frames shall be transported, bundled, unloaded and stacked in a careful manner. They shall be s tacked on edge on level bearers and supported evenly. All precautions shall be taken to ensure that the frames are not damaged or distorted in any manner.

FIXING:

The door frames shall be fixed at the top & bottom through M.S. cleats as shown on the drawings. M.S. cleats of size and detail as shown or called for shall be anchored to the floor and roof slab concrete at the time of casting the concrete. The frame shall be securely fixed to the outstanding leg after erecting in true and correct position. When the frames are to be fixed to column/wall faces, they shall be fixed with rawl bolts/expansion

bolts of approved make. The frames shall be fixed into position true to line and level using adequate number of expansion machine bolts (RAWL BOLTS) of approved size and manufactured in an approved manner. The holes in concrete / masonry members for housing anchor bolts shall be dilled with an electric drill.

The doors assembled as shown on drawings/documents shall be placed in correct final position in the openings and marks made on concrete members at jambs, sills, and heads against holes provided in the frames for anchoring. The frames shall then be removed from the openings and laid aside. Neat holes with parallel sides of appropriate size shall then be drilled in the concrete members to house the expansion bolts. The expansion bolts shall then be inserted in the holes, struck with a light hammer till the nut is forced into anchor shell. The frames shall then be placed in final position in the openings and anchored to the supports through cadmium plated machine screws of required size threaded to expansion bolts. The entire operation shall be subject to the approval of the Engineer.

The frames shall be set in the openings by using wooden wedges at supports and be plumbed in position. The wedges shall invariably be placed at the meeting points of glazing bars and frames.

The contractor shall be responsible for the doors being set straight, plumb, level and for their satisfactory operation after fixing is complete.

In case of brick wall, precast cement concrete (1:2:4 mix) blocks shall be provided at locations where the frames are to be anchored, at the time of building the wall. The rawl bolts shall then be anchored to these blocks.

Hollow of frames abutting concrete/masonry shall be filled with cement grout (1 cement : 3 coarse sand) densely packed and finished neat.

All steel frames and other steel members shall be enamel painted as provided under “PAINTING” or as specified after the installation of the shutters, glazing, etc.

DOOR SHUTTERS:

Pivoted shutters shall have “EVERITE” floor springs at the bottom suitably fixed to the floor and pivots fixed at the top as shown in drawings or as called for in the specifications. The shutters shall be fabricated with M.S. light gauge roll formed sections conforming to I.S. specification including welding all the joints and panels made out of 18 gauge M.S. sheets cut to size and shape as shown in the drawings and fixed to the shutter frame by means of brass screws and cup washers as called for in the drawings. The contractor shall however get the shop drawings and the sample approved by the Engineer before executing.

All the steel surfaces shall be thoroughly cleaned free of rust, scale or dirt and millscale by picking or phosphating and before erection painted with one coat of approved primer and after erection painted with two finishing coats of synthetic enamel paint of approved shade and quality.

PAINTING:

All exposed glazing, frames shall be treated with solignum stained to the tint approved by the Engineer. Door shutters, shall be enamel painted to approved finish. All painting, shall be carried out as specified under 'PAINTING' or as specified.

PROTECTION OF WORK:

The contractor shall be responsible for the temporary doors and closing in openings necessary for the protection of wok during progress. He shall also provide & maintain any other temporary covering required for the protection of finished wood work that may be damaged during the progress of work if left unprotected.

MAKE GOOD DEFECTIVE WORK:

The contractor shall. Be responsible for any shrinkages or warping or any other defects which may appear in any joinery work. All defective or damaged work shall be taken down and renewed or repaired to the entire satisfaction of the Engineer.

RAILING:

Railing to stairs and other locations where called for shall be of MS sections or other material as called for of size as shown in the drawing. The drilling of holes, counter sunking, etc., shall be carried out by skilled fitters in a precise, neat as directed by the Engineer. The finished railing shall be true to plumb, line and levels. The mild steel balusters and other exposed mild steel members shall be painted as specified under 'PAINTING' or as specified.

MS GRILL & STEEL LADDER

These shall be made from MS section as per the Architect's details. The item includes fixing with screws or necessary anchor bolts and flats to fix the railing rigid in position. The members shall be welded together and all the welded joints shall be filed to make smooth joints. The rate includes two coats of enamel paint of required shade and primer coat of red oxide. Measurement will be in Kg on the basis of the standard steel tables.

ROLLING SHUTTERS:

Rolling shutter of approved quality, make & type, 18 gauge (MS solid laths or grill) with all the accessories such as top cover (in or out), handles, bearings, springs, axles, locking arrangement guide rails, iron pulleys, push & pull arrangements should be purchased from reputed firm and provided and fixed with holding down bolts with PCC 1:3:6 as specified i.e., outside or inside or below lintel or between jambs of the opening. The shutter shall be either push or pull type or operated with special type of reduction/bevel gear arrangements operated with mechanical device. Shutter upto 10.2 sqm or outside width less than 3m shall be push & pull and above 10.2 sqm and width more than 3m will be mechanically operated.

The spring shall be best Indian make and manufactured from tested high tensile steel wire to balance the shutter in all positions. Spring pipe shaft shall be supported on strong mild steel or CI brackets. Both the side guides and bottom rail shall be jointless and single piece of pressed steel. The top cover of shaft, spring, etc., shall be of same materials, as that of lath and no extra payment shall be made for this. The side guides fixed with plates, welded to guides shall be properly fixed with screws, bolts, and concealed in plaster. The operation of shutter should be easy and smooth. The measurement will be in sqm. The width shall be measured as width of the shutter including portion hidden in the guide channels and height shall be measured as the length of the shutter from the bottom of the locking plate to the bottom of lintel. For cover 450mm ht. will be paid additionally. The rate includes 2 coats of enamel paint of required shade and primer coat of red oxide. The payment for shutters of push and pull type or operated with mechanical device or grill type will be separately on sqm basis.

MODE OF MEASUREMENT:

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following:

Steel Doors:

Clear area over one face inclusive of exposed frame shall be measured. Holdfasts or portions embedded in masonry or flooring shall not be measured.

Steel rolling shutters:

Clear width between sides Jambs and clear height between floor and bottom of lintel/beam shall be measured. Hood shall not be measured separately. The rate should be inclusive of the cost of hood.

MS railing, grill & ladder

Measurement will be in Kg on the basis of the standard steel tables.

NOTE:

If the approved brands mentioned above are not available, equivalent make as may be approved by the Engineer only to be used on the work.

ALUMINIUM WORKS

GENERAL :

This specification covers the general requirements for aluminum doors, windows and ventilators manufactured from extruded aluminum alloy sections of standard sizes and designs complete with fittings including supply, fabrication and installation in accordance with the drawings and specifications.

The supply, fabrication and erection will include all parts such as but not restricted to frames, tracks, guides, mullions, styles, rails, couplers, transoms, plates, glazing bars, weather bars, glass, hinges, handles, pegstays, bolts, locks, latches, locking arrangements, spring catches, cord and pulley arrangements, door closers, floor springs etc., required for the whole work whether the parts/items are individually and specifically referred to in the schedule/specifications/drawings or not, provided that the supply and installation of such parts can be inferred there from and are necessary to make the work complete, unless separate provision is made in the bills of quantities for supply to such parts/items.

Materials:

Aluminum Sections:

The members shall be made out of aluminum alloy corresponding to IS 733 (latest) and will consist of extruded sections and of other shapes, and to sizes and gauges as shown in the drawings/described in accordance with the relevant IS Codes. The members shall be chosen to provide strength/stability and maximum resistance to wear and tear.

The sections shall be of INDAL, JINDAL, or equivalent extruded sections. As indicated in the drawings the tenderer should specifically mention which section she is going to use.

The weight of sections and the corresponding catalogue numbers are mentioned. The IS specifications are to be strictly adhered.

The various tests of aluminum section shall be conducted in accordance with relevant IS Codes.

Finishing :

The extruded aluminum section shall be mechanically finished to remove all scratches, extrusion marks etc and subsequently thoroughly cleaned in an alkali bath prior to anodizing.

The anodizing shall be in natural finish by electro chemical process as per IS Specification 7088 (latest) and thickness shall be 15 microns. Film thickness test for anodic coating shall be done in authorized test house and test results shall be submitted to the Engineer.

The anodized material shall be sealed properly and it is should be wrapped in gummed tape before fabrication to avoid scratches during fabrication and erection and shall be kept protected till handing over.

Fabrication:

Before commencing the fabrication the contractor shall submit to the Engineer for his approval detailed fabrication drawings, based on the Engineer's drawings and specifications and corresponding to the finished openings left at site where the doors, windows, ventilators, partitions are to be fixed, junctions, fittings, accessories etc. such as hinges, flush bolts, locks, latches, latching arrangements, pegstays, rotor arms, centre pivots, gaskets, rubber packing, door felts, mastic, sealant, etc., fixing and sealing arrangements, etc., and the type and method of scaffolding he intends to use, incorporating therein what he has offered and what has been accepted , and specified in the order. Fabrication shall be taken up only on approval of and in accordance with the approved drawings. Should there be any necessity, the Engineer may revise the sections of any door/window/ventilator etc. and the same shall be followed for execution. However the rate quoted for the relevant finished item shall be adjusted only for the difference in weight of Aluminum sections in KG. between that specified by the tenderer at the time of tendering and that modified by the Engineer. All other elements of cost variation due to such modifications in the sections shall be deemed to have been included in the quoted rates.

Fabrication shall be done true to the drawings to correspond to the finished openings at the site, the sections cut to lengths to suit, mitred at the corners, to true right angles with joints made me neatly to hair lines, with concealed fasteners, whenever possible joints shall be made in concealed locations.

All fabricated items shall be packed and carted properly before dispatch to site to prevent damage in transit. On receipt at site they shall be carefully stacked in protected,

storage to avoid distortion/damage. Such items shall also be in the safe custody of the contractor.

Construction:

The units shall be factory built to precision, alignment, dimensional accuracy and strength.

The outer frame shall be inter-fitted together by mechanical means of best fabrication technique.

The interlocking members shall be accurately manufactured to close tolerances to ensure tight fit of the mating interlock profiles.

There shall be minimum gap between shutter and frame to facilitate easy and smooth movement of the shutter.

Field connections may be made with concealed screws, self tapping or other approved fasteners or may be made with weld due precautions being taken to avoid altogether distortion / discoloration of the finish.

Details of construction of the doors, windows, ventilators partitions shall be as specified in the relevant I.S. codes and in the absence of such details in any I.S.code, will correspond to the best engineering practice.

Faces/Parts coming into contact with masonry in the construction shall before shipment to the site be given a heavy coat of an alkali resistance bitumen paint. Aluminium coming in contact with other incompatible metals shall be given similarly a thick coat of Zinc Chromate primer.

The sliding shutters are to be fixed with nylon rollers with stainless steel ball bearings and stainless steel pin. The Stainless steel mosquito netting of approved quality with necessary fasteners are fixed in window frames at location as indicated in the drawings and complete in all respects in all respects. The frames to be fitted with wool pole as directed by the Engineer.

The doors, windows, ventilators and partitions shall be supplied in natural colour (matt finish) anodizing in the item specifications. Anodising shall be matt finish under electrically controlled conditions conforming to IS 6057, and to be minimum thickness as may be specified in the item specifications or if not so specified to a minimum thickness of 15 microns excepting on the fittings, hinges and such other moving parts where it shall be to a minimum thickness of 20 microns. Any frames found short of microns film thickness of anodizing shall be rejected.

For installation a thick layer of clear transparent lacquer based or methacrylates or cellulose butyrate shall be applied by the supplier on the aluminium doors, windows ventilators and partitions to protect the surface. The coating shall be removed after installation is done. They shall be cleaned thoroughly with warm water to restore the finish.

Scaffolding is the responsibility of the contractor and shall be done without causing any damage to the structure and the finishes therein.

Glazing:

Glazing shall be done with flawless sheet glass of Quality without waviness, distortion, coloration/discoloration, of specified thickness, in sizes as shown in the drawings, fixed as required with special glazing clips, putty, neoprene/PVC gaskets. The gasket shall be extruded EPDM synthetic rubber wrap around U channel type with beveled edges to run continuously around the perimeter of the glass. All glass shall be cleaned thoroughly before they are fixed in position.

The thickness of glass shall be as specified in the item specification under B.O.Q. and Drawings.

Fitting:

The handles shall be of cast aluminum anodized or any other material as specified in the drawing, two point handles of high quality and of approved design and shape. Peg stays shall be of anodized wrought aluminum. All fittings shall be of high quality to design and / or type approved by the Engineer.

Sealing :

Sealing shall be done using a non-hardening, transparent silicon sealant applied with single part gun to provide water tight seal between the window and the surrounding construction.

Protection and Cleaning :

The Contractor shall be responsible for the protection of all aluminum works during the course of construction of the building and for cleaning all aluminium works after painting and finishing of building is completed.

The aluminum manufacturers shall give specific performance guarantee against defects in materials of workmanship for a period of one year from the date of installation.

The rates quoted shall include:-

- Providing all aluminum doors, windows, ventilators, glazing, railings etc. of the best manufacture and as per prior approval of the Engineer.

- Providing necessary coupling, transoms and mullions.

- Providing a protective thick layer of clear transparent lacquer based on methaorylates or cellulose butyrate, for protection of surfaces of various units during transportation and installation and removal of the same after installation is complete.

- Each shutter of sliding window shall have 2 Nos. Nylon/ neoprene sleeved rollers. Lock and handle shall be provided in Nylon / PVC / Aluminum samples of which shall be got approved to prevent air infiltration to open able shutters with stainless steel ball bearing.

- Sealing the junction of windows or glazing frame with openings and / or wooden base lining around the opening with epoxy resin or other approved silicon sealant to make the junction water tight.

- Fixing of aluminum units in the openings with lugs 15 mm x 3.15 mm x 10 Cms long in cement concrete blocks of 15 mm x 10 mm x 10 Cms size 1:3:6 (1 cement : 3 coarse Sand:6 Hard stone aggregate 20 mm nominal size) or with wooden plugs and screws or with rawl plugs and screws or with bolts and nuts as required.

- Doors shutters shall have heavy duty double action hydraulic floor springs pivoted top and bottom with a minimum of One year guarantee.

- Necessary locking arrangements o approved design shall be provided to door shutters including flush type tower bolts for each shutter as directed.

- The Contractor shall furnish detailed fabrication drawings to suit site installation for approval before taking up the work.

  Providing single row continuous, neoprene or PVC weather strip to prevent air infiltration to openable shutters.

- Hoisting and working at any height including required scaffolding etc., and protecting the aluminium sections and glass from any damage, scratched etc., till being taken over by the Engineer. Rate shall include final cleaning of all items to the Engineer Satisfaction before final handing over.

- The manufacture of the aluminium framed glazed doors & windows etc., shall confirm to current Indian Standard.

- Aluminium Sections shall be of standard extrusion and shall confirm to IS 733. and shall be in accordance with the Engineer's drawing.

- All Aluminium Sections shall be finished in natural colour electro chemical anodized to 15 microns and a piece of anodized materials shall be got approved before fabrication.

- All doors, windows, etc., shall be factory finished and the frame joints shall be absolutely water tight. All frames and shutters shall be properly jointed ensuring adequate mechanical strength and absolute right angleness.

- All doors shall be provided with Hi-bronze finish anodized aluminium push plates.

- The glasses for doors, windows fixed glazing shall be fixed with aluminums anodized hi-bronze finish snap on glazing chips and gasket rubber. PVC weather strip shall be provided.

- Matching Sections shall be perfectly aligned for compactness.

- Samples of Sections for outer frame, shutter frame, hardware etc., shall be produced for prior approval.

- The size and details of doors etc., shall generally be as per the drawings prepared by the Engineer. The Contractor shall take exact site measurements, for all the items before fabrication to avoid any discrepancies.

- The rates quoted shall be for supply, delivery and erection etc., complete including packing and all other incidental charges.

Detailed fabrication drawings shall be furnished to suit the site installation for approval before taking up the wok.

MODE OF MEASUREMENT:

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following:

Measurements shall be in square meter of net areas fixed.

WOOD WORK

The specification covers the general requirements for wood work.

The contractor shall furnish all materials, labour, operations, equipment, tools and plants and incidental necessary and required for the completion of all carpentry and joinery work in connection with door shutters, glazing, cabinets and other items of work called for in the drawings.

The carpentry and joinery work shall include the provision of fixing of fastening devices and hardware in accordance with the drawings and attached hardware schedule. Hardware and other materials will be supplied by the contractor after obtaining prior approval of the Engineer of samples for each item of hardware.

SAMPLES AND SHOP DRAWING:

The contractor shall, before proceeding with the work, submit to the Engineer for his approval complete samples of the various materials including hardware and fastening devices and shop drawings and large scale details covering all joinery works.

TIMBER:

Timber shall be superior class sal wood of best quality. Timber shall be free from large loose knots, cracks, warp, twists, bends, shakes, sap wood splits, evidence of insect and fungus attack and shall be uniform in texture (there shall be no knot of any description on exposed surfaces, unless specifically agreed, plugging will not be permitted).

The seasoning of timber shall be as laid down in IS: 1141.

The colour of timber shall be consistent & to the approval of the ARCHITECT / PM or their authorized representative. All timber shall be of the same species as specified and only the best quality of timber shall be permitted on the work. Timber shall be of approved origin and shall be well seasoned.

MOISTURE CONTENT

The timber will be considered well seasoned if the moisture content does not exceed the limits as per IS 287. The moisture content shall be determined as per IS 287 whether air or kiln dried. The tolerance shall not exceed provisions in IS 4021&1003-I & II.

All timber for woodwork shall be kiln seasoned. Tests shall be carried out on each lot. Test certificate from approved laboratories shall be submitted to the ARCHITECT / PM or their authorized representative upon delivery of each lot, for acceptance.

SAMPLES

The contractor before proceeding with any work shall submit samples of timber and get the approval. Mock-ups shall be done and shall be approved by the ARCHITECT / PM or their authorized representative before executing the actual work.

WATER- PROOF PLYWOOD

Waterproof ply used for the woodwork shall be of approved or equivalent manufactures and shall confirm to the relevant IS Code of practice. The standard thickness of the ply shall be as specified on the drawings. The ply shall be free from borer insects, fungi and termite resistant. The ply should be treated with permanent preservative treatment as per manufactures specifications.

The Ply shall be bonded with high quality BWP type Phenol formaldehyde synthetic resin confirming to IS 848:1974. Ply shall be given preliminary and permanent preservative chemical treatment by impregnation as per I.S 5539:1969 to make it all weather, all-purpose plywood for high quality interiors & furniture works.

VENEER

Veneer used for panels, door shutters, counters, custom made furniture's, etc. and wherever shown on drawings shall be of approved or equivalent make. The veneer shall be made using Steam Beech Wood veneer that is pressed under high-pressure and laminated to phenolic core.

The total thickness of veneer with Bakelite backing shall be 4 mm and should be uniform. The veneer shall be 100% borer and termite resistant. The veneer procured shall be of the same group match and shall be approved by the Architect / PM / or their authorized representative.

The veneer shall be glued to the surfaces of ply, flush door, etc. using synthetic resin or Rubber based resin as recommended by the manufacturer and as per the manufacturer's specifications.

The veneer shall be fixed with grains and patterns as specified on the drawings / approved by the Architect / PM / or their authorized representative.

LAMINATE

Laminate used for panels, door shutters, counters, storage units, custom made furniture's, etc. and wherever shown on drawings shall be of approved or equivalent make confirming to IS 2046:1995.

The Laminate shall be made by base paper to match Steam Beech wood, which is pressed under high-pressure, and temperature. The thickness of laminates shall be 1.5 / 1.0 / 0.8 mm and should be uniform. The laminate procured shall be of the same group match and shall be approved by the Architect / PM / or their authorized representative.

The Laminate shall be glued to the surfaces of ply, flush door, etc. using synthetic resin or Rubber based resin as recommended by the manufacturer and as per the manufacturer's specifications. The Laminate shall be fixed with grains and patterns as specified on the drawings / approved by the Architect / PM / or their authorized representative.

JOINERY & CARPENTRY

All joinery work shall be securely joined, using appropriate method of joining as applicable like dowel, dove-tail, mortise and tenon, tongue and groove, fixed properly with best quality adhesive suitable for the joints like FEVICOL or glue -epoxy resin, like "Araldite" manufactured by Cibatul Ltd. or approved equivalent.

Timber pins shall be used where directed. All woodwork in contact with masonry shall be painted with approved wood preservative paint.

TIMBER DOORS

Doors, etc., shall be in accordance with the drawings, using steam beach wood sections, in every detail and all joiner's work shall be accurately set out, framed and finished in a proper workman like manner. The scantlings shall be accurately planed smooth. Rebates, rounding and moldings shall be made as shown on the drawings. Patching or plugging of any kind shall not be allowed.

Joints shall be simple, neat and strong. Framed joints shall be coated with suitable adhesive like glue or synthetic resin approved by the Architect / PM / or their authorized representative, before the frames are put together. All mortise and tenon joints shall fit in fully and accurately without wedging or filling. The joints shall be pinned with hard wood or bamboo pins of 10mm to 12mm dia or rust resisting star shaped metal pins of 8mm diameter. All portions of timber abutting against or embedded in masonry or concrete shall be treated against termites by giving a coat of an approved wood preservative, for which no extra cost will be paid. Putty shall not be used to cover any defects.

Unless otherwise specified, all doorframes shall have four holdfasts. Holdfasts shall be provided to the ventilators if directed. Size of holdfasts shall be 200mm x 40mm x 5mm M.S. flat bent to shape with fish tail and shall be fixed to frame with sufficient number of screws as directed.

FLUSH DOOR SHUTTERS

Flush shutters shall be solid core (Block board Type Core) construction of kiln-seasoned timber, faced with high quality commercial ply or decorative type as specified. They shall be Phenol formaldehyde resin bound flush doors. They will have steam beech wood - lipping all-round as specified of width machine pressed along with core. The shutter should generally conform to IS: 2202 part I.

FOR JOINTS, FOLLOWING PRINCIPLE TO BE OBSERVED: -

- At joints the weakness of pieces must be minimum as for as possible.

- To place each abutting surface in a joint as neatly as possible, perpendicular to pressure.

- To form and fit accurately every pair of surface that comes in contact.

For internal work where the joints are not likely to be affected by moisture the joints shall be glued. The members are then put together and joules of correct size shall be drilled before inserting screws.

Driving of screws with hammer is prohibited. Screws shall be dipped in oil before being inserted in wood. The heads of nails of screws shall be sunk and puttied.

The joints shall be pinned with hard wood or bamboo pins 10 to 15mm diameter after the frames are put together, pressed in position by means of a press. Woodwork shall not be painted, oiled or otherwise treated before each and every member has been approved by the Architect / PM / or their authorized representative. All portion of timber built into or abutting against or embedded in masonry or concrete or buried in ground shall be painted with boiling coal tar, or solignum or approved quality wood primer. The frames shall be fixed with iron holdfast well screwed and not nailed and frame shall be fixed in proper position as per drawing. Holdfast shall not be paid separately.

The doorframe vertical end should be properly protected and well fixed. The frames vertical members shall be buried in floor 38mm deep for which nothing extra shall be paid will not be considered in measurements for out to out of the frames. The frames shall be kept in position during construction against warping and shall be well protected from damage during construction due to wear and tear, against construction materials, scaffolding damages, plaster and RCC casting operations or falling materials.

The measurement shall be in sqm. and shall be taken out to out of the frame. The painting or polishing shall be done as specified in the schedule of quantities. When specified or shown on drawing, vision panels or louvers shall be provided as per details

and paid separately. The measurement shall be out & out including frames and shutters (when closed). Overlap of shutters will not be measured.

FRAMES

The sections of the frames shall be as shown on the drawings. The rebate and cover mould on the frames shall be as per drawings or as approved by the Architect / PM / or their authorized representative. The mortise and tenon joint shall fit tight without wedging or filling. The joint shall be glued, screwed, framed. Put timber pins not less than 10mm dia, after the frames are put together in position by means of a press. The joints of the doorframes shall have visible miter joints

Before any frame is fixed in position it shall be inspected and approved. The frame shall be placed in proper position and secured to Brick masonry walls /Concrete block walls / partition wall as the case may be as per drawings. All timber frames and rough grounds shall be kept in plumb with necessary spacers as required.

MOULDING, TRIMS, BANDS ETC.

Architraves. mouldings, beadings wherever indicated in all work like doors, paneling, partitions, furniture etc. shall be of superior quality. Steam beech wood shall be true to detail, clear and sharply defined. It shall be securely fastened with screws or nails, well set, and screw/nail holes finished with putty and melamine polish to match the colour of the wood.

HOLDFASTS & ANCHOR FASTNERS

Holdfasts shall be of mild steel flat 25 mm x 3 mm x 300 mm long (overall) with one end split and other end bent at right angle as per IS: 7196-1974. Expansions type anchor fasteners of Fischer or equivalent of approved size and number shall be used where holdfasts are not allowed for fixing frames.

DOORS, WINDOWS & VENTILATORS;

Doors, windows and ventilators etc,. shall be in accordance with the drawing in every detail and all joinery work shall be accurately set out, framed and finished in a proper workman like manner. Frames of doors, windows and ventilators, shutter styles and rails shall be of best solid wood of quality specified in the schedule of quantities. The scantlings shall be accurately planed smooth. Rebates, rounding and moldings shall be made as shown on the drawings. Patching of any kind shall not be allowed.

Joints shall be simple, neat and strong. Framed joints shall be coated with suitable adhesive like glue or synthetic resin before the frames are put together. All mortice and tenon joints shall fit in fully and accurately without wedging or filling. The joints shall be

pinned with hard wood or bamboo pins of 10 mm to 12 mm dia. or rust resisting star shaped metal pins of 8 mm diameter. All portions of timber abutting against or embedded in masonry or concrete shall be treated against termites by giving a coat of an approved wood preservative, for which no extra cost will be paid. Putty shall not be used to cover any defects. Unless otherwise specified, all door frames shall have six holdfasts. Holdfasts shall be provided to the ventilators if directed. Size of holdfasts shall be 400 mm x 40 mm x 5 mm M.S. flat bent to shape with fish tail and shall be fixed to frame with sufficient number of screws as directed. When door/window frames are to be fixed to RCC column or RCC wall, holdfasts shall be substituted by suitable arrangements such as screws, rawl bolts/grip bolts etc. to secure frames to RCC column or RCC wall as directed by the Engineer. The frame shall be fixed only after getting the approval of the Engineer.

NOTE:

All timber for journey or wrought formwork shall be of best Indian Teakwood unless otherwise specified and or specified quality, carefully selected free from sap and subject to inspection and approved before delivery. All teakwood to be used in this work shall be seasoned in an approved manner.

The joiner work shall be framed and put together immediately but not to be wedged up until required for fixing. The approval of the Engineer shall be obtained before any primer coat is applied.

The whole of joinery to be finished to the dimensions and sizes indicated in the drawings are subject to a tolerance to 1.50 mm of each planed face, but no allowance shall be given to flush doors, shutters, ply and other manufactured board etc.

All block boards etc. shall correspond to respective IS specifications. Flush doors shall correspond too relevant IS specifications. Samples of all block board, plywood, flush doors, etc. shall be got approved by the Engineer before placing order. All such items shall be of standard manufacture of reputed quality. Unless otherwise specified, all flush shutters shall be teak veneered on both sides. All flush shutters shall be of solid core and shall be provided with teakwood external lipping.
If after execution any shrinkage or bad workmanship is found, the Contractor shall forthwith replace or refix the same at his own cost, all as directed by the Engineer.

Rate quoted shall include for all framing, usual waste and cuttings and no extra rates or claims will be entertained on this account.

The rate for wood work shall include the cost of all sawing, planning, jointing, framing, labour and materials for raising and fixing and all workmanship and fixing and supplying of all strips, bolts, nails, triennials, spikes, keys, wedges, pins, screws etc. necessary for

the framing as per specification and drawings. Edges of the beams, joists, posts, frames etc. shall be rounded, moulded or chamfered as directed without extra charges.

The Contractors shall be responsible to deliver all items at site of work. The Contractor will submit a programme of work in such a way that requirements for each floor commencing from ground floor is completed before the requirement of the next floor and arrange to have them fixed in position as the General Builders work progresses.

Timber in contact with masonry or concrete shall be treated with solignum paint or any approved anti-termite treatment before fixing.

The Contractor will be making necessary holes in concrete and masonry for fixing in position and grouting. The Contractor will be responsible for the proper fixing of partitions true to plumb and alignment until completion and grouting pockets with cement concrete and make good affected portions without claim to any extra.

The iron monger fittings shall be of heavy type stainless steel and of approved manufacture. Samples of all iron monger items shall be got approved by the Engineer prior to procurement.

PANELED SHUTTERS

Panels shall be of pattern and size as shown in the drawings or as directed by the architects. Solid wood panels shall be in one piece wherever possible. Where two or more pieces are permitted, they shall be of equal width. Panels shall be framed into grooves made in styles and rails to the full depth of groove.

Partly paneled and partly glazed shutter shall be similar to paneled shutters except that such parts as are directed shall be glazed as specified, styles and rails shall be rebated 12mm to receive glass. Sash bars shall be moulded and rebated and mitered on sides to receive the glass which shall be fixed with putty and beading.

The fixing of hardware shall be done in the best workmanlike manner and in accordance with the manufacture's specifications. The contractor shall be held responsible for working of all moving parts dependant on the proper fixing.

FLUSH DOOR SHUTTERS;

Internal door shutters, unless otherwise noted or specified, shall be 35 mm thick phenol formal-dehyde synthetic resin thermo pressed flush shutters, teak veneered faced on both faces. The shutters shall conform to IS:2202 (Part-I). Shutter make shall be approved by the Engineer.

The solid core shall be wood laminate prepared from battens of well seasoned and treated good quality wood having straight grains. The battens shall be of uniform size of about 2.5 cm width. These shall be properly glued and machine pressed together, with grains of each piece reversed from that of adjoining one. The Longitudinal joints of the battens shall be staggered and no piece shall be less than 50 cm. in length. Alternatively, the core shall be of solid teak particle board. Edges of the core shall be lipped internally with first class teak wood battens of 4 cm. minimum depth, glued and machine pressed along with the core.

The core surface shall then have two or three veneers firmly glued on each face. The first veneer (called cross band) shall be laid with its grains at right angles to those of the core and the second and the third veneers with their grains parallel to those of the core. The under veneers shall be of good quality, durable and well seasoned wood. The face veneers shall be of minimum 1 mm thickness and of well matched and seasoned first class teak, laid along with grains of the core battens. The combined thickness of all the veneers on each face shall not be less than 4 mm. Thermosetting synthetic resin conforming to I.S. 303 or moisture – proof plywood grade M.P.F.I. shall be used in manufacture. All doors shall have external lipping alround 6 to 10 mm thick in addition to internal lipping.

Block boards and ply for various items of work called for shall be of approved make. Unless otherwise shown all block boards and ply shall be teak veneered faced on both faces.

Samples of flush doors, block boards, etc., shall be submitted to the Engineer for his approval and all shutters, etc., to be used in the work shall conform to the approved sample in all respects.

HARDWARE FITTINGS;

All hardware fittings and fixtures shall be made with structural properties to sustain safety and withstand strains and stresses to which they a re normally subjected, such as opening and closing, wind pressure etc. The fittings shall generally conform to relevant specifications.

They shall be made true, clean, straight, with sharply defined profiles and unless otherwise shown or specified, with true smooth surfaces and edges, free from defects, screw holes shall be counter sunk to suit the head of wood screws.

The metal shall be treated with finish as specified in the Schedule of Quantities.

Butt Hinges:

These shall be treated with finish as specified in the Schedule of Quantities.

SS Hinges shall conform generally to the latest version of I.S.205.

SS Butt hinges shall be manufactured from SS sheets of approved gauges. Hinges shall be finished as specified in the respective items. The size of butt hinges shall be taken as length of the hinge.

Sliding bolts/Latches:

These shall be of Stainless steel or as specified and shall be capable of smooth sliding action. These shall be finished as specified. The size of latch shall be taken as the length of the bolt catch.

Tower Bolts:

These shall be of stainless steel or as specified tower bolts from external section.

In the case of brass and aluminum tower bolts, steel spring and ball shall be provided between the sheet and the barrel.

The size of tower bolts shall be taken as the length of barrel without top socket. The bolt shall be finished as specified.

Handles :

These shall be as mentioned in the drawings.

PRESERVATIVE TREATMENT;

All wood work in contact with masonry shall be painted with approved asphalt or bitumen paint before placing. Care shall be taken to keep exposed faces clear from tar, etc. Tarfelt shall be used to isolate wood from masonry wherever practically possible. All concealed wood members in ceiling, partitions, cabinet work, etc., shall be treated fully and liberally with solignum before placing in position.

MODE OF MEASUREMENT;

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

All work shall be measured net as fixed. No extra measurement will be given for shape, joints, splayed, meeting stiles of doors and windows and shall be measured in unit of square metre.

Area over one face inclusive of exposed frame thickness (excluding width of cover mould) shall be measured in case of doors, windows and ventilators when frames are included in the item. Portions embedded in masonry or flooring shall not be measured.

PANTING WORKS

Scope:

This Specification describes the general requirements of painting and decorating on internal and external surfaces, woodwork and metalwork and varnishing and polishing to be executed on projects.

Applicable Codes:

The following Indian Standards and Codes are made part of this Specification. All the Standards and Codes of Practice referred to herein are references to the latest editions including any and all official amendments and revisions.

Sr.No	BIS Code No	Part	Title
1.	75		Specification for raw and refined linseed oil.
2.	345		Specification for transparent liquid wood filler.
3.	348		Specification for French polish.
4.	427		Specification for distemper – dry colour.
5.	428		Specification for distemper – oil emulsion colour.
6.	533		Specification for gum spirit of turpentine.
7.	1477	1	Code of Practice for painting of ferrous metals in buildings – Pre-treatment.
8.	1477	2	Code of Practice for painting of ferrous metals in buildings-Paintings.
9.	2338	1	Code of Practice for finishing of wood and wood-based materials – Operation and workmanship.
10.	2338	2	Code of Practice for finishing of wood and wood-based materials – Schedule.
11.	2395		Code of Practice for painting concrete, masonry and plaster surfaces.
12.	2932		Specification for enamel synthetic exterior undercoating and finishing.
13.	2933		Specification for enamel exterior undercoating and finishing.
14.	3140		Code of Practice for painting asbestos cement building products.
15.	3537		Specification for ready-mixed paint, finishing, interior, for general purposes to IS colours.
16.	3631		Specification for ready-mixed paint for finishing interior, alkyd and non-alkyd for general purposes to IS colours.
17.	4597		Code of Practice for finishing of wood and wood-based products with nitro-cellulose and cold-catalysed materials.
18.	5410		Specification for coloured cement paints.

19.	6005		Code of Practice for phosphating iron and steel.
20.	6278		Code of Practice for whitewashing and colour washing.

GENERAL:

The specification covers the general requirements for various types of painting and finishing of all surfaces throughout the interior and exterior of the building. The scope shall include furnishing of-all materials, labour, scaffolding, tools and appliances to do all painting and / or white / colour washing of both interior and exterior surfaces of plastering, ceiling and all carpentry works. This also include painting structural and miscellaneous steel, railings, gratings, steel doors and frames, steel sashes, windows, louvers and frames, steel rolling shutters, MS grills etc. The number of coats required in various situations and also the types of finish required for the several items of work such as cement based paint, plastic emulsion paint, oil bound distemper, synthetic enamel paint, etc., are specified in the schedule of quantities and specifications.

Before the commencement of the work the contractor shall provide sample panels of painting at his own cost for the approval of the Engineer to enable him to keep an accurate check on the materials supplied and final shade to be painted. It is however the express responsibility of the contractor to provide any deviations and defects shall have to be rectified by the contractor at his own cost.

Contractor shall protect not only his own work at all times but also all the adjacent work and materials by suitable covering, protection or other methods acceptable to the Engineer during progress of painting. It is the responsibility of the contractor upon completion of painting work to remove all paint and varnish spots from floors, walls, glass panes and other surfaces and restore them to the original conditions. The work generally to be touched up shall be attended to after all other workmen have left. An accumulated material, rubbish etc. have to be cleared and the premises left in clean, orderly and acceptable conditions.

Contractor shall provide scaffolding wherever necessary erected on double supports tied together by horizontals, no ballies, bamboo's or planks shall rest on or touch the surface which is being painted. Contractor is deemed to have considered the following while tendering and no extra claim on account of these will be entertained

- Supplying the paint and other materials required of approved colour and brand.
- Preparing the surfaces to be painted.
- Providing and erecting scaffolding and removing the same after completion of the work.

- Lifting of materials to any height and painting at all levels.
- Application of paint as per the specification to manufacture's instructions.
- Curing, protecting the painted surface, adjacent work and thoroughly cleaning of the premises.

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All doors, partitions etc., shall be finished in the manner specified in the drawing, specifications and schedules, wherever painting and polishing are specified, although three coats finishes specified are to be included in the rates quoted, the contractor shall be required to carry out additional coats of paint/polish to obtain uniform and good finish at no extra cost, wherever such additional coats are considered necessary in the opinion of the Engineer. If directed, putty shall be applied over the entire surface to ensure smooth and neat finish at no extra cost.

MATERIAL:

The paint shall generally conform to chemical composition and other characteristics laid down in the relevant Indian standard specification. The entire materials required for painting work shall be obtained direct from approved manufacturers or their authorised agents and brought to site in original manufacturer's containers with seals unbroken.

Paint shall be ready mixed and of 1st quality of the approved brand and manufacture. Mixing of paint by the contractor at site will not be allowed except with preparation of ingredients and their quality shall be strictly maintained as per manufacturer's instructions and all as directed by the Engineer. All the materials shall be kept properly protected when not actually in use. Lids of containers shall be kept closed. Materials which have become stale or flat (in the opinion of the Engineer) shall not be permitted to be used on the works and shall be removed from site forthwith. Wherever the word Approved occurs in these specifications it shall mean that the competent authority for such approval is the Engineer. Any materials found not conforming to the relevant specification shall have to be removed by the contractor from the site at his own expenses. Colours shall be uniform and non-fading.

Protruding timber fixes shall be removes and all holes shall be filled with teakwood batten. The nail marks shall be covered with putty. The work shall then be sanded first with G/80 sand paper followed by G/120 or G/150 sand paper. Sanding should be taken up only when it can be followed immediately by painting.

The surface shall be thoroughly cleaned sand papered and / or rubbed with emery cloth if necessary to remove grease, mortar or any other foreign materials. In case of rusted surface, it shall be first cleaned with steel wire brushes till the corroded crust is removed.

The cleaned surface shall be shiny and free from brush marks, patches, blisters and other irregularities. The surface thus finished shall be got approved before painting.

Concrete / plaster and cement plastered surfaces shall be thoroughly cleaned of mortar droppings and other stickings. All loose scales and flakes shall be removed by rubbing with hessian cloth or sand papering. All holes shall be filled and the surface rubbed smooth to get evenness of the existing surface. Area to be distempered shall be applied with one coat of white chalk solution mixed with required Want of glue or plaster of Paris and shall be sand papered before distempering. The area to be cement painted shall be wetted by sprinkling of water with fine spray. The surface shall be sprayed several times with a few minutes intervals between each spraying to allow the moisture to seek into the surface.

The sanded surface she,, be dusted and a priming paint, brush coated in thin even layers. For all flush doors and teakwood approved aluminium wood primer shall be applied If some time passes after priming another coat of primer shall be applied before under coating is done.

The cleaned surface shall be dusted and a priming coat of anticorrosive paint shall be applied.

Stopping and filling carpentry work should be done when the primer is just dry. For deep scratches, holes etc. stopping shad be done with putty of plastic wood (IS 423). Putty can be white lead with linseed oil base or synthetic metal putty.

For all minor scratches and rough surfaces, like flush door's faces filling made out of one part of white lead; two parts of whiting (powdered chalk) mixed and kneaded in double boiled linseed oil shall be evenly applied and rubbed down with G/220 or G/240 sand paper after allowing it to dry ovemight.

Painting shall be done by skilled labourers in a workmanlike manner. All materials shall be evenly applied so as to be free from sags, runs, crawls, or other defects. All coats shall be of proper consistency and shall be well brushed out, so that no brush marks are visible, except varnish and enamels which shall be uniformly flowed on. The brushes shall be cleaned and in good condition before application of paint. No work shall be done under conditions that are unsuitable for production of good results.

The undercoating should be nearest to the specified colour of the finishing coat. Ready mixed synthetic enamel paint or fill paint may be used for the undercoat. The undercoat shall be uniform and free of all brush marks.

Undercoats should be completely dry before finishing coat is taken up. For synthetic enamels overnight and for oil paints, a whole day shall be left between undercoat and finishing coat. The undercoat shall then be rubbed with G/240 sand paper and dusted

clean. The finishing coat of approved paint shall then be applied. If the surface is not satisfactory additional finish coats shall be applied at no extra cost. The paints shall be applied with bristle brushes and not horse hair ones.

The manner of taking measurements will be in accordance with IS 1200.

WHITE WASHING WALLS AND CEILINGS:

Lime used shall conform to IS 712. The wash shall be prepared from lime of approved quality.

While wash shall be prepared from fat lime or shell lime slaked on site mixed with just enough water to make a Thick paste and allowed to remain for atleast 7 days before use. At the time of using, the paste shall be diluted with just sufficient water and stirred until the mixture attains the consistency of a thin cream and strained through clean and coarse cloth. Four kgs. of gum dissolved in hot water shall be added to each cu.metre of the lime used. Ultra marine blue shall be added to give required whiteness The number of coats shall be specified in the bill of quantities and shall be applied by using flat brushes or spray pumps, on surface prepared. Before the wash is applied the surface shad be thoroughly cleaned of all dust, dirt, scales, marks and mortar drops. All holes and depressions shall be filled in with cement mortar 1:4 or lime putty. The wash shall be applied with brush with alternate coats of horizontals and verticals. When a coat is being given it shall be ensured that the previous one has dried up complete. Two or more coats of wash (as specified in the schedule of quantities) shall be applied to give uniform finished surface without any patches or cracks and brush marks. It should not come off when rubbed hard with hand. One coat of white wash shall consist of one stroke .from top downwards, another from bottom upwards over the first stroke, and another from left to right before the previous one dries up. The final coat shall be perfectly uniform in appearance and free from brush marks.

COLOUR WASH :

Colour wash shall be prepared by adding mineral colours or approved pigments not affected by lime or light. Colour wash shall be applied as specified under 'white wash'. Approval of the Engineer shall be obtained in regard to exact shade before applying colour wash.

Colour wash shall consist of lime wash composed as described above to which a solution of water and lime fast pigment, boiled if directed, shall be gradually added and stirred until the required tinge is obtained to the Satisfaction of the Engineer.

Surfaces shall be prepared by removing all mortar droppings and other deleterious foreign matter and thoroughly cleaned with wire or fibre brushes to the approval of the Engineer. Holes and/or depressions shall be stopped with mortar and cured prior to colour washing.

Colour wash shall be applied by brush, the first stroke being from the top downwards, the second from the bottom upwards over the first stroke and similarly with strokes from right and left over the first strokes before they dry . This application forms one coat and each coat shall be allowed to dry and shall be subject to inspection by the Engineer before the next coat is applied. W#hen dry surfaces shall not show signs of cracking and present a smooth and uniform finish free from brush marks, not easily executed at the Contractor's own expense

Doors, windows floors, fittings, fixtures and the like shall be protected from splashes, splashing and droppings, if any, being removed and surfaces thoroughly cleaned to the satisfaction of the Engineer

Oil Bound Distemper:

Washable oil bound distemper shall conform to IS 428 and be of approved make and shade and shall be applied only in d ry weather with a broad stiff brush in long parallel strokes.

Priming coats shall be applied to completely dry surfaces as recommended by the manufacturers of patent distempers and approved by the Engineer and allowed to dry thoroughly before the next coat is applied.

Surfaces shall be cleaned and all cracks, holes and surface defects repaired with gypsum and allowed to set hard. All irregularities shall be removed by sand papering smooth and wiped clean and surfaces so prepared shall be completely dry and free from dust before distempering is commenced. In the case of newly plastered surfaces special care shall be taken to ensure that they are completely dry before any application is attempted.

Existing, previously distempered surfaces shall be cleaned of grease, dirt, dust and other deleterious matter and cracks, holes and surface defects repaired with plaster of Paris, allowed to set hard, s and papered smooth and wiped clean. Flaking from previous coatings, if any, shall be thoroughly removed.

Plastic Emulsion Paint:

Plastic emulsion paint shall be of approved make, colour and shade to the satisfaction of the Engineer.

Plastic emulsion paint shall be diluted by the addition of a quantity of water equivalent to half the volume of the paint to be applied. The painting g and water shall be thoroughly mixed and then strained through cloth.

Priming coats, shall be applied to surfaces by brush and allowed to dry properly, holes and depressions being filled with putty prepared with whitening and plastic emulsion paint and rubbed smooth and dry and touched up with plastic emulsion paint.

Subsequent coats, diluted by the addition of a quantity of water equivalent to about 15% to 20% of the volume of paint to be applied shall be applied to surfaces by brush and allowed to dry thoroughly so that no brush marks shall be seen.

Surfaces shall be cleaned and all cracks, holes and surface defects repaired with gypsum and allowed to set hard. All irregularities shall be removed by sand papering smooth and wiped clean and surfaces so prepared shall be completely dry and free from dust before painting is commenced. In the case of newly plastered surfaces special care shall be taken to ensure that they are completely dry before any application.

Existing, previously distempered or painted surfaces shall be cleaned of grease, dirt, dust and other deleterious matter and cracks, holes and surface de fe cts repaired with plaster of Paris, allowed to set hard, sand papered smooth and wiped clean. Flakung from previous coatings, if any, shall be thoroughly removed.

CEMENT PAINT:

The number of coats shall be indicated in the bill of quantities. The surface to be cement painted shall be thoroughly cleaned of dust, dirt, grease, oils marks, cement marks, loose scales,- etc. by the use of a stiff wire brush or by colt rope. The cleaned surface should be wetted with clean water either by spray gun or any other convenient method, to ensure complete absorption. Cement paint shall not be applied on dripping or wet surface. All holes, depressions, cavities, etc. shall be filled in with cement mortar 1:4 or as directed by the Engineer, to render the entire surface smooth and even to receive the paint, at no extra cost. All fungus or organic matters, which may be present, shall be removed by scrapping and sand papering and the surface rendered smooth.

The cement paint shall be prepared in exact conformity and workable consistency as per specifications of the manufacturer. Approval of the Engineer shall be obtained in regard to the exact shade and colour before applying the cement paint. Cement paint shall be applied with good quality flat brush horizontally or vertically to ensure perfect covering. The first coat should be well brushed into the surface to farm a good film appearance. The second or subsequent coats shall be applied carefully to give a good final satisfactory finish and may be applied by brushing or spraying. Each cement paint application should be wetted at the end of the day with a fine water spray. Twentyfour hours after the first coat has been applied, saturate the surface with water and second or subsequent coats can be applied when the surface is damp to touch. Rewater the surface with ample water after 24 hours to ensure perfect setting of the paint film.

Paint shall be applied by brushing, each coat being properly cured and inspected and approved by the Engineer before the application of each subsequent coat.

Absorbent surfaces shall be thoroughly wetted so as to provide even absorption. In dry weather freshly painted surfaces shall be kept damp for at least two days and protected from direct sunlight.

Surfaces shall be free from dirt, dust, grease and other deleterious matter and thoroughly cleaned by brushing and washing down with clean water.

Existing lime wash and/or water bound distemper shall be thoroughly removed by washing, brushing and, if necessary, accumulated coats of oil paint removed by brushing and/or scraping and w ashing to obtain clean and even surfaces.

ENAMEL PAINTING, ACRYLIC EMULSION ETC:

Ready mixed oil paint, acrylic emulsion paint, ready mixed synthetic enamel paint, Aluminum paint, etc. shall be brought in original containers and in sealed tins. If for any reason thinner is necessary the brand and quantity of thinner recommended by the manufacturer or as instructed by the Engineer shall be used.

Materials shall be properly stored and protected when not in use with the lids of containers kept tightly closed. Paint in open containers during painting operations shall be covered with a thin layer of turpentine to prevent the formation of skin on the surface.

If required by the Engineer paint supplied by the Contractor shall be quality tested in an approved laboratory as described in IS 101. Rejected paint shall be removed immediately from Site.

Unless Otherwise specified , paint may be applied by brush or spray. Brushes of appropriate size shall be either round or oval shaped and shall be maintained carefully throughout the work so as to be pliable and free from loose bristles. All brushes, rollers, implements and the like used for painting shall be cleaned of all foreign matter prior to beginning different operations.

Contents of drums and tins shall be well stirred before use and constantly during operations with a small, clean and smooth stick to prevent s edimentation at the bottom of containers.
Painting shall be carried out, as far as possible, in dry, warm weather.

Primer coats shall be applied as soon as surfaces have been cleaned and before the deterioration of surfaces by rust and/or contamination by dust, dirt or any other deleterious material. Sufficient time shall be allowed for one coat of paint to dry before the next is applied.

Painted surfaces shall be protected from sun, rain, condensation, contamination or other surface damage until they are completely dry, “Wet Paint” boards being placed where necessary.

Surface preparation, the application of priming coats, undercoats and finishing coats shall be carried out as specified below or as recommended by the manufacturer.

New plaster shall be carefully rubbed smooth and thoroughly cleaned with fresh water to leave dry and smooth surfaces free from dirt. Surfaces shall not be primed or painted until they are completely dry and hard and have been approved by the Engineer.

Steel surfaces shall be degreased using proprietary brand solvent cleaners approved by the Engineer or mineral turpentine or petroleum and other petroleum solvents, such as tri-chloro-ethylene or other equal and approved alkalu solutions or detergents.

De-rusting of steel surfaces shall be done by manual scraping using wire brushes, fine steel-wool, sand paper and the like, mechanically by sand blasting, shot blasting or by flame cleaning or chemical cleaning by methods approved by the Engineer.

Oil paint shall not be applied to woodwork that is not well seasoned. Surfaces of woodwork to be painted shall be thoroughly dry, clean and smooth and prepared by using coarse and medium grade sandpaper with finished surfaces free from s

The surface shall be prepared as specified above and a coat of approved primer shall be applied. After 24 hours drying, specified quality paint shall be applied evenly and smoothly. If required a filler putty coating may be given to give smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned of dust before the next coat is applied. Number of coats shall be as specified in the item and if however the finish of the surface is no. uniform additional coats as required shall be applied to get good and uniform finish at no extra cost. After completion no hair marks from me brush or clogging of paint puddles in the corners of panel angles of moldings shall be left on the work. The glass panes floor etc., shall be cleaned of stains.

When the tile final coat is applied, if directed, the surface shall be rolled with a roller or if directed it shall be stippled with a stippling brush.

DUCO PAINT:

Wooden or metal surfaces shall be thoroughly cleaned. Initial metal putty work shall be carried out to cover knots, dents, etc.. Two coats of ‘Duco’ paint is sprayed of approved make & colour over one coat of primer on wooden & metal surfaces. On no account putty is to be used before priming coat.

Primers & Final painting to be used shall be according to the manufacturer's specification

APEX COAT:

All walls shall be cleaned for dirt, cement slurry, etc using wire brush. The surface is washed with water. Necessary surface cracks are filled with crack fillers of approved make. Two coats of Apex paint shall be applied over one coat of primer with brush, as per manufacturer's specification

COLOURLESS LACQUER POLISH

Nitro cellulose lacquer polish of approved brand manufacture and finish shall be used.

PREPARATION OF SURFACE

The surface shall be cleaned and all unevenness shall be rubbed down smooth with suitable grade sand paper and well dusted. Knots if visible shall be made good as per the direction of the architects. Holes and indentation on the surface shall be stopped with glaziers putty. The surface then shall be given a coat of ready made ragging wood filler and allowed to dry for maximum 4 hours. The surface again shall be rubbed down perfectly smooth with suitable emery paper and wiped clean. Thereafter a finishing touch up with ragging wood filler is to be given and allowed to dry. To receive the polishing the surface is again rubbed down smooth.

APPLICATION

Nitro cellulose sealer coat of approved manufacturer shall be applied strictly as per the manufacturers specification. The polish shall be applied with a sprayer at suitable pressure and viscosity as recommended by the manufacturer, and allowed to dry for 4 to 6 hour and rubbed down with suitable grade emery. The surface shall be again sprayed with 3 coats of NC lacquer (3 wet on wet coat). Finally, the surface shall be given wax polishing by using rubbing compound.

FRENCH POLISHING

All unevenness shall be rubbed down to smoothness with sand paper and the surface shall be well dusted. The pores in the wood shall be filled up with filler made of a paste whiting in water on ethylated spirit (with a suitable pigment like burnt sienna or umber, if required), otherwise the French polish will get absorbed and a good gloss will be difficult to obtain.

APPLICATION OF POLISH

A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with polish and rubbed hard on the surface on a series of overlapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil on the face of the pad may be added which shall facilitate

this operation. The surface shall be allowed to dry and the remaining coats applied the same way. To finish off the pad shall be covered with a fresh piece fine cloth, slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall present a uniform texture and high gloss.

WAX POLISH

Wax polish shall either be prepared on site or obtained readymade from market. Polish made on the site shall be prepared from a mixture of pure bees wax from paraffin or stearine adulterates, linseed oil, turpentine oil and varnish in the proportion of 2:1.5:1:.5 by weight. Bees wax and boiled linseed oil shall be heated over a slow fire. When the wax is completely dissolved the mixture shall be cooled till it is just warm and turpentine oil and varnish added to it in the required proportion and the entire mixture is well stirred.

Surface shall be cleaned. All unevenness shall be rubbed down with sandpaper and well dusted. Holes and indentation of surface shall be filled with putty made of whiting and linseed oil. Surface shall be given a coat/filler made of 2.25kgs of whiting in 1.5 liters of methylated spirit. When it dries, surface shall again be rubbed down perfectly smooth with sandpaper and wiped clean.

APPLICATION OF BEES WAX OR WAX POLISH

The polish shall be applied evenly with a clean soft pad of cotton cloth in such a way that the surface is completely and fully covered. The surface is then rubbed continuously for half an hour. After well rubbing in one coat of wax polish, the work shall be covered with dust proof sheet (cloth for preventing dust falling on the work). Subsequent coat shall be applied after the surface is quite dry and shall be rubbed off with soft flannel until the surface has assumed an uniform gloss and in dry, showing no sign of sickness. The final polish depends largely on the amount of rubbing which shall be continuous and with uniform pressure, with frequent changes in the direction.

MELAMINE POLISH:

The surface shall be cleaned and all unevenness shall be rubbed down smooth with suitable grade sand paper and well dusted. Knots if visible shall be made good as per the direction of the architects. Holes and indentation on the surface shall be stopped.

Application of polish as per manufacturers specification is executed. Two coats uniform spray of melamine spread evenly on a surface is to be applied.

MODE OF MEASUREMENTS:

The method of measurement for various items in the tender shall be generally in accordance wit e IS: 1200 subject to the following :

The following multiplying tractor for obtaining equivalent areas shall be adopted.

Sl. No.	Description of work (1)	How Measured (2)	Multiplying Factor (3)
1	Panelled, or framed and braced or edged and battened and braced joinery	Measured flat (not girthed), including CHOWKAT or frame. Edges, chocks, cleats, etc., shall deemed to be included in the item.	1.30 (for each side)
2	Flush joinery	Measured flat (not girthed) including CHOWKAT or Frame. Edges, chocks, cleats, etc., shall be deemed to be included in the item.	1.20 (for each sided)
3	Fully glazed or gauzed joinery	Measured flat (not girthed), including CHOWKAT or frame. Edges, chocks, cleats, etch shall be deemed to be included in the item.	0.80 (for each side)
4	Partly Panelled and Partly glazed or gauzed joinery	Measured flat (not girthed), Including CHOWKAT or frame. Edges, chocks, cleats, etc., shall be deemed to be included in the item.	1.00 (for each side)
5	Fully venetioned or loured joinery of gauzed joinery	Measured pat (not girined); Including CHOWKAT or frame. Edges, chocks, cleats etc., shall be deemed to be included in the item.	1.80 (for each side)
6	Weather boarding	Measured flat (not girthed), supporting framework shall not be measured separately.	1.20 (for each side)
7	Wood shingle roofing	Measured flat (not girthed)	1.10(for each side)
8	Boarding with cover fillets and match boarding	Measured flat (not girthed	1.05(for each side)
9	Tile and slate battening	Measured flat(not all)no deduction	0.80(for

		shall be made for open spaces.	painting all over)
10	Trellis (or JAFRI work) one-way or two-way	Measured flat overall; no deduction shall be made for open spaces; supporting members shall not be measured separately.	2.00(for painting all over)
11	Guard bars, balustrades, gates, gratings, grills expanded metal and railings.	Measured flat overall; no deduction shall be made for open spaces; supporting members shall not be measured separately.	1.00(for painting all over)
12	Gates, and open palisade fencing including standards, braces, rails, stays, etc.	Measured flat over all, no deduction shall be made for open spaces; supporting members shall not be measured separately.	1.00(for painting all over)
13	Carved or enriched work	Measured flat	2.00(for each side)
14	Steel roller shutters	Measured fiat Size of opening) Overall Jamb guides bottom rails and locking arrangement, etc. shall be included in the item (top cover shall be measured separately).	1.10(for each side)
15	Plain sheet steel doors and windows.	Measured flat(not girthed)including frame, edges, etc.	1.10 (for each side)
16	Fully glazed or gauzed steel doors and windows	Measured flat (not girthed)including frame, edges, etc.	0.50(for each side)
17.	Party Panelled and Party glazed or gauzed steel doors.	Measured flat(not girthed)including frame, edges, etc.	0.80(for each side)
18.	Collapsible gate	Measured Flaat (size of opening)	1.50(for painting all over)

NOTE:

The height shall be taken from the bottom of the lowest rail, if the palisades do not go below it for from the lower end of palisades, if they project below the lowest rail) upto the top of palisades, but not up to the top of the standards, ~ they are higher than the palisades. Similarly for gates depth of roller shall not be considered while measuring the height.

WATERPROOFING WORK

SCOPE:

It is the intent of this specification to secure completely waterproof terraces, roofs, toilets, basement, etc. guaranteed for at least 10 (ten) years against leakage, dampness, seepage and other defects. The contractor shall provide all materials, labour, plant, equipment, incidentals and everything necessary for securing a fully waterproof job as called for above.

General

All waterproofing works shall be carried out by specialist agencies approved by the architect. Installation and materials shall be as per best practices for obtaining waterproof work and as recommended by the manufacturer.

Waterproofing work shall be commenced only after the surface is prepared, cleaned free of dirt, dust and foreign materials, inspected and approved. Compressed air shall be used for effective cleaning of all surfaces, where so called for. Unless instructed otherwise preparatory work shall be carried out as laid down in IS: 3067-1988. Fillets, rounding off etc. shall be carried out wherever required, as laid down in IS: 3067.

Waterproofing to toilets, water tanks, water storage tanks, etc.

Toilets in upper floor shall be rendered waterproof by the application of waterproof plaster or other treatment as approved by the architect, to the manufacturer's specifications. The application details, briefly stated, are as follows (each coat minimum 15mm): -

Waterproof plaster application: Toilet and tank floors and sides of walls shall be rendered waterproof by the application of waterproof plaster consisting of:

Grouting with cement slurry shall be resorted to wherever honeycombing in concrete is noticed. This shall be part of the treatment.

First coat (1 cement: 3 clean sand and conplast 4211C by Rofee or Equivalent.)
Second coat (1cement: 3 clean sand and conplast 4211c or approved equivalent).

The treatment shall be applied to the prepared surface of RCC slab and surrounding vertical surface after preparation of the surface by brushing, cleaning, etc. The treatment shall be carried out by specialist agency generally according to above specifications and their own specifications and shall carry a guarantee for 10 (ten) years against leakage, seepage, dampness, etc.

The treated areas shall be tested by allowing water to stand on the areas to a depth of 150mm for at least 72 hours. Any leakage or defects observed shall be thoroughly examined and rectified, tested again till acceptance by the architect.

The treatment shall carry a guarantee for 10 (ten) years against leakage, seepage, dampness, etc. and the guarantee furnished in approved format.

Terrace and Roof waterproofing

Treatment to terraces and roof slabs, shall be integral cement based waterproofing treatment with brick bat coba laid to approved slopes and finished as approved. The treatment shall be taken over vertical surfaces and finished appropriately. The work shall be carried out by approved professional agency. The average thickness of the waterproof treatment layer shall not be less than 100mm.

The treatment shall broadly consist of:

- RCC surface to be cleaned, brushed and watered.
- Cement slurry with waterproofing compound to be applied over the cleaned surface.
- Brickbats placed over above to required gradient.
- Joints in above grouted with waterproofing cement mortar 1:2.
- Surface finished with waterproof plaster.
- Impression markings on above where called for.
- Treatment to be taken to at least 400mm on vertical faces.
- Ponding to at least 150mm depth for at least 3 days to check for leakage, seepage, etc.

The treatment shall be carried out in the best professional manner after preparing the surfaces in appropriate manner and after ensuring that gradients as called for and as required for the proper drainage of the roof/terrace slabs are available or will be provided by the contractor. It shall be the responsibility of the contractor to check, verify and ensure that the slopes are in the right direction and adequate. If the treatment requires that the slope has to be formed by the agencies other than the specialist waterproofing contractor, the contractor shall bring the same to the notice of the Architect at the time of tendering.

Rainwater inlets, protruding pipes ad other obstructions shall be properly treated to ensure that the leakage/seepage does not take place at these or similar locations. The treatment shall be carried over vertical faces and terminated in a proper manner so that there is no ingress of water at any point.

Preparatory work, protective work and any other related work should be clearly spelt out by the contractor along with the cost implication, if any.

Treated surfaces shall be tested for water tightness by the ponding method. At least 150mm of water shall be allowed to stand over the treated surfaces for 72 hours and observation made for signs of leakage, seepage, dampness, etc.

The treatment shall be guaranteed against defects such as leakage, seepage, dampness, sweating, etc. for a period of 10 (ten) years.

Box method waterproofing (with cuddapah slab)

A. BASEMENT FLOOR

Sub base shall be cleaned for all debris and dust, which might be present over the sub base (PCC 1:3:6)

Cement slurry mixed with waterproofing admixture as per manufacturer's specification approved by consultants shall be spread evenly over PCC 1:3:6 base, which penetrates into lean concrete and fills porous areas.

Waterproof plaster in CM 1:3 (1 cement: 3 coarse sand) of 20mm thick shall be laid over the prepared surface. Stone chips (12mm and down size) shall be embedded in the mortar.

Rough finished low porosity stone slabs of 15 to 20mm thick and 450 x 450mm in size (kota, Kaddapa, shahbad, tandur) shall be laid over 15mm thick waterproof cement mortar, with a gap of about 15mm provided between the stone slabs.

The joints between the stone slabs shall be raked, cleaned and filled with waterproof cement grouting.

A protective layer of 20mm thick waterproof plaster in cement mortar 1:3 shall be laid over the stone slabs and shall be finished smooth with rounding of edges, etc. complete.

B. SIDE WALLS

Rough finished low porosity stone slabs of 15-20mm thick and 450 x 450mm in size shall be fixed with the help of cement paste (mixed with waterproof admixture) applied on the internal face to stone slabs.

A gap of 5-6 mm shall be provided between RCC wall and stone slabs. The stone slabs shall be fixed side by side without leaving any gap between the edges.

A groove shall be made in the top layer of Base treatment in order to fix the bottom most layer of stones to ensure the water tightness at the junction of the walls and raft.

Waterproof plastering of 15mm thick in cement mortar 1:3 shall be done over the external face of rough stones with rounding of edges.

The gap between the wall and stone slab layer shall be filled with waterproof cement grout, which on relation forms and impermeable monolithic layer. The treatment is continued 300mm above G.L or as specified.

Note:

Applicable to side walls of underground sump, underground structure, trenches and retaining wall. In the case of underground sump interior surface of walls shall be treated.

GUARANTEE

Guarantee for watertight performance of the structure for a minimum period of 10 years from the date of completion shall be given in the prescribed form given below. This guarantee shall be in legal paper in an acceptable form. The guarantee shall be enforceable by the Owner. If, during the guarantee period, water leaks are noticed in the structure from the portions treated by the Contractor, the same shall be rectified when called upon immediately, aft at no extra cost to the entire satisfaction of the Owner.

MODE-OF MEASUREMENT

Base Slab

On PCC levelling course : Measurements shall be in square metre for the areas actually treated.

Injection Treatment: Measurements shall be in square metre for the plan areas actually treated for aft thickness / depths.

Side Walls

Injection Treatment: Measurements shall be in square metro for the area actually treated for aft thickness.

Surface treatment shall be measured in square metro for the areas actually treated.

Cover Slab

Injection Treatment : Measurements shall be in square were for the plan area actually treated for aft thickness.

Surface Treatment: Measurements shall be in square metro for the areas actually treated.

PROFORMA OF GUARANTEE CERTIFICATE

WATER PROOFING WORK

Name of the Firm/Company at its address

Dear Sirs

Water proofing work to ..... – Free maintenance guarantee for 10(Ten) years - Reg.

Agreement No..... dated …….

Free maintenance guarantee for 10 We hereby certify that proofing to .....has been executed and completed by us as per specification and in accordance with terms and conditions of contract.

We hereby guarantee that the water proofing treatment green by us to ..... shall be safe against any leakage, forming wet patches, dampness etc. for a period of 10 (ten) years from the date of virtual completion of whole work, from .....to

If at any time or times during the guaranteed period of 10 (Ten) years the underground structure lift pit, trenches, roofs, moris, toilets, water tanks and other portion thus treated by us starts leaking or in any way give way to the influence of water including forming wet patches, dampness etc. due to the inadequacy of the work carried out or due to any other reason whatsoever relating to the specification, workmanship etc. including the responsibility for any surface treatment and plumbing etc. we agree to carry out necessary remedial measures to such extent and so often as may be necessary to free' the said premises from leakage etc without any extra cost to the Owner or to the occupants.

The question of whether there is any leakage or the treatment has given way to water or moisture after the date of virtual completion of whole work i.e. from .....to ..... shall be decided by the Owner and the decision of the Owner in this regard shall be final and binding on us. We shall reinstate the surface to its original condition after carrying out the rectification work, if necessary by bringing new materials at no extra cost to the Owner.

Signature of Contractor :

Name of Company :

Address :

Seal :

ROADWORKS AND PAVINGS :

Scope:

This specification describes the general requirements of road works and paving on projects.

Applicable Codes:

The latest revision of the following Indian Standards and Codes, unless otherwise specified, shall be applicable to all road works and paving:

Sr. No.	BIS Code No.	Part	Title
1	73		Specification for preparing bitumen and for paving bitumen
2	215		Specification for road tar.
3	217		Specification for cutback bitumen
4	454		Specification for Digboi type cuttabck bitumen
5	1498		Classification and identification of soils for general engineering purposes.
6	1834		Specification for hot applied sealing compounds for joints in concrete
7	1838		Specification for preformed filler for expansion test in concrete, pavement and structural non-extruding and resilient type.
8	2720	1	Method of test for soils.
9	2720	2	Determination of water content dry density relation using light compaction
10	IRC 10		Recommended practice for 2 cm thick bitumen and tar carpets.
11	IRC 14		Recommended practice 2 cm thick bitumen and tar carpets.
12	IRC 15		Standard specification and code of practice for construction of concrete roads
13	IRC 17		Tentative specification for single coat bituminous surface dressing.
14	IRC 19		Standard specification and code of practice for Water Bound Macadam.
15	IRC 27		Tentative specification for Bituminous Macadam.
16	IRC 29		Tentative specification for 4 cm asphaltic concrete surface course.
17	IRC 36		Recommended practice for the construction of earth embankments for road works.

Site Clearance:

Land required for roadways, payments, paths, car parks, gutters, storm drains, side slopes, embankments and the like shall be cleared of all trees having a girth of 300mm and less, brushwood, loose stones, vegetation, bushes, stumps and all other similar materials. Three roots and stumps shall be grubbed out and removed to a depth of approximately 500mm below the finished surfaces.

Useful materials as designated by the Engineer shall be removed and neatly stacked by the Contractor at his own cost and disposed of for use by the Employer as directed by the Engineer.

Setting Out:

Following clearance of the Site the alignment of the roads, paving and other works shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer.

The Contractor shall be responsible for establishing and marinating all Bench Marks, profiles, alignments, stakes and markers as long as they are required for the work in the opinion of the Engineer.

Levels and sections of the work shall be taken and recorded jointly by the Engineer and the Contractor before any excavation and/or filling work is commenced.

Excavation and Construction:

The Contractor shall refer earthwork section for items in relation to excavation and earthwork, which shall apply equally to the work under this Clause

Temporary profiles of the work sections, including gutters and drains, shall be installed at suitable intervals as directed by the Engineer.

Excavation shall be done neatly, smoothly and evenly to the correct lines, curves, grades, sections and side slopes as shown on the drawings or as directed by the Engineer. The Engineer may require measurement ridges and dead-men to be left at specified intervals to check measurements.

The Contractor shall not be paid for excavation below specified levels or outside sections. The Contractor shall fill up at his own cost such extra excavation with approved materials in layers 150mm to 200mm thick well watered and fully compacted to the same density as the sub-grade. Sub-grades, if loose, shall be scarified, watered and properly compacted to the satisfaction of the Engineer.

The Contractor shall provide at his own cost adequate temporary drainage for the removal of seepage and other water from the excavations. Springs, sewers, irrigation channels, service lines, cables and carefully made good by the Contractor at his own cost.

Preparation of Sub-grades :

Sub-grades for all paved surfaces shall be prepared as follows :

150mm thick layers of consolidated, stabilized soil shall be rolled with an 8 to 10 tonne capacity rollers to the required grades, camber and sections. Soil for this purpose shall be sued either from excavated materials on Site or brought from approved outside sources as directed by the Engineer and mixed with approved quality lime in the proportion of 5% (five percent) by weight. Stabilized soils shall have CBR 4. The proportion of lime may vary according to actual site conditions to achieve the required CBR and to the entire satisfaction of the Engineer at no additional cost.

On stabilized soils, a layer of good quality muroom shall be spread and rolled with an 8 to 10 tonne capacity roller to a compacted thickness of 230 mm and with a Proctor Density of 95% or a dry density of 1.4 gm/cm, whichever is the higher, all to the satisfaction of the Engineer.

In certain cases, subsoil conditions and/or to achieve levels a layer of boulders of required thickness may have to be provided below the stabilized soil layer, properly packed and rolled with an 8 to 10 tone capacity roller as directed by and to the satisfaction of the Engineer.

Soling :

The Contractor shall provide samples and information regarding the sources and quality of materials for soling for approval by the Engineer. Materials brought on to the Site shall conform strictly to the approved samples and be obtained only from the approved sources.

Rubble stones shall be hard, tough, sound, durable, dense, clean, of course texture, free from unsound material, cracks, decay and weathering. Water absorption shall be as low as possible, but no more than 5% (five percent). Rubble stones shall be flat bedded and the smallest size shall be equal to the specified thickness of soling. Lengths and breadths shall not exceed twice the thickness.

If material is found to be of inferior quality or of a size less then that specified, the same may be rejected or accepted by the Engineer, at his discretion, at a reduced rate, if found to be fit for the purpose.

The Contractor shall be solely responsible for any and all tonnage, royalties, rent and other payments or compensation, if any, for getting stone, gravel or other materials required for the work. No claims on account of any obstruction caused in the collection of materials or difficulties or actions arising out of quarrying on either Government or private land shall be entertained by the Employer. Quarrying shall

be done only form sound portions of approved quarries, disintegrated and weathered material being unacceptable.

Rubble shall be stacked uniformly at the Site in regular piles of approximately 6m x 3m x 1m unless otherwise specified by the Engineer. All leads and lifts for transporting rubble to the area to be surfaced are deemed to be included in the quoted rates.

Rubble shall be stacked on even ground clear of the areas to be surfaced and as far as possible beyond the side widths and side drains. In the absence of even ground ruble shall be stacked on a platform prepared by the Contractor at his own cost. Widths of stacks may be rejected by the Engineer if there is a shortage of space on the Site

Dry Rubble Pitching :

Dry rubble stone pitching 230mm thick pointed with cement mortar (1:1) shall be used for banks.

Rubble stones for pitching shall be sound, hard and durable and fairly regular in shape, the depth of the stones shall be approximately equal to the specifie3d thickness of pitching and each stone shall generally be not less than 0.01 cubic meter or as directed by the Engineer. Smaller size stones shall only be brought to Site or the purpose of packing and wedging.

Slopes of banks shall be made up with muroom and trimmed to the required slopes and properly compacted. Temporary profiles shall be installed with pegs and strings at required intervals for the pitching to ensure that It executed true to line, curves, levels, thickness and slopes.

If necessary masonry walls shall be provided at the top to support the pitching. Pitching shall be commenced at the bottom of the bank and laid course by course up the slope. Stones shall be laid closely in position on the prepared bed and firmly set with the even face at the top.

Pitching shall be laid to lines, levels, curves and slope as indicated on the drawings or as directed by the Engineer. Each stone shall cover the full depth of pitching and shall be perpendicular to the sloping bed. Stones shall be laid with breaking joints as far as possible. Additional muroom bedding, if required for proper slopes, shall be carried out simultaneously, watered and rammed. Inter-sections in joints between stones shall be filled with spalls of the proper size and wedged in with hammers to ensure tight packing.

Rolling :

Unless otherwise directed by the Engineer sub-grades for roads and paved areas shall be rolled with power rollers weighting not less than 10 (ten) tones. Rolling shall progress in parallel lines from the edges to the centre of areas to be compacted, lapping uniformly each preceding rear wheel track by at least

half the width of the track. During and after rolling the Contractor shall check the surfaces fro grade and camber.

Mechanical hand rollers for restricted areas and steep slopes shall weigh not less than half a tonne and the working methods and operatives shall be subjected to the approval of the Engineer.

Traffic :

The Contractor shall provide and maintain at his own cost as necessary or as directed by the Engineer diversions and barricades. Traffic signals or flagmen, if required for the safety and convenience of the public and to maintain access, use or occupation of public and private roads and footpaths, shall be provided day and night for the duration of the work.

One Layer Metal Packing :

The Contractor shall provide samples and information regarding the sources and quality of over size metal for approval by the Engineer. Materials brought on to the Site shall conform strictly to the approved samples and be obtained only from the approved sources.

Material found to be of inferior quality or of a size less than approved samples may be rejected or accepted by the Engineer, at his discretion, at reduced rates if, in the opinion of the Engineer, it would be fit for the purpose.

The Contractor shall be solely responsible for any and all tonnage, royalties, rent and other payments or compensation, if any, for getting stone, gravel or other materials required for the work. No claims on account of any obstruction caused in the collection of materials or difficulties or actions arising out of quarrying on either Government or private land shall be entertained by the Employer. Quarrying shall be done only from sound portions of approved quarries, disintegrated and weathered material being unacceptable.

60mm metal shall be hard, tough, sound durable, dense, clean, of course texture, free from unsound material, cracks, decay and weathering. Water absorption shall be as low as possible, but no more than 5% (five percent).

Over size metal shall be flat bedded and the smallest size shall be equal to the specified thickness of the relevant layer. Lengths and breadths of metal should generally not exceed twice the thickness.

The Contractor shall clear off areas to be surfaced in accordance with this Specification and carry out all trimming or filling to lines, curves, grades and sections. All filling shall be well watered and compacted to obtain maximum consolidation. Cambers, grads and elevations of sub-grades shall conform to the finished surfaces as shown on the drawings or directed by the Engineer and camber boards shall be used to ensure the required sections.

60mm metal shall be roughly spread over prepared bases to an initial total thickness of 115mm. Layers shall then be rolled and compacted by a 10 tonne capacity power roller until the compacted layer does not exceed 80mm.

Rolling shall start from edges of areas to be surfaced and proceeded towards the crown in longitudinal strips `overlapping on successive strips by at least one half the width of the rear wheel of the roller.

The operation shall continue until no visible settlement of the metal or movement under the roller is observed. Gradients and cambers shall be checked from time to time by means of level, stakes, strings and cambers. Depressions or humps shall be corrected by completely removing and relaying the metal layer and rolling the same satisfactorily until refusal.

After dry rolling is completed, grit, stone dust and sand shall be spread. Moderate sprinkling of water and rolling shall be continued and stone dust shall again be spread, if required, until all the voids are completely filled and the movement of metal under the wheel ceases. If there is excess powder the same shall be removed lightly by brooms.

Surfaces shall be checked for camber and unevenness or undulations shall be rectified as required. Surfaces shall be then watered, extra power added, if required, brushed and rolled to obtain a mosaic surface. This surface shall be maintained until an upper coating is laid.

The rate of spreading grit, sand and dust shall not be less than 3 cubic meters to 4.60 cubic meters per square metre. The first layer of grit, sand or stone dust shall not be spread over a wet or watered metal layer.

Junctions of existing and new surfaces shall be diagonal on plan and shall be in accordance with the corresponding course levels of the existing surfaces. Each layer shall be laid and rolled true to grade and section and checked by bonding rods and template boards. Gravel or hard muroom shall be spread evenly over the rolled second layer and further rolled with a power roller weighing not less than 10 tonnes as specified here above.

Two Layer Metal Packing :

The Contractor shall provide samples and information regarding the sources and quality of over size metal for approval by the Engineer. Materials brought on to the Site shall conform strictly to the approved samples and be obtained only from the approved sources.

Material found to be of inferior quality or of a size less then approved samples may be rejected or accepted by the Engineer, at his discretion, at reduced rates if, in the opinion of the Engineer, it would be fit for the purpose.

The Contractor shall be solely responsible for nay and all tonnage, royalties, rent and other payments or compensation, if any, for geeing stone, gravel or other

materials required for the work. No claims on account of any obstruction caused in the collection of materials or difficulties or actions arising out of quarrying on either Government or private land shall be entertained by the Employer. Quarrying shall be done only from sound portions of approved quarries, disintegrated and weathered material being unacceptable.

Over size metal between 75mm and 100mm shall be hard, tough, sound, durable, dense, clean, of course texture, free from unsound material, cracks, decay and weathering. Water absorption shall be as low as possible, but no more than 5% (Five Percent).

Over size metal shall be flat bedded and the smallest size shall be equal to the specified thickness of the relevant layer. Lengths and breadths of metal should generally not exceed twice the thickness.

The Contractor shall clear off areas to be surfaced in accordance with this Specification and carry out all trimming or filling to lines, curves, grades and section. All filling shall be well watered and compacted to obtain maximum consolidation. Cambers, grades and elevations of sub-grades shall conform to the finished surfaces as shown on the drawings or directed by the Engineer and camber boards shall be used to ensure the required sections.

150mm thick layers of metal packing shall be laid and rolled to a consolidated thickness of 100mm. The final consolidated thickness of 200mm shall be executed in two layers only.

Junctions of existing and new surfaces shall be diagonal on plan and shall be in accordance with the corresponding course levels of the existing surfaces. Each layer shall be laid and rolled true to grade and section and checked by bonding rods and template boards. Gravel or hard muroom shall be spread evenly over the rolled second layer and further rolled with a power roller weighing not less than 10 tonnes as specified here above.

Stone Metal For Macadam:

Rubble for breaking into metal shall be obtained from approved quarries and shall be hard, durable, tough, sound, clean, dense, close grained and free from soft decayed and weathered portions. Disintegrated stones or stones with skin will not be accepted.

Rubble shall be broken or crushed into pieces small enough to pass through a square mesh of approximately 65 mm in size, all pieces being retained on a square mesh of approximately 40mm in size. No more than 20% (twenty percent) of any sample shall have its greatest dimension exceeding 75mm. metal shall be roughly cube-shaped and more or less of uniform size with sharp edges for proper interlocking. Rounded, flaky, thin and elongated material will not be accepted.

Metal may be stacked in piles approximately 5m x 2m x 0.5m in size or as directed by the Engineer. Metal shall be conveyed from stacks for spreading on to prepared

surfaces and evenly spread true to line, grade and section to provide the requisite thickness of crust. Metal once spread shall be checked with camber boards and the line for the camber and grade at intervals of 8 (Eight) metres. Bunds of muroom shall be provided at the edges of areas to be surfaced to prevent the dissemination of metal.

Water Bound Macadam :

Water bound macadam shall consist of clean aggregates interlocked by rolling and bonded together with binding material where necessary and water laid on prepared sub-grades, bases or existing paved surfaces and finished as described here below in conformity with the lines, grades and cross-sections shown on the drawings or otherwise directed by the Engineer.

Surfaces shall be opened to traffic after the macadam has set but not earlier than 24 (twenty four) hours after completion of the final rolling. Watering shall be done in patches, where necessary, for 2 (two) to 3 (three) days after opening to traffic. For one week after traffic is allowed to run on surfaces it shall be distributed over the full width by blinding with gravel or by other acceptable means by tracks that may be forming in the surface.

After the expiry of the stipulated Defects Liability Period or following one Monsoon, whichever is the later, any settlement of the surfaces shall be made good with an additional layer of water bound macadam to bring it to the required final level to the entire satisfaction of the Employee/Engineer.

Hard Muroom :

Hard muroom shall be freshly quarried, disintegrated trap or granite and shall be sufficiently hard and free from soft murrom, earth, organic matter or other deleterious soft material.

The Contractor shall provide samples and information regarding the sources and quality of hard muroom for approval by the Engineer. Materials brought on to the Site shall conform strictly to the approved samples and be obtained only from the approved sources.

Muroom shall be stacked in piles as for stone metal, conveyed from stacks and spread evenly over the fully completed metal layer to the specified thickness and as directed by the Engineer.

Metalled surface shall be rolled with a power roller weighing not less than 10 tonnes, first dry to refusal, again after watering and also after the spreading of muroom blindage. Rolling shall be executed as specified hereabove.