STATE BANK OF INDIA

CRM CAMPUS-II

ADMINISTRATIVE OFFICE -4 (NCR HARYANA),
PLOT NO.79, SECTOR-18, GURUGRAM-122015

E-TENDER FOR CIVIL WORKS,
FOR PROPOSED ROAD AT CRM CAMPUS-II GURUGRAM

TENDER ID: DEL/AO4/ 2024-25/1

Architect:

T H E G R I D
Architects and Interior Designers
E-326, Greater Kailash-II
New Delhi- 110 048
Ph: 29221089,
+9111 40569525

E- TENDER FOR CIVIL WORKS FOR PROPOSED ROAD AT CRM CAMPUS-II GURUGRAM

CONTRACTOR NAME **:** _____

ADDRESS **:**

CONTACT NO. **:**

DATE OF ISSUE **:** _____

LAST DATE OF SUBMISSION **:** **3:00 PM, 06.06.2024**

CHIEF MANAGER (HR)
State Bank Of India, CRM CAMPUS-II
AO. OFFICE-4 GURUGRAM

DATE OF OPENING **: 3:30 PM, 06.06.2024**

CHIEF MANAGER (HR)
State Bank Of India, CRM CAMPUS-II
AO. OFFICE-4 GURUGRAM

NOTE: - RATE TO BE WRITEN IN FIGURE AND WORDS BOTH

ARCHITECTS:

THE GRID
e-326,greater kailash-II,
new delhi- 110 048.
ph: 29221089, 2922 1090

Contractor's Signature & Stamp

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Online tenders are invited from State Bank of India from empanelled Contractors for the **CIVIL WORKS Category 15 to 25 Lacs and above** , FOR ROAD AT CRM CAMPUS -II GURUGRAM

Details of Tenders are as under:

1.	Name of Work	:	**CIVIL WORKS,** FOR ROAD CONSTRUCTION AT CRM CAMPUS –II, SECTOR 18, GURUGRAM
2.	Earnest Money Deposit	:	***Rs.15,000/- (Rupees Fifteen Thousand)*** *by crossed Bank Draft / Banker's Cheque drawn in favour of* ***State Bank of India, GURUGRAM.***
3.	Security Deposit	:	For the successful bidder, total security deposit shall be 5% of the contract value. Out of this, 2% of the contract value will be in the form of initial security deposit, including EMD. Balance 3% shall be deducted from the running account bill/s of the work @ 10% of respective running account bill i.e. deduction from each running bill account will be 10%, till the 3% of the contract value is reached and total 5%.
4	Date of Issue of Tender	:	*Tender documents can be downloaded from* **Bank's web site: http://www.sbi.co.in.**
5	Date of pre bid meeting	:	***N/A***
6	*Online submission of indicative price bid on the web site.(Online Bid) "https://sbi.abcprocure.com "*	:	
7	*Online a reverse auction on website: https://sbi.abcprocure.com (only to the bidders who have submitted (EMD))*	:	*NIL*
8	Time allowed for completion	:	***1 Month (Including Rainy Seasons)*** *from 7 days of Work order or date of handing over of the site which ever is earlier.*
9	Contents of the tender		*-Notice inviting tender* *-General rules & instructions for the guidance of tenderer.* *-General conditions of the contract* **-Technical specifications.**

Contractor's Signature & Stamp

10	Submission of tender in online mode	:	*On-line submission (Technical and commercial) Web Portal- https://sbi.abcprocure.com* *Agency for arranging online bidding (submitting of Technical and price bid)* ***e-Procurement Technologies Ltd.*** *Mr. Parth Joshi* *Ph. No. 079- 40230801/802/803* *parth.joshi@auctiontiger.net* *Vendors are requested to contact the agency for completion of all the business Formalities at the earliest.* *Bidders must have valid Signing & Encryption Digital Signature Certificate in name of their Organization for online submission of the tender..*
			The tender shall be liable for rejection if any of the above requirements are not complied with. The bank reserves the right to reject any or all tenders without assigning any reasons whatsoever.
11	*Defects Liability Period*		11 Month from the completion of the works.
12	*Value of Interim Certificate*		**Rs.5 lakhs.**
13	*Liquidated Damages*		*0.5% per week of delay, subject to maximum* **5% of the contract value**
14	*Retention percentage*		Besides the ISD, as deposited by the contractor in the above said manner, the retention money shall be deducted from the running account bill at the rate of 10% of the gross value of work done by the contractor and claimed in each bill, provided the total security deposit i.e. ISD plus Retention Money shall both together not exceed 5% of the contract value.
15	Retention period		11 Month from the date of completion of work
16.	Contact person from whom Tender enquiry to be obtained and clarifications to be sought.	:	*DY. Manager –CIVIL, Sh. Arun Sajwan 9417495262*
17.	In case, the date of opening of tenders falls on holiday or declared later as holiday, the tenders will be opened on the next working day at the same time. In case of any change in time/date of opening of tenders, the same will be advised.		
18	*SBI has the right to accept/reject any / all tenders without assigning any reasons*		
19	Note-The contractor has to execute an Agreement before starting the work on site within 7 days from the issue of work order.		
			For and behalf of State Bank of India

Contractor's Signature & Stamp

The quality and punctuality of / in rendering of the said services are the essence of the contract and the contractor undertakes to abide by them at all times.

SBI reserves the right to amend, rescind or reissue the tender, at any time prior to the deadline for submission of bids. The bank, for any reason, whether, on its own initiative or in response to a clarification requested by prospective bidder, may modify the bidding document by amendment which will be made available to the bidders by way of corrigendum / addendum. The interested parties / bidders are advised to check the Bank's Website regularly till the date of submission of bid documents specified in the schedules of events / email and insured that clarification/ amendments issued by the Bank, if any, have been taken into consideration before submitting the bid. Such amendments / clarifications, if any, issued by the Bank will be binding on the participating bidders. Bank will not take any responsibility for any such omission by the bidders. SBI, at its own discretion, may extend the deadline for the submission of bids in
order to allow prospective bidders a reasonable time to prepare the bid for taking the amendments into account.

Signature of the Contractor/Tenderer with seal

TENDER FOR

CIVIL WORK, ***FOR ROAD WORKS AT CRM CAMPUS -II GURU GRAM***

DOCUMENT ISSUED TO M/S. …….

DATE OF ISSUE OF TENDER: FROM
PREBID MEETING: N/A

SUBMISSION OF TENDER: ON OR BEFORE ---------- UPTO 3.00 P.M.

PLACE OF SUBMISSION OF TENDER: On-line ONLY submission (Technical and commercial)
Web Portal- https://sbi.abcprocure.com

Agency for arranging online bidding (submitting of Technical and price bid) e-Procurement Technologies Ltd.

Mr. Parth Joshi
Ph. No. 079- 40230801/802/803
parth.joshi@auctiontiger.net

You are requested to contact the agency for completion of all the business Formalities at the earliest.

Bidders must have valid Signing & Encryption Digital Signature Certificate in name of their Organization for online submission of the tender.

The Chief Manager (HR)
State Bank of India,
AO. OFFICE -4 GURU GRAM

Contractor's Signature & Stamp

INSTRUCTIONS TO THE TENDERERS

Scope of Work:

Sealed tenders are invited by State Bank of India for the **CIVIL WORKS**, FOR CRM CAMPUS-II GURUGRAM

Site and its Location

The proposed work is to be carried out at PLOT NO 79, CRM CAMPUS-II SECTOR 18, AO. OFFICE -4 GURUGRAM

Tender Documents

The work has to be carried out strictly according to the conditions stipulated in the tender consisting the following documents and the most workmen like manner.

Instructions to Tenderers

General Conditions of Contract

Special Conditions of Contract

Additional Specifications

Drawings

Price Bid

1. The above documents shall be taken as complementary and mutually explanatory of one another but in case of ambiguities or discrepancies, shall take precedence in the order given below:

i)Price Bid

ii)Additional Specifications

iii)Technical Specifications

iv)Drawings

v)Special Conditions of Contract

vi)General Condition of Contract

vii)Instruction to Tenderer

2. Complete set of tender documents including relevant drawings can be downloaded from **"Procurement-news" section of SBI Corporate website.** The tender documents are not transferable.

6. Site Visit

3.1**The tenderer must obtain himself on his own responsibility and his own expenses all information and data which may be required for the purpose of filling this tender document and enter into a contract for the satisfactory performance of the work. The tenderer is requested satisfy himself regarding the availability of water, power, transport and communication facilities, the character quality and quantity of the materials, labour, the law and order situation, climatic conditions local authorities requirements, traffic**

regulations etc;.

The tenderer will be fully responsible for considering the financial effect of any or all the factors while submitting his tender.

4.0 **Earnest Money**

4.1 The tenderers are requested to submit the Earnest Money of ***Rs.15,000/- (Rupee Fifteen thousand only)*** in the form of Demand Draft of Bankers' Cheque in favour of State Bank of India drawn on any Nationalised Bank in India, Payable at Guru Gram.

1. EMD in any other form other than as specified above will not be accepted. Tender not accompanied by the EMD in accordance with clause 4.1 above shall be rejected.
2. No interest will be paid on the EMD.
3. EMD of unsuccessful tenderers will be refunded within 30 days of award of Contract.
4. EMD of successful tenderer will be retained as a part of security deposit.

5.0 **Initial Security Deposit**

The successful tenderer will have to submit a sum equivalent to 2% of contract value less EMD, by means of Demand Draft drawn in favour of State Bank of India within a period of 7 days of acceptance of tender.

5.1 **Security Deposit**

Total security deposit shall be 5% of contract value. Out of this 2% of contract value is in the form of initial security deposit, which includes the EMD. Balance 3% shall be deducted from the running account bill of the work at the rate of 10% of the respective running account bills i.e., deduction from each running bill account will be 10% till total 3% of contract value is reached. 50% of the total security shall be paid to the contractors on the basis of architect's certifying the virtual completion. The balance 50% would be paid to the contractors after the defects liability period as specified in the contract provided he has carried out all the work and attended to all the defects in accordance with the condition of the contract and clearance, if any, of the observations of the CTE of CVC.

1. No interest shall be paid to the amount retained by the Bank as Security Deposit.

6.0 **Signing of Contract Documents**

The successful tenderer shall be bound to implement the contract by signing an agreement and conditions of contract attached herewith within 7 days from the receipt of intimation of acceptance of his tender by the Bank. However, the written acceptance of the tender by the Bank will constitute a binding agreement between the Bank and successful tenderer whether such formal agreement is subsequently entered into or not.

7.0 Completion Period

Time is essence of the contract. The work should be completed in all respects in accordance with the terms of contract within a **period of 1 Month (Including Rainy Season)** from the date of handing over of the site**.**

8.0 Validity of Tender

Tenders shall remain valid and open for acceptance for a period of ninety days from the date of opening price bid. If the tenderer withdraws his/her offer during the validity period or makes modifications in his/her original offer which are not acceptable to the

Bank without prejudice to any other right or remedy the Bank shall be at liberty to forfeit the EMD.

10.0 Liquidated Damages

The liquidated damages shall be 0.5% per week subject to a maximum of 5% of the accepted Contract Value.

Rate and Prices:

11.1 The tenderers shall quote their rates for individual items both in words and figures. In case of discrepancy between the rate quoted in words and figures the unit rate quoted in words will prevail. If no rate is quoted for a particular item the contractor shall not be paid for that item when it is executed.

The amount of each item shall be calculated and the requisite total is given. In case of discrepancy between the unit rate and the total amount calculated from multiplication of unit rate and the quantity the unit rate quoted will govern and the total amount will be corrected.

2.19.1 The tenderers need not quote their rates for which no quantities have been given. In case the tenderers quote their rates for such items those rates will be ignored and will not be considered during execution.

2.19.2 The tenderers should not change the units as specified in the tender. If any unit is changed the tenders would be evaluated as per the original unit and the contractor would be paid accordingly.

11.3 The tenderer should not change or modify or delete the description of the item. If any discrepancy is observed he should immediately bring to the knowledge of the Architect/Bank.

11.4 Each page of the BOQ shall be signed by the authorized person and cutting or over writing shall be duly attested by him.

1.1 Each page shall be totaled and the grand total shall be given.

1.1.1 The rate quoted shall be firm and shall include all costs, allowances, taxes, levies etc. and deduction at source for Income Tax etc. Except GST. GST WILL BE PAYABLE AS PER GST RULES

The Contractor shall quote the GST separately along with relevant documentary proof for applicability of GST.

1.1.2 The contractor shall be required to conduct necessary tests of the water brought from tube well or any other outside source, from approved laboratory.

11.6 The contractor is required to comply with all act of the Government relating to labour and the rules and regulations made there under from time to time and to submit at the proper times all particulars and statements required to be furnished to the appropriate authorities.

Contractor's Signature & Stamp

FORM OF TENDER (To be filled up by the Tenderer)

To

Chief Manager (HR)

State Bank of India,

AO OFFICE -4

CRM CAMPUS-II

GURUGRAM

Dear Sir,

Reg: CIVIL WORKS, ***FOR ROAD WORK AT CRM CAMPUS-II GURU GRAM***

I / We refer to the tender notice issued by you for Interior & Furnishing works and allied works in connection with the above.

I / We hereby offer to perform, provide, execute, complete and maintain the works in conformity with the drawings, designs, conditions of contracts, specifications, schedule of quantities relating to the works for the sum of Rs…….. at the respective rates quoted in the schedule of quantities.

I / We have satisfied myself / ourselves as to the site conditions, examined the drawings and all aspects of the tender conditions, subject to above, I / We do hereby agree, should this tender be accepted in whole or in part, to:

Abide by and full fill all the terms and provisions of the said conditions annexed here to,

Complete the works within **1 Month** as per the work program enclosed with the tender in two or three shifts if considered necessary by the Employer / Architects at no extra cost to the Employer.

I / We have deposited the earnest money of **Rs.15,000/- (*Rupees Fifteen thousand only*)** in the form of Demand Draft / Banker's Cheque drawn in favour of **State Bank of India, Guru Gram,** which I / We note, will not bear any interest and is liable for forfeiture.

If our offer is withdrawn within the validity period of acceptance by the Employer.

Or

If the contract agreement is not executed by us within 7 days from the date of receipt of the letter of acceptance.

Or

If we fail to pay the initial security deposit as stipulated.

Or

If the work is not commenced within 10 days after issue of work order.

Contractor's Signature & Stamp

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

The names of **Directors/ Partners** of our Firm are:

1_____

2_____

3_____

4_____

Yours faithfully,

Name of Partner / Director of the Firm, authorized to sign or name of person having power of attorney to sign the contract. (Certified true copy of power of attorney should be attached)

Signature ……..

Designation ……..

Signature and address of witnesses:

a. Signature ……

Name ……..

Address ……..

b. Signature ……

Name ……..

Address ……..

Contractor's Signature & Stamp

AGREEMENT

This agreement made on the _____day of _____Two Thousand _____ BETWEEN **State Bank of India** a corporation constructed under the State Bank of India Act, 1955 and having it's **A.O. OFFICE** AT GURU GRAM and many other places, through *The* ***Chief Manager (HR), State Bank of India, Guru Gram****.* (Hereinafter called "the Employer") of the one part and M/s _____ through its _____ having its registered office at _____ (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer is desirous of executing Certain Works to be carried out at *_CIVIL WORKS,* ***FOR ROAD WORKS AT CRM CAMPUS-II GURU GRAM***

as per Schedule-I, to this agreement and has caused Drawings, Bills of Quantities and Specification describing the work to be done, prepared by ***M/s THE GRID , Architects & Interior Designers., e-326 Greater Kailash, Part II, New Delhi-48.*** (hereinafter called "the Architects").

AND WHEREAS the said Drawings, the Bills of Quantities marked pages _____ to _____ (inclusive) and the Specifications as stated have been signed by or on behalf of the parties hereto:

AND WHEREAS the Contractor has agreed to execute the work upon the Conditions of Tender and the Conditions of Contract and further subject to the Special Conditions set forth in Schedule-II hereto attached (hereinafter collectively referred to as "the said Conditions") as per the said Drawings and as described in the said Specification and included in the said Bills of Quantities for the sum of Rupees _____

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the sum of Rupees _____ to be paid at the time and in the manner set forth in the said Conditions, the Contractor shall upon and subject to the said Drawings and described in the said Specification and Bills of Quantities.

2. The Employer shall pay to the Contractor the said sum of Rs._____ _____ _____ or such other sum as shall become payable hereunder at the times and in the manner specified hereinafter.

3. The term "The Architects" in the said conditions shall mean ***M/s THE GRID Architects & Interior Designers. e-326 Greater Kailash, Part II, New Delhi-48.*** or in the event of their ceasing to be Architects for the purposes of this Contract, such other persons as shall be nominated for that purpose by the Employer, not being a person to whom the contractor shall object for reasons considered to be sufficient by the Employer mentioned in the said Conditions. Provided always that no persons subsequently appointed to be Architects under this Contract shall be entitled to disregard or overrule any decision or approval or direction given or expressed by the Architects for the time being.

4.The said Conditions, Specifications and Priced Bills of Quantities shall be read and construed as forming part of this agreement, and the parties hereto shall respectively abide by and submit themselves to the conditions and stipulations and perform the agreement on their parts respectively in such Conditions, Specifications and Priced Bills of Quantities contained.

Contractor's Signature & Stamp

5. This agreement is subject to jurisdiction of courts in Delhi only.

6. ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram***. shall exercise powers on behalf of the said Employer for the purpose of the Contract Agreement.

7. Whereas both the parties agree to sign the following annexure Annexed to this Agreement in token of their acceptance.

   (i) Agreement
   (ii) General Conditions of contract.
   (iii) Special Condition of Contract.
   (iv) Safety Codes.
   (v) Specifications.
   (vi) Material Testing & Their Frequency.
   (vii) List of Approved Makes/ Brands
   (viii) Priced Bill of Quantities.
   (ix) Drawings.

8. The Bank shall pay the contractor such sum as shall become payable hereunder at the times and in the manner specified in the said Conditions mentioned in the General Conditions of Contract.

9. Whereas the Contractor hereby undertakes and agrees to carry out and complete the works within **1 Month** from the date of handing over site or 10 days from the date of issue of letter of acceptances, whichever is earlier. The Contractor agrees and has deposited the sum of Rs. _____ by way of **Initial Security Deposit** for due fulfillment of this Contract for the Works. It is agreed that the Security Deposit shall be deducted from each running bills and refunded to the contractor as per clause 2 of the General Conditions of the Contract Annexed herewith.

10. Whereas it is agreed that the earnest money amounting to ***Rs.15,000/- (Rupees Fifteen thousand only)*** deposited by the Contractor in the form of Demand Draft along with the tender shall be forfeited in full in case the Contractor does not remit the Initial Security Deposit within the stipulated period of the start of the works by the stipulated date mentioned in the award letter.

11. Whereas Shri _____ is the accredited representative(s) of the Contractor who would be responsible for taking instructions from the Employer in relation to the Works. The Contractor agrees to pay Sales Tax or any other Tax on material or finished works like Works Contract Tax, Turnover Tax etc. including Income Tax in respect of this Contract of the Works and the Employer will not entertain any claim whatsoever in this report nor the Employer shall be responsible to pay any Tax as mentioned above. If due to non – payment of any of the aforesaid Tax or other Taxes connected with the Works, the Contractor suffers any loss or damages occurred to the Contractor and the Employer will be entitled to claim damages from the contractor for non completion of the Work within **2 Calendar Months** stipulated in Para 9, above.

12. Whereas the Contractor hereby declares the list of all the relative working with the Employer which is annexed herewith.

OR

Whereas the Contractor declares that none of his relative is working with the Employer.

Contractor's Signature & Stamp

Whereas the Contractor declares that he has associated himself with the agencies of the appropriate classes of person for Sanitary and Water Supply Installation etc. or any other specialized job to complete the works.

The Plans, Drawings, Specifications, Contract Documents and the Documents above mentioned shall form basis of this Contract and the decision of ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram***. for the time being as mentioned in the Conditions of Contract in reference

to all matters of dispute as to material, workmanship or account and as to the intended interpretation of the clauses of the Agreement or any of the document attached hereto shall be final and binding on both parties and may be made rule of the court.

13. ***The work comprises of the*** *"CIVIL* ***WORKS, FOR ROAD WORKS AT CRM CAMPUS-II GURU GRAM"*** *as mentioned above and all subsidiary and other works connected therewith on the same site as may be ordered to be done from time to time by Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram., for the time being even though such works may not have been shown on the , Plans or described in the said Specifications or Schedule of Quantities of various classes of Work to be done.*

14. The Employer through the ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram.*****,** reserves himself the right of altering the Plans, Drawings and nature of Work of adding to or omitting any items of work or having portions of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice to this Contract.

15. All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Delhi and only the courts of Delhi shall have jurisdiction to determine the same.

16. The several parts of this Contract have been read to us and fully understood by us.

In Witness whereof the parties above named have executed these presents today and year first hereinabove written.

Signed, Sealed and Delivered by:

Authorized Representative of Employer **Authorized Representative of Contractor**

Contractor's Signature & Stamp

SCHEDULE I

"Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram" all as described in Tender and Drawings inclusive hereto as Specifications.

SCHEDULE II

The following Letters/ Correspondence form a part of Agreement:

1.
2.
3.

As witness our hands the day and year first written above,

In presence of

Signature:	Signature by the said Employer
Name:	Name:
Occupation:	Designation:
Address:	Address:

In presence of

Signature:	Signature by the said Contractor
Name:	Name:
Occupation:	Designation:
Address:	Address:

GENERAL CONDITIONS OF CONTRACT

2 Definitions:

"Contract means the documents forming the tender and the acceptance thereof and the formal agreement executed between State Bank of India (client) and the contractor, together with the documents referred therein including these conditions, the specifications, designs, drawings and instructions issued from time to time by the architects / Bank and all these documents taken together shall be deemed to form one contract and shall be complementary to one another.

1.1 In the contract the following expressions shall, unless the context otherwise requires, have the meaning hereby respectively assigned to them.

1.1.1 'SBI' shall mean State Bank of India (client) having its Corporate Centre at **State Bank Bhavan, Madame Cama Road, Mumbai-400 021** and includes the client's representatives, successors and assigns.

'Architects/Consultants' shall mean ***M/s THE GRID, Architects & Interior Designers, e-326 Greater Kailash, Part II, New Delhi-48.***

'Site Engineer' shall mean an Engineer appointed by the Bank as their representative to give instructions to the contractors.

2.10.1 'The Contractor' shall mean the individual or firm or company whether incorporated or not, undertaking the works and shall include legal personal representative of such individual or the composing the firm or company and the permitted assignees of such individual or firms of company.

The expression 'works' or 'work' shall mean the permanent or temporary work described in the "Scope of work" and / or to be executed in accordance with the contract and includes materials, apparatus, equipment, temporary supports, fittings and things of all kinds to be provided, the obligations of the contractor hereunder and work to be done by the contractor under the contract.

2.10.2 'Engineer' shall mean the representative of the Architect/Consultant.

2.10.3 'Drawings' shall mean the drawings prepared by the Architects and issued by the Engineer and referred to in the specifications and any modifications of such drawings as may be issued by the Engineer from time to time. 'Contract Value' shall mean the value of the entire work as stipulated in the letter of acceptance of tender subject to such additions thereto or deductions there from as may be under the deductions there from as may be made under the provision herein after contained.

2.10.4 'Specifications' shall mean the specifications referred to in the tender and any modifications thereof as may time to time be furnished or approved by the architect / consultant "Month" means calendar month.

2.10.5 "Week" means seven consecutive days.

2.10.6 "Day" means a calendar day beginning and ending at 00 Hrs. and 24 Hrs. respectively.

3 Total Security Deposit

Total Security Deposit comprise of 1) Earnest Money Deposit, 2) Initial Security Deposit and 3) Retention Money

1. Earnest Money Deposit:

The tenderer shall furnish EMD of ***Rs.15,000/- (Rupees Fifteen Thousand only)*** in the form of Demand Draft drawn in favour of SBI, New Delhi on any Nationalised /Scheduled Bank. No tender shall be considered unless the EMD is so deposited in the required form. No interest shall be paid on this EMD. The EMD of the unsuccessful tenderer shall be refunded after the decision to award the contract is taken without interest. The EMD shall stand absolutely forfeited if the tenderer revokes his tender at any time the period when he is required to keep his tender open acceptance by the SBI or after it is accepted by the SBI the contractor fails to enter into a formal agreement or fails to pay the initial security deposit as stipulated or fails to commence the work within the stipulated time.

2. Initial Security Deposit (ISD)

The amount of ISD shall be 2% of accepted value of tender including the EMD in the form of D/D drawn on any scheduled Bank and shall be deposited within 7 days from the date of acceptance of tender.

3. Retention Money:

Besides the ISD as deposited by the contractor in the above said manner the retention money shall be deducted from the running account bill at the rate of 10% of the gross value of work done by the contractor and claimed in each bill provided the total security deposit i.e. the ISD plus Retention Money shall both together not exceed 5% of the contract value. 50% of the total security deposit shall be refunded to the contractor without any interest on issue of Virtual Completion certificate by the Architect / consultant. The balance 50% of the total security deposit shall be refunded to the contractors without interest within fifteen days after the end of defects liability period provided the contractor has satisfactorily attended to all defects in accordance with the conditions of contract including site clearance.

4.0 Language

The language in which the contract documents shall be drawn shall be in English.

3.0 Errors, Omissions and Discrepancies

In case of errors, omissions and / or disagreement between written and scaled dimensions on the drawings or between the drawings and specifications etc., the following order shall apply.

i) Between scaled and written dimension (or description) on a drawing, the latter shall be adopted.

ii) Between the written or shown description or dimensions in the drawings and the correspondence one in the specification the former shall be taken as correct.

iii) Between written description of the item in the specifications and descriptions in bills of quantities of the same item, the former shall be adopted.

a) In case of difference between rates written in figures and words, the rate in words shall prevail.

b) Between the duplicate / subsequent copies of the tender, the original tender shall be taken as correct.

4.0 Scope of Work:

The contractor shall carryout complete and maintain the said work in every respect in strictly accordance with this contract and with the directions of and to the satisfaction of the Bank to be communicated through the architect / consultant. The architect /

consultant at the directions of the Bank from time to time issue further drawings and / or written instructions, details directions and explanations which are hereafter collectively referred to as Architect's / Consultant's instructions in regard to the variation or modification of the design, quality or quantity of work or the addition or omission or substitution of any work. Any discrepancy in the drawings or between the BOQ and / or specifications. The removal from the site of any material brought thereon by the contractor and any substitution of any other materials therefore the removal and / or re-execution of any work executed by him. The dismissal from the work of any person employed / engaged thereupon.

1.1 i) Letter of Acceptance:

Within the validity period of the tender the Bank shall issue a letter of acceptance either directly or through the architect by registered post or otherwise depositing at the address of the contractor as given in the tender to enter into a Contract for the execution of the work as per the terms of the tender. The letter of acceptance shall constitute a binding contract between the SBI and the contractor.

ii) Contract Agreement:

On receipt of intimation of the acceptance of tender from the SBI / Architect the successful tenderer shall be bound to implement the contract and within **fifteen days** thereof he shall sign an agreement in a non-judicial stamp paper of appropriate value.

6.0 Ownership of Drawings:

All drawings, specifications and copies thereof furnished by the SBI through its architects / consultants are the properties of the SBI. They are not to be used on other work.

7.0 Detailed Drawings and Instructions:

The SBI through its architects / consultants shall furnish with reasonable promptness additional instructions by means of drawings or otherwise necessary for the proper execution of work. All such drawings and instructions shall be consistent with the contract documents, true developments thereof and reasonably inferable there from.

The work shall be executed in conformity therewith and the contractor prepare a detailed program schedule indicating therein the date of start and completion of various activities on receipt of the wok order and submit the same to the SBI through the architect / consultant.

8.0 Copies of Agreement

Two copies of agreement duly signed by both the parties with the drawings shall be handed over to the contractors.

9.0 Liquidated Damages:

If the contractor fails to maintain the required progress in terms of clause 30 of GCC or to complete the work and clear the site including vacating their office on or before the contracted or extended date or completion without justification in support of the cause of delay, he may be called upon without prejudice to any other right of remedy available under the law to the SBI on account of such breach to pay a liquidated damages at the rate of 0.5% of the contract value per week which is subject to a maximum of 5% of the contract value.

10.0 Materials, Appliances and Employees

Unless or otherwise specified the contractor shall provide and pay for all materials, labour, water, power, tools, equipment transportation and any other facilities that are required for the satisfactory execution and completion of the work. Unless or otherwise specified all materials shall be new and both workmanship and materials shall be of best quality. The contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him. Workman whose work or behavior is found to be unsatisfactory by the SBI / architect/ consultant he shall be removed from the site immediately.

11.0 Permits, Laws and Regulations:

Permits and licenses required for the execution of the work shall be obtained by the contractor at his own expenses. The contractor shall give notices and comply with regulations, laws, and ordinances rules, applicable to the contract. If the contractor observes any discrepancy between the drawings and specifications, he shall promptly notify the SBI in writing under intimation of the Architect / Consultant. If the contractor performs any act which is against the law, rules and regulations he shall meet all the costs arising there from and shall indemnify the SBI any legal actions arising there from.

12.0 Setting out Work:

The contractor shall set out the work and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions, and alignment of all parts thereof and get it approved by the architect/ consultant before proceeding with the work. If at any time any error in this respect shall appear during the progress of the works, irrespective of the fact that the layout had been approved by the architect / consultant the contractor shall be responsible for the same and shall at his own expenses rectify such error, if so, required to satisfaction of the SBI.

13.0 Protection of Works and Property:

The contractor shall continuously maintain adequate protection. Of all his work from damage and shall protect the SBI's properties from injury or loss arising in connection with contract. He shall make good any such damage, injury, loss, except due to causes beyond his control and due to his fault or negligence.

He shall take adequate care and steps for protection of the adjacent properties. The contractor shall take all precautions for safety and protections of his employees on the works and shall comply with all applicable provisions of Govt. and local bodies safety laws and building codes to prevent accidents, or injuries to persons or property on, about or adjacent to his place of work. The contractor shall take insurance covers as per clause 26.0 at his own cost. The policy may take in joint names of the contractor and the SBI and the original policy may be lodged with the SBI.

14.0 Inspection of Work:

The SBI / Architect / Consultant or their representatives shall at all reasonable times have free access to the work site and/ or to the workshop, factories, or other places where materials are lying or from where they are obtained and the contractor shall give every facility to the SBI, Architect / consultant and their representatives necessary for inspection and examination and test of the materials and workmanship. No person unless authorised by the SBI/ Architect / Consultant except the representative of Public authorities shall be allowed on the work at any time. The

proposed work either during its construction stage or its completion can also be inspected by the Chief Technical Examiner's organization a wing of Central Vigilance Commission.

15.0 Assignment and Subletting

The whole of work included in the contact shall be executed the contractor and he shall not directly entrust and engage or indirectly transfer, assign or underlet the contract or any part or share thereof or interest therein without the written consent of the SBI through the architect and no undertaking shall relieve the contractor from the responsibility of the contractor from active superintendence of the work during its progress.

16.0 Quality of Materials, Workmanship & Test

All materials and workmanship shall be best of the respective kinds described in the contract and in accordance with Architect / consultant instructions and shall be subject from time to time to such tests as the architect / consultant may direct at the place of manufacture or fabrication or on the site or an approved testing laboratory. The contractor shall provide such assistance, instruments, machinery, labour, and materials as are normally required or examining measuring sampling and testing any material or part of work before incorporation in the work before incorporation in the work or testing as may be selected and required by the architect / consultant.

ii) **Samples**

All samples of adequate numbers, size, shades and pattern as per specifications shall be supplied by the contractor with out any extra charges. If certain items proposed to be used are of such nature that samples cannot be presented or prepared at the site detailed literature / test certificate of the same shall be provided to the satisfaction of the Architect / consultant. Before submitting the sample / literature the contractor shall satisfy himself that the material / equipment for which he is submitting the sample / literature meet with the requirement of tender specification. Only when the samples are approved in writing by the architect / consultant the contractor shall proceed with the procurement and installation of the particular material / equipment. The approved samples shall be signed by the Architect / Consultant for identification and shall be kept on record at site office until the completion of the work for inspection / comparison at any time. The Architect / Consultant shall take reasonable time to approve the sample. Any delay that might occur in approving the samples for reasons of its not meeting the specifications or other discrepancies inadequacy in furnishing samples of best qualities from various manufacturers and such other aspects causing delay on the approval of the materials / equipment etc. shall be to the account of the contractor.

iii) **Cost of Tests**

The cost / expenditure required for the tests shall be borne by the contractor if such test is intended by or provided for in the specification or BOQ.

iv) **Costs of Tests not provided for**

If any test is ordered by the Architect / Consultant which is either

If so intended by or provided for or (in the cases above mentioned) is not so particularized, or though so intended or provided for but ordered by the architect / Consultant to be carried out by an independent person at any place other than the site or the place of manufacture or fabrication of the materials tested or any Government / approved laboratory, then the cost of such test shall be borne by the contractor.

17.0 Obtaining Information Related to Execution of Work

No claim by the contractor for additional payment shall be entertained which is consequent upon failure on his part to obtain correct information as to any matter affecting the execution of the work nor any misunderstanding or the obtaining incorrect information or the failure to obtain correct information relieve him form nay risks or from the entire responsibility for the fulfillment of contract.

18.0 Contractor's Superintendence

The contractor shall give necessary personal superintendence during the execution of the works and as long, thereafter, as the Architect / consultant may consider necessary until the expiry of the defects liability period stated hereto.

19.0 Quantities

i) The Bill of Quantities (BOQ) unless or otherwise stated shall be deemed to have been prepared in accordance with the Indian Standard Method of Measurements and quantities. The rate quoted shall remain valid for variation of quantity against individual item to any extent subject to maximum variation of the contract value by 25%. The entire amount paid under Clause 20, 21 hereof as well as amounts of prime cost and provisional sums, if any, shall be excluded.

20.0 Works to be measured

The Architect / Consultant may from time to time intimate to the contractor that he required the work to be measured and the contractor shall forthwith attend or send a qualified representative to assist the Architect in taking such measurements and calculations and to furnish all particulars or to give all assistance required by any of them. Such measurements shall be taken in accordance with the Mode of measurements detailed in the specifications. The representative of the Architect / Consultant shall take joint measurements with the contractor's representative and the measurements shall be entered in the measurement book. The contractor or his authorised representative shall sign all the pages of the measurement book in which the measurements have been recorded in token of his acceptance. All the corrections shall be duly attested by both representatives. No over writings shall be made in the M Book should the contractor not attend or neglect or omit to depute his representative to take measurements then the measurements recorded by the representative of the Architect / consultant shall be final. All authorised extra work, omissions and all variations made shall be included in such measurement.

21.0 Variations

No alteration, omission or variation ordered in writing by the Architect / consultant shall vitiate the contract. In case the SBI / Architect / Consultant thinks proper at any time during the progress of works to make any alteration in, or additions to or omissions from the works or any alteration in the kind or quality of the materials to be used therein, the Architect / Consultant shall give notice thereof in writing to the contractor or shall confirm in writing within seven days of giving such oral instructions the contractor shall alter to, add to, or omit from as the case may be in accordance with such notice, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from the works or any deviation from any of the provisions of the contract, stipulations, specifications or contract drawings without previous consent in writing of the Architect / Consultant and the value of such extras, alterations, additions or omissions shall in all cases be determined by the Architect /

Consultant and the same shall be added to or deducted from the contract value, as the case may be.

22.0 Valuation of Variations

No claim for an extra shall be allowed unless it shall have been executed under the authority of the Architect / Consultant with the concurrence of the SBI as herein mentioned. Any such extra is herein referred to as authorised extra and shall be made in accordance with the following provisions.

a) i) The net rates or prices in the contract shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced herein.

ii) Rates for all items, wherever possible should be derived out of the rates given in the priced BOQ.

a) The net prices of the original tender shall determine the value of the items omitted, provided if omissions do not vary the conditions under which any remaining items of works are carried out, otherwise the prices for the same shall be valued under sub-clause (c) hereunder.

b) Where the extra works are not of similar character and /or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items or works are carried out, then the contractor shall within 7 days of the receipt of the letter of acceptance inform the Architect / consultant of the rate which he intends to charge for such items of work, duly supported by analysis of the rate or rates claimed and the Architect / Consultant shall fix such rate or prices as in the circumstances in his opinion reasonable and proper, based on the market, rate.

c) Where extra work cannot be properly measured or valued the contractor shall be allowed day work prices at the net rates stated in the tender of the BOQ or, if not, so stated then in accordance with the local day work rates and wages for the district; provided that in either case, vouchers specifying the daily time (and if required by the Architect / Consultant) the workman's name and materials employed be delivered for verifications to the Architect / consultant at or before the end of the week following that in which the work has been executed.

d) It is further clarified that for all such authorised extra items where rates cannot be derived from the tender, the Contractor shall submit rates duly supported by rate analysis worked on the "market rate basis" for material, labour, hire / running charges of equipment and wastage etc. plus 15% towards establishment charges, contractor's overheads and profit. Such items shall not be eligible for escalation.

23.0 Final Measurement

The final measurement, valuation and payment in respect of the contract shall be completed within six months of the virtual completion of the work.

24.0 Virtual Completion Certificate (VCC)

On successful completion of entire woks covered by the contract to the full satisfaction of the Architects / SBI, the contractor shall ensure that the following works have been completed to the satisfaction of the Architects / SBI.

a) Clear the site of all scaffolding, wiring, pipes, surplus materials, contractor's labour, equipment and machinery.

b) Demolish, dismantle and remove the contractor's site office, temporary works, structures including labour sheds/camps and constructions and other items and things whatsoever brought upon or erected at the site or any land allotted to the contractor

by the SBI and not incorporated in the permanent works.

c) Remove all rubbish, debris etc. from the site and the land allotted to the contractor by the SBI and shall clear, level and dress, compact the site as required by the SBI.

d) Shall put the SBI in undisputed custody and possession of the site and all land allotted by the SBI.

e) Shall hand over the work in a peaceful manner to the SBI.

f) All defects / imperfections have been attended and rectified as pointed out by the SBI to the full satisfaction of SBI.

Upon the satisfactory fulfillment by the contractor as stated above, the contractor shall be entitled to apply to the Architect / consultant is satisfied of the completion of the work. Relative to which the completion certificate has been sought, the Architect / consultant shall within fourteen (14) days of the receipt of the application for virtual completion certificate, issue a VCC in respect of the work for which the VCC has been applied.

This issuance of a VCC shall be without prejudice to the SBI's rights and contractor's liabilities under the contract including the contractor's liability for defects liability period nor shall the issuance of VCC in respect of the works or work at any site be construed as a waiver of any right or claim of the SBI against the contractor in respect of works or work at the site and in respect of which the VCC has been issued.

25.0 Work by other Agencies

The SBI / Architect / Consultant reserves the rights to use premises and any portion of the site for execution of any work not included in the scope of this contract which it may desire to have carried out by other persons simultaneously and the contractor shall not only allow but also extend reasonable facilities for the execution of such work, the contractor, however, shall not be required to provided any plant or material for the execution of such work except by special arrangement with the SBI. Such work shall be carried out in such manner as not to impede the progress of the works included in the contract.

26.0 Insurance of Works

26.1Without limiting his obligations and responsibilities under the contract, the contractor shall insure in the joint names of he SBI and the contractor against all loss of damages from whatever cause arising other than the excepted risks, for which he is responsible under the terms of contract and in such a manner that the SBI and contractor are covered for the period stipulated in clause 28 of GCC and are also covered during the period of maintenance for loss or damage arising from a cause, occurring prior to the period of maintenance for loss or damage arising from a cause, occurring prior to the commencement of the period of maintenance and for any loss or damage occasioned by the contractor in the course of any operations carried out by him for the purpose of complying with his obligations under clause.

a) The works for the time being executed to the estimated current Contract value thereof, or such additional sum as may be specified together with the materials for incorporation in the works at their replacement value.

The constructional plant and other things brought on to the site by the contractor to the replacement value of such constructional plant and other things.

b) Such insurance shall be effected with an insurer and in terms approved by the SBI which approval shall not be unreasonably withheld and the contractor shall whenever required produce to the Architect / consultant the policy if insurance and the receipts

for payment of the current premiums.

26.2 **Damage to Persons and Property**

The contractor shall, except if and so far as the contract provides otherwise indemnify the SBI against all losses and claims in respect of injuries or damages to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of he works and against all claims proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation of damages for or with respect to:

a) The permanent use or occupation of land by or any part thereof.

b) The right of SBI to execute the works or any part thereof on, over, under, in or through any lands.

c) Injuries or damages to persons or properties which are unavoidable result of the execution or maintenance of the works in accordance with the contract.

d) Injuries or damage to persons or property resulting from any act or neglect of the SBI their agents, employees or other contractors not being employed by the contractor or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the SBI, their employees, or agents or other employees, or agents or other contractors for the damage or injury.

26.3 Contractor to Indemnify SBI

The contractor shall indemnify the SBI against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the matters referred to in the provision sub-clause 26.2 of this clause.

26.4 Contractor's Superintendence

The contractor shall fully indemnify and keep indemnified the SBI against any action, claim, or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claim made under or action brought against SBI in respect of such matters as aforesaid the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expenses to settle any dispute or to conduct any litigation that may arise there from, provided that the contractor shall not be liable to indemnify the SBI if the infringement of the patent or design or any alleged patent or design right is the direct result of an order passed by the Architect / Consultant in this behalf.

26.5 Third Party Insurance

26.5.1 Before commencing the execution of he work the contractor but without limiting his obligations and responsibilities under clause 26.0 of GCC shall insure against his liability for any material or physical damage, loss or injury which may occur to any property including that of SBI, or to any person, including any employee of the SBI, by or arising out of the execution of the works or in the carrying out of the contract, otherwise than due to the mattes referred to in the provision to clause 26.0 thereof.

26.5.2Minimum amount of Third Party Insurance

Such insurance shall be affected with an insurer and in terms approved by the SBI which approval shall not be reasonably withheld and for at least the amount stated below. The

contractor shall, whenever required. Produce of the Architect / consultant the policy or policies of insurance cover and receipts for payment of the current premiums.

26.5.3 The minimum insurance cover for physical property, injury, and death is Rs. 5 lacs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

26.6 Accident or Injury to Workman

The SBI shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other person in the employment of the contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the SBI or their agents, or employees. The contractor shall indemnify and keep indemnified SBI against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

26.6.1 Insurance against Accidents etc. to Workmen

The contractor shall insure against such liability with an insurer approved by the SBI during the whole of the time that any persons are employed by him on the works and shall, when required, produce to the architect / consultant such policy of insurance and receipt for payment of the current premium. Provided always a that, in respect of any persons employed by any sub-contractor the contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub contractor shall be insured against the liability in respect of such persons in such manner that SBI in indemnified under the policy but the contractor shall require such sub-contractor to produce to the Architect / consultant when such policy of insurance and the receipt for the payment of the current premium.

26.6.2 Remedy on Contractor's failure to Insure:

If the contractor fails to effect and keep in force the insurance referred to above or any other insurance which he may be required to effect under the terms of contract, then and in any such case the SBI may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the SBI as aforesaid from any amount due or which may become due to the contractor, or recover the same as debt from the contractor.

Without prejudice to the others rights of the SBI against contractors. In respect of such default, the employer shall be entitled to deduct from any sums payable to the contractor the amount of any damages costs, charges, and other expenses paid by the SBI and which are payable by the contractors under this clause. The contractor shall upon settlement by the insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with due diligence to rebuild or repair the works destroyed or damaged. In this event all the monies received from the insurer in respect of such damage shall be paid to the contractor and the contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

27.0 Commencement of Works:

The date of commencement of the work will be reckoned as the date of handing over site or three days from the date of issue of letter of acceptance of the tender by the SBI which ever is later.

28.0 Time for Completion

Time is essence of the contract and shall be strictly observed by the contractor. The entire work shall be completed within a period of **1 Month** from the date of commencement. If required in the contract or as directed by the Architect / consultant. The contractor shall complete certain portions of work before completion of the entire work. However the completion date shall be reckoned as the date by which the whole work is completed as per the terms of the contract.

29.0 Extension of Time

If, in the opinion of the Architect/consultant, the work be delayed for reasons beyond the control of the contractor, the Architect/consultant may submit a recommendation to the SBI to grant a fair and reasonable extension of time for completion of work as per the terms of contract. If the contractor needs an extension of time for the completion of work or if the completion of work is likely to be delayed for any reasons beyond the due date of completion as stipulated in the contract, the contractor shall apply to the SBI through the Architect / Consultant in writing in detail and his justification if any, for the delays. The architect/consultant shall submit their recommendations to the SBI in the prescribed format for granting extension of time. While granting extension of time the contractor shall be informed the period-extended time which will qualify for levy of liquidated damages. For the balance period in excess of original stipulated period and duly sanctioned extension of time by the SBI the provision of liquidated damages as stated under clause10.0 of Instructions to the Tenderers shall become applicable. Further the contract shall remain in force even for the period beyond the due date of completion irrespective whether the extension is granted or not.

30.0 Rate of Progress

Whole of the materials, plant and labour to be provided by the contractor and the mode, manner and speed of execution and maintenance of the works are to be of a kind and conducted in a manner to the satisfaction of the Architect / consultant should the rate of progress of the work or any part thereof be at any time be in the opinion of the Architect / consultant too slow to ensure the completion of the whole of the work by the prescribed time or extended time for completion the Architect / consultant to expedite progress so as to complete the works by the prescribed time or extended time. Such communications from the Architect / consultant neither shall relieve the contractor from fulfilling obligations under the contract nor will he be entitled to raise any claims arising out of such directions.

31.0 Work during Nights and Holidays

Subject to any provision to the contrary contained in the contract no permanent work shall save as herein provided be carried on during the night or on holidays without the permission in writing of the Architect / consultant, save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the work in which case the contractor shall immediately advise the Architect / consultant. However the provisions of the clause shall not be applicable in the case of any work which becomes essential to carry by rotary or double shifts in order to achieve the progress and quality of the part of the works being technically required / continued with the prior approval of the Architect / consultant at no extra cost to the SBI.

All work at night after obtaining approval from competent authorities shall be carried out without unreasonable noise and disturbance.

32.0 No Compensation or Restriction of Work.

If at any time after acceptance of the SBI shall decide to abandon or reduce the scope of work for any reason whatsoever and hence not required the whole or any part of the work to be carried out. The architect / consultant shall give notice in writing to that effect to the contractor and the contractor shall act accordingly. In the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the work fully but which he did not derive in consequence of the foreclosure of the whole or part of the work.

Provided that the contractor shall be paid the charges on the cartage only of materials actually and bonafide brought to the site of the work by the contractor and rendered surplus as a result of the abandonment, curtailment of the work or any portion thereof and then taken back by the contractor, provided however that the Architect / consultant shall have in such cases the option of taking over all or any such materials at their purchase price or a local current rate whichever is less.

"In case of such stores having been issued for SBI stores and returned by the contractor to stores, credit shall be given to him at the rates not exceeding those at which were originally issued to the contractor after taking into consideration and deduction for claims on account of any deterioration or damage while in the custody of the contractor and in this respect the decision of Architect / consultant shall be final.

33.0 Suspension of Work

i) The contractor shall, on receipt of the order in writing of the Architect / consultant (whose decision shall be final and binding on the contractor) suspend the progress of works or any part thereof for such time and in such manner as Architect / consultant may consider necessary so as not to cause any damage or injury to the work already done or endanger the safety thereof for any of following reasons.

a) One account any default on the part of the contractor, or

b) for proper execution of the works or part thereof for reasons other than the default of the contractor, or for safety of the works or part thereof.

c) The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the Architect / consultant.

ii) If the suspension is ordered for reasons (b) and (c) sub-para (i) above: the contractor shall be entitled to an extension of time equal to the period of every such suspension. No compensation whatsoever shall be paid on this account.

34.0 Action when the whole Security Deposit is forfeited

In any case in which under any clause or clauses of this contract, the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit the Architect / consultant shall have the power to adopt any of the following course as they may deem best suited to the interest of the SBI.

a) To rescind the contract (of which rescission notice in writing to the contractor by the Architect / consultant shall be conclusive evidence) and in which case the security deposit of the contractor shall be forfeited and be absolutely at the disposal of SBI.

b) To employ labour paid by the SBI and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and materials (the cost of such labour and materials as worked out by the Architect /consultant shall be

final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same manner and at the same rates as if it had been carried out by the contractor under the terms of this contract the certificate of architect / consultant as to the value of work done shall be final and conclusive against the contractor.

c) To measure up the work of the contractor, and to take such part thereof as shall be unexecuted, out of his hands, to give it to another contractor to complete in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (of the amount of which excess the certificates in writing of the Architects / consultant shall be final and conclusive) shall be borne by original contractor and may be deducted from any money due to him by SBI under the contract or otherwise, or from his security deposit or the proceeds of safe thereof, or sufficient part thereof. In the event of any of above courses being adopted by the SBI the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any material or entered into any engagements or make any advances on account of, or with a view to the execution of the work or the performance of the contract and in case the contract shall be rescind under the provision aforesaid, the contractor shall not be entitled to recover or to be paid any sum or any work thereto for actually performed under this contract, unless, and until the Architect / consultant will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

35.0 Owner's Right to Terminate the Contract

If the contractor being an individual or a firm commit any 'Act of Insolvency' or shall be adjusted an insolvent or being an incorporated company shall have an order for compulsory winding up voluntarily or subject to the supervision of Govt. and of the Official Assignee of the liquidator in such acts of insolvency or winding up shall be unable within seven days after notice to him to do so, to show to the reasonable satisfaction of the Architect / Consultant that he is able to carry out and fulfil the contract, and to give security therefore if so required by the Architect / consultant.

Or if the contractor (whether an individual firm or incorporated Company) shall suffer execution to be issued or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor.

Or shall assign or sublet this contract without the consent in writing of the SBI through the Architect / consultant or shall charge or encumber this contract or any payment due to which may become due to the contractor there under:

a) Has abandoned the contract; or

b) Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for days after receiving from the SBI through the Architect / Consultant written notice to proceed, or

c) 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 with in the time agreed upon, or has failed to remove the materials from the site or to pull down and replace work within seven days after written notice from the SBI through the Architect / consultant that the said materials were condemned and rejected by the Architect / consultant under these conditions; or has neglected or failed persistently to observe and perform all or any the acts, matters or things by this contract to be observed and performed by the contractor for seven days after written notice shall have been given to the contractor to observe or perform the same or has to he determent of good

workmanship or in defiance of the SBI's or Architect's / consultant's instructions to the contrary subject any part of the contract. Then and in any of said cases the SBI and or the Architect / consultant, may not withstanding any previous waiver, after giving seven days notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the SBI or the Architect / Consultant or the obligation and liabilities of the contractor the whole of which shall continue in force as fully as if the contract had not been so determined and as if the works subsequently had been executed by or on behalf of the contractor. And further the SBI through the Architect / consultant their agents or employees may enter upon and take possession of the work and all plants, tools, scaffoldings, materials, sheds, machineries lying upon the premises or on the adjoining lands or roads use the same by means of their own employees or workmen in carrying on and completing the work or by engaging any other contractors or persons to complete the work and the contractor shall not in any was interrupt or do any act, matter or thing to prevent or hinder such other contractor or other persons employed for completing and finishing or using the materials and plant for the works.

When the works shall be completed or as soon thereafter as convenient the SBI or the architect / consultant shall give a notice in writing to the contractor to remove his surplus materials and plants and should the contractor fail to do so within 14 days after receipt thereof by him the SBI sell the same by public auction after due publication, and shall adjust the amount realized by such auction. The contractor shall have no right to question any of the act of the SBI incidental to the sale of the materials etc.

36.0 Certificate of Payment

The contractor shall be entitled under the certificates to be issued by the Architect / consultant to the contractor within 14 working days from the date of certificate to the payment from SBI from time to time. The SBI shall recover the statutory recoveries towards Income tax, Work contract tax as per the prevailing bye laws and other dues including the retention amount from the certificate of payment.

Provided always that the issue of any certificate by the Architect / consultant during he progress of works or completion shall not have effect as certificate of satisfaction or relieve the contractor from his liability under clause.

The Architect / consultant shall have power to with hold the certificate if the work or any part thereof is not carried out to their satisfaction.

The architect / consultant may by any certificate make any corrections required in previous certificate.

The SBI shall modify the certificate of payment as issued by the architect / consultant from time to time while making the payment.

The contractor shall submit interim bills only after taking actual measurements and property recorded in the M books

The contractor shall not submit interim bills when the approximate value of work done by him is less than **Rs.5.00 lakhs** and the minimum interval between two such bills shall be **30 DAYS**.

The final bill may be submitted by contractor within a period of one month from the date of virtual completion and Architect / consultant shall issue the certificate of payment within a period of two months. The SBI shall pay the amount within a period of three months from the date of issue of certificate provided there is no dispute in respect of rates and quantities.

The contractor shall submit the interim bills in the prescribed format with all details.

37.0 Settlement of Disputes and Arbitration

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or those conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of the work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereinafter.

i) If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the Architect or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute to the ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram*** and endorse a copy of the same to the Architect, within 40 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Bank be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor to the ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram*** in the manner and within the time as aforesaid. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to the ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram.*** in writing in the manner and within the time aforesaid.

ii) The ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram,*** shall give his decision in writing on the claims notified by the contractor. The contractor may within 30 days of the receipt of the decision of the ***Chief Manager (HR), A.O.-4 State Bank of India, Guru Gram,*** submit his claims to the conciliating authority namely the **Dyp. General Manager, AO-4 SBI, New Delhi** for conciliation along with all details and copies of correspondence exchanged between him and the Regional Manager.

iii) If the conciliation proceedings are terminated without settlement of the disputes, the contractor shall, within a period of 30 days of termination thereof shall give a notice to the concerned **Chief General Manager of the Bank** for appointment of an arbitrator to adjudicate the notified claims failing which the claims of the contractor shall be deemed to have been considered absolutely barred and walved.

iv) Except where the decision has become final, binding and conclusive in terms of the contract, all disputes or differences arising out of the notified claims of the differences arising out of the notified claims of the contractor as aforesaid and all claims of the Bank shall be referred for adjudication through arbitration by the Sole Arbitrator appointed by the **Chief General Manager of the Bank,** It will also be the objection to any such appointment that the Arbitrator so appointed is a Bank Officer and that he had to deal with the matters to which the Contract relates in the course of his duties as Bank Officer. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid by the **Chief General Manager of the Bank,** Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of arbitrator.

It is also a term of this contract that no person other than a person appointed by **Chief General Manager of the Bank,** as aforesaid should act as arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made there under.

It is also a term of the contract that if any fees are payable to the arbitrator these shall be paid equally by both the parties. However, no fees will be payable to the arbitrator if he is a Bank Officer.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award (including the fees, if any of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof, shall be paid and fix or settle the amount of costs to be so paid.

38.0 Water Supply

The contractor shall make his own arrangements for water required for the work and nothing extra will be paid for the same. This will be subject to the following conditions.

That the water used by the contractor shall be fit for construction purposes to the satisfaction of the Architect / Consultant.

The contractor shall make alternative arrangements for the supply of water if the arrangement made by the contractor for procurement of water in the opinion of the Architect / Consultant is unsatisfactory.

39.0 Power Supply

The contractor shall make his own arrangements for power and supply / distribution system for machinery for the work and for lighting purpose at his own cost. The cost of running and maintenance of the plants are to included in his tender prices. He shall pay all fees and charges required for the power supply and include the same in his tendered rates and hold the owner free from all such costs. He has to obtain necessary approval from the appropriate authorities, if required.

40.0 Treasure Trove etc.

Any treasure trove, coin or object antique which may be found on the site shall be the property of SBI and shall be handed over to bank immediately.

41.0 Method of Measurement

Unless otherwise mentioned in the schedule of quantities or in mode of measurement, the measurement will be on the net quantities or work produced in accordance with up to date. Rules laid down by the Bureau of Indian Standards. In the event any dispute / disagreement the decision of the Architect / consultant shall be final and binding on the contractor.

42.0 Maintenance of Registers

The contractor shall maintain the following registers as per the enclosed Performa at site of work and should produce the same for inspection of SBI / architect / consultant whenever desired by them. The contractor shall also maintain the records / registers as required by the local authorities / Govt. from time to time.

i) Register for Cement / Paint / Lead / Specific Materials
ii) Register for Steel
iii) Register for Secured Advance
iv) Register for Bulkage of Sand
v) Register for Silt Test
vi) Register for Sieve Analysis for Fine Aggregate
vii) Register for Sieve Analysis for Course Aggregate
viii) Register for Slump Test.
ix) Register for Concrete Cube Test.
x) Register for Hindrance to Work.
xi) Register for Consumption of Cement
xii) Register for Running Account Bill
xiii) Register for Labour

43.0 Force Majeure

43.1 Neither contractor nor SBI shall be considered in default in performance of their obligations if such performance is prevented or delayed by event such as but not to war, hostilities revolution, riots, civil commotion, strikes, lockout, conflagrations, epidemics, accidents, fire, storms, floods, droughts, earthquakes or ordinances or any act of god or for any other cause beyond the reasonable control of the party affected or prevented or delayed. However a notice is required to be given within 30 days from the happening of the even with complete details, to the other party to the contract, if it is not possible to serve a notice, within the shortest possible period without delay.

43.2 As soon as the cause of force majeure has been removed the party whose ability to perform its obligations has been affected, shall notify the other such cessation and the actual delay incurred in such affected activity adducing necessary evidence in support thereof.

43.3 From the date of occurrence of a case of force majeure obligations of the party affected shall be suspended during the continuance of any inability so caused. With the cause itself and inability resulting there from having been removed, the agreed time of completion of the respective obligations under this agreement shall stand extended by a period equal to the period of delay occasioned by such events.

43.4 Should one or both parties be prevented from fulfilling the contractual obligations by a state of force majeure lasting to a period of 6 months or more the two parties shall each other to decide regarding the future execution of this Agreement.

44.0 Local Laws, Acts, Regulations :

The contractor shall strictly adhere to all prevailing labour laws inclusive of contract labour (regulation and abolition act of 1970) and other safety regulations. the contractor shall comply with the provision of all labour legislation including the latest requirements of all the Acts, laws, any other regulations that are applicable to the execution of the project.

i) Minimum wages Act 1948 (Latest Amendment)
ii) Payment of wages Act 1936 (Latest Amendments)
iii) Workmen's compensation Act 1923 (Latest Amendments)
iv) Contact labour regulation and abolition act 1970 and central rules 1971 (Latest

Amendments)

v) Apprentice act 1961 (Latest Amendments)

vi) Industrial employed (standing order) Act 1946 (Latest Amendments)

vii) Personal injuries (Compensation insurance) act 1963 and any other modifications with latest amendments.

viii) Employees' provided fund and miscellaneous provisions Act 1952 and latest amendment thereof.

ix) Shop and establishment act

x) Any other act or enactment relating thereto and rules framed there under from time to time.

40.0 Accidents

The contractor shall immediately on occurrence of any accident at or about the site or in connection with the execution of the work report such accident to the Architect / consultant. The contractor shall also such report immediately to the competent authority whenever such report is required to be lodged by the law and take appropriate actions thereof.

SPECIAL CONDITIONS OF CONTRACT

1.0 Scope of Work

The scope of work is to carry out the **CIVIL WORKS,** FOR ROAD CONSTRUCTION

2.0 Address of site

The site is located at "**SBI *CRM CAMPUS-II SECTOR-18 GURU GRAM"***

3.0 Dimension and Levels

All dimensions and levels shown on the drawing shall be verified by the contractor on the site and he will be held responsible for the accuracy and maintenance of the entire dimension and the levels. Figured dimensions are in all cases to be accepted and no dimension shall be scaled. Large-scale details shall take precedence over small – scale drawing. In case of discrepancy the contractor shall ask for clarification from the Architect / Consultant before proceeding with the work.

4.0 Notice of Operation

The contractor shall not carry out any important operation without the consent in writing from the Architect / Consultant.

5.0 Construction Records

The contractor shall keep and provide to the Architect / Consultant full and accurate records of the dimension and positions of all new work and any other information necessary to prepare complete drawings recording details of the work as constructed.

6.0 Safety of adjacent Structures and Trees

The contractor shall provide and erect to the approval of the Architect / Consultant such supports as may be required to protect effectively all structures and protective guards to trees which may be endangered by the execution of the works or otherwise take such permanent measures as may be required by the Architect to protect the trees and structures.

7.0 Temporary Works

Before any temporary works are commenced, the contractor shall submit at least 7 days in advance to the architect / consultant for approval complete drawings of all temporary works he may require for the execution of the works. The contractor shall carry out the modifications relating to strength, if required by the architect / consultant may require in accordance with the conditions of contract at his own cost. The contractor shall be solely responsible for the stability and safety of all temporary works an unfinished works and for the quality of the permanent works resulting from the arrangement eventually adopted for their execution.

8.0 Temporary Roads

The contractor shall provide access roads to the site from the nearest main road at no extra cost and as directed by the architect / consultant. The contractor shall also responsible for proper maintenance of this access road and would take all care to see that existing services, if any, are maintained in working order at his own cost. The laying and maintaining the temporary roads within the site area shall be the contractor's responsibility and the contractor shall take such measures that are necessary and as directed by the architect / consultant.

9.0 Water, Power and Other Facilities

a) The rate quoted by the contractor shall include all expenses that are required for providing all the water required for the work and the contractor shall make his own arrangements for the supply of good quality water suitable for the construction and good quality drinking water for their workers. If necessary, the contractor has to sink a tube well / open well and bring water by means of tankers at his own cost for the

purpose. The SBI will not be liable to pay any charges in connection with the above.

The rate quoted in the tender shall include the expenses for obtaining and maintaining power connections and shall pay for the consumption charges.

The contractors for other trades directly appointed by the SBI shall be entitled to take power and water connections from the temporary water and power supply obtained by the contractor. However, the concerned contractor shall make their own arrangements to draw the supply and pay directly the actual consumption charges at mutually agreed rates between them. All municipal charges for drainage and water connection for construction purposes shall be borne by the contractor and charges payable for permanent connections, if any, shall be initially paid by the contractor and the SBI will reimburse the amount on production of receipts.

b) The SBI as well as the Architect / Consultant shall give all possible assistance to the contractors to obtain the requisite.

c) Permission from the various authorities, but the responsibility for obtaining the same in time shall be of the contractor.

10.0 Office Accommodation

a) The contractor shall provide and maintain all necessary offices, workshops, stores, shelters, sanitary facilities, canteens and other temporary structures for themselves in connection with the work at the site own cost after getting the approval from the architect / consultant.

b) All temporary buildings and facilities as mentioned above shall be removed on completion of the work or at any other earlier date as directed by the architect / consultant.

All the expenses for obtaining statutory approvals and maintenance of the above facilities as well as running expense shall be borne by the contractor at no extra cost. It is also the responsibility of the contractor to obtain statuary approvals for providing the above facilities.

11.0 Facilities for Contractors' Employees

The contractor shall make his own arrangement for the housing and welfare of his staff and workmen including adequate drinking water facilities. The contractor shall also make his arrangements at his own cost for transport where necessary for his staff and workmen to and from site of work at his own cost.

12.0 Lighting of Works

The contractor shall at all times provide adequate and approved lighting as required for the proper execution and supervision and inspection of works.

13.0 Fire Fighting Arrangements

i) The contractor shall at all times provide suitable arrangements for the fighting at his own cost. For this purpose he shall provide requisite number of fire extinguishers and adequate number of buckets, some of which are of be always kept filed with sand and some with water. These equipments shall be provided at suitable prominent and easily accessible places and shall be properly maintained.

ii) Any deficiency in the fire safety or unsafe conditions shall be corrected by the contractor at his own cost and to the approval of the relevant authorities. The contractor shall make the following arrangements at his own cost but not limited to the following :

a) Proper handling, storage and disposal of combustible materials and waste.

b) Worked operations which can create fire hazards.

c) Access for the fire fighting equipments.

d) Types, number and location of containers for the removal of surplus materials and rubbish.

e) Type size, number and location of fire extinguishers or other fire fighting equipment.

f) General house keeping.

14.0 Site Order Book.

A site order book shall be maintained at site for the purpose of quick communication between the Architect / Consultant. Any communication relating to the works may be conveyed through Records in the site order book. Such a communication from one party to the other shall be deemed to have been adequately served in terms of contract. Each site order book shall have machine numbered pages in triplicate and shall carefully maintained and preserved by the contractor and shall be made available to the Architect / Consultant as and when demanded. Any instruction which the Architect / Consultant may like to issue to the contractor or the contractor may like to bring the architect / Consultant may like to issue to the Contractor or the Contractor may like to bring to the Architect / Consultant two copies of such instructions shall be taken from the site order book and one copy will be handed over to the party against proper acknowledgment and the second copy will be retained for their record.

15.0 Site Meetings

Site meetings will be held to review the progress and quality evaluation. The contractors shall depute a senior representative along with the site representative staff of approved sub-contractors and suppliers as required to the site meetings and ensure all follow up actions. Any additional review meetings shall be held if required by the Architect / Consultant.

16.0 Disposal of Refuse

The contractor shall cart away all debris, refuse etc. arising from the work from the site and deposit the same as directed by the Architect / Consultant at his own cost. It is the responsibility of the contractor to obtain from the locate authorities concerned to the effect that all rubbish arising out of contractor's activities at the construction site or any other off-site activities borrow pits has been properly disposed off.

17.0 Contractor to Verify Site Measurement

The contractor shall check and verify all site measurements whenever requested by other specialists' contractors of other sub contractors to enable them to prepare their own shop drawings and pass on the information with sufficient promptness as will not in any way delay the works.

18.0 Displaying the Name of the Work

The contractor shall put up a name board of suitable size as directed by the Architect / Consultant indicating there in the name of the project and other details as given by the Architect/ Consultant at his own cost remove the same on completion of work.

19.0 Bar Bending Schedule

The contractor shall prepare a detailed bar bending schedule for all reinforced concrete works and got them approved by the Architect / Consultant well in advance.

20.0 As Built Drawings

i) For the drawing issued to the contractor by the Architect/Consultant. The Architect /

will issue two sets of drawings to the contractor for the item for which some changes have been made. From the approved drawings as instructed by the SBI / Architect / Consultant. The Contractor will make the changes made on these copies and return these copies to the architect / consultant for their approval. In case any revision is required or the corrections are not properly marked the Architect / Consultant will point out the discrepancies to the contractor. The contractor will have to incorporate these corrections and /or attend to discrepancies either on the copies as directed by the Architect / Consultant and resubmit to him for approval. The Architect / Consultant will return one copy duly approved by him.

ii) For the drawings prepared by the Contractor, the Contractor will modify the drawing prepared by him wherever the changes are made by the SBI / Architect / Consultant. And submit two copies of such modified drawings to the Architect / Consultant for approval. The Architect / Consultant will return one copy of the approved drawing to the Contractor.

21.0 Approved Make

The Contractor shall provide all materials form the list of approved makes at his own cost. The Architect / Consultant may approve any make / agency within the approved list as given in the tender after inspection of the sample / mock up.

22.0 Procurement of Materials

The Contractor shall make his own arrangements to procure all the required materials for the work. All wastage's and losses in weight shall be to the contractors account.

23.0 Excise Duty, Taxes, Levies etc.

The contractors shall pay and be responsible for payment of all taxes, duties, levies, royalties, fees cess, or charges in respect of the works including but not limited to sales tax, tax on works contract excise duty, and octroi, payable in respect of materials, equipments plant and other things required for the contact. All of the aforesaid taxes, duties, levies, fees and charges shall be to the contractors account and the SBI shall not be required to pay any additional or extra amount on this account. Variation of taxes, duty fees, levies etc if any, till completion of work shall be deemed to be included in the quoted in the quoted rates and no extra amount on this account. Variation of taxes, duties, fees, levies, etc if any till completion of work shall be deemed to be included in the quoted rates and no extra claim on this account will in any case be entertained. If a new tax or duty or levy or cess or royalty or octroi is imposed under as statue or law during the currency of contract the same shall be borne by the contractor.

24.0 Acceptance of Tender

The SBI shall have the right to reject any or all tenders without assigning any reason. They are not to bound to accept the lowest or any tender and the tenderer shall have no right to question the acts of the SBI. However, the adequate transparency would be maintained by the SBI.

GENERAL SAFETY CODE

1. First aid appliances including adequate supply of sterilized dressing and cotton wool shall be kept in a readily accessible place.
2. An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.
3. Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from the ground.
4. No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm (Clear) and the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding ladder.
5. Every opening in the floor of a building or in a working platform be provided with suitable means to prevent to fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one meter.
6. No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.
7. Workers employed on mixing and handling material such as asphalt, cement mortar or concrete and lime mortar shall be provided with protective footwear and rubber hand-gloves.
8. Those engaged in welding works shall be provided with welder's protective eye-shields and gloves.
9. I)No paint containing leads or lead products shall be used except in the form of paste or readymade paint.

   ii)The workers should supply suitable facemasks for use when the paint is applied in the form of spray or surface having lead paint dry rubbed and scrapped.
10. Overalls shall be supplied by the contractor to the painters and adequate facilities shall be provided to enable the working painters to wash during the periods of cessation of work.
11. Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition.
12. The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.

Contractor's Signature & Stamp

Scaffolds

i) Suitable scaffolds i.e Steel tubular scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration work which can be done safely from ladders. When a ladder is used, it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 400 mm and a maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than 1/4 to 1(1/4 horizontal and 1 vertical).

ii) Scaffolding or staging more than 4 m. above the ground floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly bolted, braced or otherwise secured, at least 1 m. above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

iii) Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform, gangway or stairway is more than 4 m. above ground level or floor level, they shall be closely boarded and shall have adequate width and be suitably fenced as described in (ii) above.

iv) Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of Persons or materials by providing suitable fencing or railing whose minimum height shall be l.0 m.

Wherever there are open excavations in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

v) Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m. in length while the width between side rails in rung ladder shall in no case, be less than 290 mm. for ladder up to and including 3 m. in length. For longer ladders this width shall be increased at least 20 mm for each additional meter of length.

vi) A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to construction.

Other Safety Measures

vii) All personnel of the contractor working within the plant site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal workers shall be provided with safety gloves. Persons employed on metal cutting and grinding shall wear safety glasses.

viii) Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.

Excavation & **Trenching**

ix) All trenches, 1.25 m. or more in depth shall at all times be supplied with at least one ladder for each 30 m. in length or fraction thereof. The ladder shall be extended from bottoms of the trench to at least 1.0 m. above the surface of the ground. Sides of trenches which are 1.5 m. or more in depth shall be stepped back to give suitable slope or securely held by timber bracing so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

x) The contractor shall take all measures on the site of the work to protect the public from accidents and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any persons for injury sustained owing to neglect of the above precautions and to pay any such persons or which may with the consent of the contractor, be paid to compromise any claim by any such person.

Demolition

xi) Before any demolition work is commenced and also during the process of the work:

a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.
All practical steps shall be taken to prevent danger to persons employed from the risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

Personal Safety Equipments

xii) All necessary personal safety equipment as considered adequate by the Engineer should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned.

a) Workers employed on mixing asphalting materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

b) Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes shall be provided with protective goggles.

c) Those engaged in welding works shall be provided with welder's protective eyesight lids.

d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

e) When workers are employed in sewers and manholes, which are in use, the contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into manholes and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.

f) The contractor shall not employ men below the age of 18 years and women, on the work of painting with products containing lead or any toxic material in any form. Wherever men above the age of 18 are employed on the work of such painting the following precautions should be taken:

i) No paint containing lead or lead products shall be used except in the form of paste or readymade paint. Paints like vinyl and epoxies having toxic fumes should be applied after following all precautions laid down by manufacturers.

ii) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

iii) Overalls shall be supplied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

xiii) When the work is done near any public place where there is risk of drownings all necessary equipment's should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

xiv) All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use.

Adequate washing facilities should be provided at or near places of work.

xvi) These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.

xvii) To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer, Engineers of the Department or their representatives.

xviii) Workers handling construction chemicals shall be provided with safety equipments like, over gowns, hand gloves, goggles etc. as per the precautions prescribed by the

construction chemical manufacturer.

xix) Notwithstanding the above clause from (i) to (xix), there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

PROFORMA FOR RUNNING ACCOUNT BILLS

C E R T I F I C A T E

The measurements on the basis of which the above entries for the Running Bill No._____ were made have been taken jointly on _____ and are recorded at pages _____ of Measurement Book No. _____.

Date & Signature of Contractor.	Date & Signature of Architect's Representative (Seal).	Date & Signature of Site Engineer

The work recorded in the above mentioned measurements has been done at the site satisfactorily as per tender drawings, conditions and specifications.

ARCHITECT
ENGINEER

SITE ENGINEER / BANK's

Contractor's Signature & Stamp

RUNNING A/C BILL

Name of Contractor/Agency: _____

Name of Work: _____

Sr. No. of this Bill: _____

No. and Date of Previous Bill. _____

Reference to Agreement No. _____

Date of Written Order to Commence._____

Date of Completion as per Agreement._____

Sr. No.	Item description	Unit	Rate (Rs.)	As per Tender		Upto Previous R/A Bill		Upto Date (Gross)		Present Bill		Remarks
				Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	
1.	2.	3.	4.	5.		6.		7.		8.		9.

Note: 1. If Part Rate is allowed for any Item, it should be Indicated with reasons for allowing such a Rate.

2. If Adhoc Payment is made, it should be mentioned specifically.

Net value since Previous Bill.

Date & Signature of Contractor.

PERFORMA FOR APPLICATION BY CONTRACTOR FOR EXTENSION OF TIME

1. Name of the Contractor
2. Name of the Work as given in the Agreement
3. Agreement W O
4. Tender Amount
5. Date of Commencement of Work
6. Period allowed for Completion as per Agreement
7. Date of Completion as per Agreement
8. Period for which Extension of Time has been given

	Date	**Month**	**Year**
a) 1st Extension vide Bank's Letter No			
b) 2nd Extension vide Bank's Letter No			
c) 3rd Extension vide Bank's Letter No			

9. Reasons for which extensions have been previously given (Copies of the previous applications should be attached)

10. Period for which extension is applied for and the reasons thereof including hindrances, time for extra work assigned, if any etc.

Signature of Contractor & Seal

PERFORMA OF HINDERANCE REGISTER

Name of Work	:	Date of State of Work	:
Name of Contractor	:	Period of Completion	:
Agreement No	:	Date of Completion	:

Sr No	Nature of Hindrance	Date of occurrence of Hindrance	Date of which Hindrance was removed	Period of Hindrance	Signature SE / PE	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**

SE = Site Engineer

PE = Project Engineer

ACCOUNT OF SECURED ADVANCE, IF ADMISSIBLE ON MATERIALS HELD AT SITE BY THE CONTRACTOR

No.	Item	Quantity	Unit	Amount	Remarks
1	2	3	4	5	6

Total Value of Materials at Site

Secured Advance @……% of above Value B

CERTIFIED (I) That the materials mentioned above have actually been brought by the contractor to the site of the work and no advance on any quantity of any of this item is outstanding on their security, (ii) that the materials are of imperishable nature and are all required by the contractor for use in the work in connection with the items for which rates of finished work have been agreed upon.

Dated Signature of Site Engineer

Preparing the Bill Designation_____

Dated Signature of Bank's Architects

(Name of the Architects)

_____

Dated signature of Contractor

SPECIFICATIONS

1. General:

1.1 Without forgoing the requirements of the Conditions of Tender and the Conditions of Contract the works in general shall confirm to the "Latest Specifications" published by CPWD, New Delhi and the "Specifications for Works" stated in this tender. In case of items not covered by the General Specifications referred above, reference shall be made to the appropriate I.S. Code. If there is any difference in the particular specifications of individual item of work and the description of item as given in the Schedule of Quantity, the latter shall prevail. In case of any work for which there is no specification in I.S. Specifications or in the specifications forming part of tender documents or in case there is any variation, such work shall be carried out in all respects in accordance with the instructions to be issued by the Architects. The term Department shall mean the Employer. Any reference to ISI shall also mean reference to its successor Bureau of Indian Standards. All corrections to "Latest Specifications" or revisions of I. S. shall be deemed to apply to this contract.

1.2 Materials bearing ISI certification mark shall be given highest preference for use in the works.

1.3 Where the Contractor is required to do, perform, execute (etc.) any work or service or the like, it shall be deemed to be at his own cost. Absence of terms providing supplying, installing, fixing, etc. shall not even remotely entitle the Contractor to any additional payment thereof.

1.4 The rates accepted in the Schedule of Quantities apply to all floors, heights, depths, leads, lifts, spans, sizes, shapes, locations, etc. unless a distinction has been included in the very Schedule.

1.5 The Specifications and the Schedules may have been divided into various sub-heads for convenience only. This does not limit applicability of one to the other nor it absolves the Contractor of his responsibility to complete any trade/item of work as reasonably inferred from one or more of such sub-heads.

1.6 The Schedule of Quantities is not necessarily based on "Schedule of Rates – Delhi 2013 or any of its later/earlier versions. Hence the Schedule of Quantities shall be read and construed according to explanations given herein and intentions gathered there from. A mere parallel drawn from the said Schedule of Rates shall therefore not form a basis for a variation and, or additional payment.

1.7 All work under this contract is deemed to be performed above subsoil water level. However, removal of water collected from rains and the like shall be treated as part of contractual risk/obligation.

1.8 Screws, bolts, nuts, washers, hold fasts, lugs, anchors, clamps, plugs, suspenders, brackets, straps and fasteners of the like are deemed to be included in the rates of various items unless the Schedule of Quantities expressed a different intention.

1.9 Resetting any displacements, making good holes/chases and such other incidental jobs are included in rates of respective items for which these are required.

2) Wood Work:

a) The areas of doors & windows shutters shall be measured to the nearest cm in closed position covering the rebates of the frame but excluding the gap between the shutter and the frame. Over lap of two shutters shall not be measured. All work shall be measured for finished dimensions. No allowance shall be made for dimensions supplied beyond those specified. Length of each piece shall be measured overall nearest to 1 cm, so as to include projections for tenons, scraves or mitres, width and thickness shall be measured to the nearest mm.

b) Where painting, Polishing has been included in the item the same shall be executed as per Architect's directions. Painting shall be two or more coats of approved synthetic enamel plus a coat of fire resistant primer to wood work as approved by Architect and shall conform to BS-476 part 7 for class I surface spread of flame. Preparations of surfaces, fillars, etc. are included. This primer shall also be applied before polishing (i.e. French Spirit Polish). The fire resistant primer shall be measured & paid separately in the relevant item.

c) All flush door shutters shall have teak lipping on all edges as directed with extra thickness of

lipping of meeting edges of double shutter doors.

i) Glasses 5.5mm thick or 4mm thick shall respectively weigh not less than 13.75 Kg/sqm.

Or 10 Kg/sqm.

ii) Bends, stepping and circular shapes in railings are integral part of the rate.

iii) The widths of various rails & styles shall be as described in the items or shown in the drawing. All aluminum section & fittings used shall be ISI marked. All screws for fixingof fittings/fixtures shall be of matching finish.

iv) In case of composite units (M.S. frame + teak wood shutter) the hold fasts shall be added or fixed with counter sunk machine screws. Also the M.S. frames shall have necessary holes and other arrangement for receiving/fixing of fittings

3.0 Plaster of Paris Punning (P. O. P.)

If the plaster surface is to be finished with plaster of paris punning, the surface shall be combed slightly with the wire brushes or nails before it is completely set to form key for plaster of Paris punning. The surface shall be thoroughly cleaned of dust then only damped but not soaked before the application of plaster of paris punning. The Gypsum for preparing punning shall be approved quality. It shall be dry and free from lumps and shall be suitably packed in watertight bags or containers. Paste shall be prepared by adding required quantum of water and it shall be used before it sets. No dropping paste shall be used in the work. Punning shall be applied to the prepared surface with steel trowel to a thickness required to make the surface produce perfectly smooth and even surface working from top to bottom. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of paris mixed with water, then sand papering the same after it is dry. Pilling in plaster shall be made good with plaster of paris mixed with colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. The surface shall be allowed to dry thoroughly before the regular coat of paint is applied. The measurement shall be in square meter.

4.0 Plastic Emulsion Paint:

Plastic emulsion paint shall be of approved manufacturer and shall generally confirm to IS-5411 (Part-I)-1969.

The colour and shade of the emulsion shall be got approved by the Architect. Double scaffolding shall be used, ladden if used shall be tied with old gunny bags at top to prevent damage or scratches to the walls. The instructions of the manufacturer shall be followed, in application of priming and finishing coats. Turpentine or any other solvent shall not be used for thinning the paint.

Minimum 3 coats of paint shall be applied inclusive of primer coat. If a proper and even surface is not obtained to the satisfaction of the Architects in 3 coats, Contract shall carry out additional coats of painting to approval at his expenses. Care shall be taken that dust or other foreign material does not settle or disfigure the various coats. The measurement shall be in square meter.

5.0Miscellaneous:

The work of cupboard/cabinets shall be done as per drawings. The depth of cupboards shall be as shown in drawings. The work includes holdfasts and other accessories usually required for complete installation. All inner surfaces shall be painted & outer face polished as per Architects approval.

All exposed cut ends of boards shall be provided with hardwood lippings.

Kail wood to be used shall be of the best available quality.

The joints in cement concrete pavements/roads shall be formed as per design and pattern. The joints shall be cleaned and neatly filled with 'A' grade sealing compound. Side kerbs shall be made in situ to design and volume paid for in the same item. Required side forms shall not be paid separately.

For whitewashing, colour washing, distempering on sand faced plaster or on rough cast plaster with stone aggregate upto 10mm, only flat single surface will be measured and paid.

In the case of R.C.C. Jallies upto 50mm thick only single flat surface will be considered for each side of painting.

ELECTRICAL SPECIFICATIONS

1.01 It is not the intention to specify completely herein all aspects of design and constructional features of equipment's and details of the work to be carried out, nevertheless, the equipment and work shall confirm in all respects to high standards of Engineering, Design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the owner who will interpret the meaning of the specifications and drawings and shall have right to reject or accept any work or material which in his assessment is not complete to meet the requirements of this specifications and / or applicable code and standards mentioned elsewhere in this specifications.

2.00 **SCOPE OF WORK**

The scope of work under this specifications shall include design, manufacture, testing, supply, storage, erections, testing and commissioning of following items for complete electrification including labour, tools, tackles and plants etc. as required.

2.01 A) Lighting system for the indoor and outdoor areas of the building complete with switchboards, switches, receptacles, wires, conduits, Earthling and their accessories etc. as required.

B) SERVICES

a) For Electrical points, telephone, fire alarm system wiring, cabling connections and their terminations at required points with respective accessories.
b) Laying of conduits, made of PVC/MS with respective accessories.
c) Panel and distribution boards with accessories and their terminations.
d) Raising mains/sub-mains/bus ducts with accessories and their terminations.
e) Earthing system.
f) The scope of work shall also include all minor/ civil works associated with lighting, power panels, Distribution boards, Cables, cable trays, conduits either on surface or in walls or ceiling for light points, switch boxes cutting and chasing the walls, ceiling including refilling, plastering the same.

g) Materials and components not specifically mentioned in the specifications but necessary for satisfactory installations and operations of the system mentioned therein shall be deemed to have been included in the scope of work of this specification and NO extra payment shall be made for the same.

2.02 The installation shall comply in all respects with the requirements of Indian Electricity Act 1910 as amended up to date. Indian Electricity Rules 1956, there under and special requirements, if any of the state electricity boards etc.

2.03 **RATE**

A) The rate of the wiring points (light, fan, plug, bell) given in the schedule of work shall be irrespective of the length of the points. Circuit wiring of these points shall not form part of the rate. The point wiring shall be carried out with 3/0.029 copper conductor PVC insulated 650/1100 volts grade wire with the circuit wiring shall be 3/0.036 copper conductor. For power point wiring shall be with 7/0.036 copper conductor PVC insulated 650/1100 volts grade wire including earth conductor of minimum size of 14 SWG bare / copper shall be part of the point wiring.

B) Separate wiring shall be made for each wiring system such as NORMAL, EMERGENCY, and TELEPHONE etc. No extra payment shall be made to the contractor on this regard.

c) Point wiring shall consist of circuit wiring from final/sub-distribution board together with controlling switch, ceiling rose or any other approved termination or socket outlet with switch.

d) Wiring shall be done in LOOP IN system and phase or line wire shall be looped at switch box and neutral conductor shall be looped from point.

2.04 DRAWINGS

i) Few drawings showing general layout of building and distribution as such are enclosed with these specifications or can be seen at consultant/ Architect's office. These drawings are meant to give a general Idea to bidder regarding the nature of work covered by these specifications.

ii) No information/Data shown/not shown in these drawings shall relieve the contractor of his responsibility to carry out the work as per these specifications and or drawings after the award of the work. Prices shall not be subject to variation after award of work due to difference in drawings and actual construction drawings released from time to time.

iii) Contractor shall prepare and submit to the consultant for his approval, detailed shop drawings of all system of wiring, Distribution boards, panels etc. All work shall be carried out on the approval of these drawings, however approval of these drawings does not release the contractor of his responsibility with the intent of the specifications.

2.05 **ERECTION OF CONDUITS**

a) The conduit shall be properly and tightly screwed between the various lengths and into the boxes through which it runs and terminals so that the wiring is continuously, and effectively protected through out its entire length. No part of the conduit shall be under mechanical stress and the whole conduit system shall be electrically and mechanically continuous through out.

b) Corners shall be turned by means of easy bends or sets made without altering the section or opening the same. The radius of every conduit bends shall be such as to allow compliance with regulation B-32 of I.E.E. regulations for bends. in cable; and in addition the inner radius of the bend shall not be less 2.5 times the out side diameter of the conduit.

c) Where conduits are connected by means of a socket, the ends of the conduit shall be put together in the centre of the socket, and in the case of running joints no exposed shall be visible after erection.

2.06 **FIXING OF BOXES**

(a) All boxes, except those for external works, shall be securely fixed by means of counter sunk screws, minimum size 40mm No.8 using approved type rawl plugs.

(b) At least one screw shall be used for fixing standard circular boxes and adaptable boxes up to 100mm size. A minimum of four fixing screws shall be used for larger boxes.

(c) In all cases, the fixing holes shall be suitable for counter sunk screws, so that the screws heads do not project into the boxes and all screws driver burrs shall be removed before cables are drawn in.

(d) For external work and other particularly damp situations, galvanised cast iron, weatherproof boxes with external fixing lugs shall be used.

(e) In addition to the external fixing, the boxes shall be supported by saddles spaced not more than 150mm on each side of the box Fixing holes shall not be drilled in the box.

2.07 **EARTHING**

(a) Cypriot 14 swg minimum copper bare earth wire or insulated wire as specified is to be drawn in each conduit for earthing the general light and power outlet up to 230 volts and 2 for 415 volts. Earth conductor size shall be in accordance with I.E. Rules table D-2.

(b) The earth conductor shall be terminated by means of drilling two holes in the conduit box, the earth wire shall pass through one hole to the outside of the box and shall be connected by means of a rose Courtney type washer to a 3/8", 2" BA round headed brass screws which shall be bolted into the second hole. Two washers and two nuts shall be used with each screw.

(c) A similar arrangement to the above shall be used at the termination to the equipment or by any other approved manner, meeting with the approval of the Engineer.

2.08 **INSTALLATION OF SWITCHES, SOCKETS & ACCESSORIES**

All the switches shall be wired on phases connections shall be made only after testing the wires for continuity, cross phase etc. with the help of a switches, sockets, fan, regulator etc. shall be housed in proper sheet steel enclosure with PVC/Perspex sheet. Regulators shall be fixed on adjustable MS flat straps inside the enclosure. The arrangement of switches and sockets shall be neat and systematic covers for enclosures accommodating switches, sockets, etc.(point control boxes) shall be of 5mm thick. fine finished PVC/PERSPEX material/hylam are fixed to the enclosure in plumb with counter sunk head, chromium plated brass screws. outlets shall be terminated into a ceiling rose for fan points and into auto way wall plug sockets, the conductors may be terminated directly into the switches and sockets. The outlets, point control boxes etc. shall be set out as shown on the drawings. Before fixing these, the contractor shall obtain clearance from the Engineer/Architect with regard to their proper locations. The enclosures of sockets/and 3rd pin of the sockets shall be connected to the ground through a proper size earth continuity wires as laid out in standard specifications no. MV-150.

2.09 **POSITION OF POINTS,DISTRIBUTION BOARDS & SWITCHBOARDS**

a) The recommended position of the light point, control switches, distribution boards as shown on the drawings shall be adhered to as far as practicable. In case of location changes due to Architectural requirements, no extra payments will be made on this account.

b) Should there be any discrepancy or incomplete description ambiguity or emission in the drawings or in other documents whether original or supplementary forming the contract, the tenderer shall immediately on discovering the same shall draw attention of the Architect / consultant.

c) Before commencement of work, the exact final position of all points, switch boxes and the distribution boards shall be ascertained by the tenderer from the Architects / Consultants.

2.10 **SAMPLES**

The contractor shall submit 2 sets of samples of accessories and apparatus, he proposes to use in the installations, at site for approval a required. This specification shall not be departed from without any written instructions from the consultants.

2.11 **MANUFACTURER'S INSTRUCTIONS.**

Where manufacturers have furnished specific instructions relating to the material/ equipment to be used in this job, covering points, not specifically mentioned in these documents, manufacturer's instructions shall be followed.

2.12 **MATERIALS AND EQUIPMENTS**

All the materials and equipments shall be of approved make and design, Unless otherwise called for, only the best quality materials and equipment shall be used.

TECHNICAL SPECIFICATIONS

MATERIAL AND WORKMANSHIP

1. All Materials brought on site of works and meant to be used in the same shall be the best of their respective kinds and to the approval to the architects/Employer.

2. Samples of all materials shall be got approved by the Architects/Employer and shall be deposited with him before the order for the material is placed with the suppliers. The material brought on the works shall confirm in every respective with approved samples.

3. The contractors shall check each fresh consignment of materials as it is brought on the site of the works, to see that they confirm in all respects to the satisfactions and/or samples approved by the Architects.

4. The Architects/Employer will have the option to have any of, the materials tested to find whether they whether they are accordance with the satisfaction and the contractor will bear all expenses in that connection. All bills, vouchers and test certificates which, in the opinion of the Architects/Employer or the representative, as necessary to convince him as to the quality of the materials of their suitability shall be produced for his inspection on requisition Testing charges, if any shall have to be borne by the contractor.

5. Any material that have not been found to confirm to the specification will be rejected forthwith and shall be removed from the site by the contractors within 48 hours at their own cost.

6. The Architect/Employer shall have power to cause the contractors to purchase and use such materials, from any particular source, as may in his opinion be necessary for the proper execution of the work.

7. Workmanship: All works shall be to level plumb and square comers, edges and arises in all cases shall be unbroken and finished neat.

8. Skilled miseries for the respective trades shall employed by the contractors to check to the work in progress and to instruct and extract the right kind of workmanship from the men employed on the works Instructions given to such mistries by the architect or his representative shall be carried out with a view to get the work executed in a neat and workman like manner according to these specification.

9. The Architect/Employer may order the inspection any finished work as he chooses and in a manner he decides, and the contractors shall bear all expenses in the connection. If the results of such inspection prove that the workmanship is not of the standard required, the work will be rejected and removed forthwith and he replaced by works of the accepted standard of quality.

2.11 HARDWARE & METALS:

2.12 Tables side units back units consoles or other articles as per schedule of quantities shall be deemed to be inclusive of all the hardware required e.g. locks, sliding channels handles / knobs, bolts screws PVC buffers for the legs of sofas chairs tables etc. as per instructions of engineer in charge.

2.13. Screws are to match the finish of the articles to be fixed and to be round or flat headed or counter sunk as required.

2.14 The contractor should cover up and protect the brass and bronze surfaces with a thick grease or other suitable protective materials renew as necessary and subsequently clean off and clear away join completion.

2.15 Aluminum and stainless steel shall be of approved manufacturer and suitable for its particular application. Generally, surface of aluminum shall have an iodized finish or powder coated finish and both shall comply with the samples approved by the Architects/Employer All stainless steel sheets shall be 304 s.s. Japan or equivalent with gauge as specified but not thinner than 16 gauge. All exposed steel surfaces shall also have powder coated finish and shall completed with samples approved by Architect/Employer.

2.16 All steel, brass, bronze, aluminum and stainless steel articles shall be subjected to a reasonable test for strength if so required by the Architect /Employer at the contractor 's expense.

2.17 All branching and welding are to be executed in a clean and smooth manner rubbed down and left in the flattest and tidiest way, particularly where exposed.

2.18 Chromium plating shall be in accordance with IS standard or as per approved specification for normal outdoor conditions and shall be on a base material of copper brass or as specified.

2.19 GLAZING:

2.20 All glass is to be of approved manufacturer of approved quality and shall be free from bubbles, smokes, waves, air holes and other defects.

2.21 While cutting glass, proper allowance by made for expansion. Each square of glazing to be in one whole sheet. On completion of work, all glass shall be cleaned inside and outside and all cracked scratched and broken panes shall be replaced and left in a good condition.

2.22 All exposed edges of glass shall be lead polished.

WORKMANSHIP

This specification is for work to be done, item to the supplied and materials to be used in the works as shown and defined the drawings and described herein, all under the supervision and to the satisfaction of the Architects/Employer.

1.1 The workmanship is to be the best available and of a high standard. Use must be made of special tradesmen in all aspect of the work and allowance must be made in the rates for doing so.

1.2 The materials and items to be provided by the contractor shall be approved by the Architects/Employer in according with any samples which will be submitted for approval by the contractor and generally in accordance with the specifications. Also if products are specified in the specification and/or bill of brand trade name or catalogue reference the contractor will be required to obtain the approval of the Architects before using the materials. The contractor shall produce all invoice, vouchers or receipts for any materials if called upon to do so by the Architects/Employer.

1.3 Samples of all materials are to be submitted to the Architect for approval before the contractor orders or delivers the materials at site. Samples together with their packing are to be provided free of charge by the contractor and should an materials be rejected they will be removed from the site at the contractors expenses. All samples will be retained by the Architects/Employer for comparison with the materials which will be supplied. The contractors submit specimen finish of colors, fabrics, etc. for the approval of the Architect before proceeding with the work.

1.4 The contractor shall be responsible for providing and maintaining any boxing or other temporary coverage required it the protection of dresses or finished work if left unprotected. He is also to clean out all shelving cut ends and other waste from all parts of the works before coverings or in-fillings are constructed.

1.5 Templates, boxes and moulds shall be accurately set out rigidly constructed so as to remain accurate during the tin. they are in use.

1.6 Only the class workmanship will be accepted contractor shall maintain uniform quality and consistency in workmanship throughout.

2.0 **JOINERY**

2.1. Joinery is to be taken up immediately after the placing of the contract frame-up, bonded and wedged up. Any portions that are warped or found with other defects are to be replaced before wedging up. The whole of the work is to framed and finished in a proper workman like manner in accordance with the detailed drawings, wrought and whenever required, fitted with all necessary metal ties, straps, bolts, screws glue etc. Jointers work, generally to be finished with fine sand glass paper.
2.2. Joints: All joints will be standard mortise and tenon, dowel, dovetail, and cross halved. Nailed or glued butt join will not be permitted. Screws nails etc. will be standard iron or oxidized and of nettle fold make joint less state otherwise. Where mortise and tenon joints are used, tenons should fit the mortises exactly. In respect of points in the hollock timber frame wash in sofas the joints should confirm to the best practice in the trade.
2.3. Nailed or glued butt joints will not be permitted, except in exceptional cases with approval of Architects/Employer
2.4. Where screws shown on a finished surface, these will be sunk and the hole plugged with a wood plug of the san wood and grain of the finished surfaces unless detailed otherwise. Nails on finished surfaces will be nearly punches and the hole filled with wood filler to match the color.
2.5. Should Joints in joiner's work open, or other defects arise within the period stated for defect liability in the contract and the clause thereof, such defective joinery shall be taken down and refilled, redecorated and/or replaced necessary and any work disturbed shall be made good at the contractor's expense.
2.6. Nails, spikes and bolts shall be of lengths and weights approved by the Architects/Employer Nails shall complete with IS 1959-1960 or equivalent approved quality sample. Brass hedge nails are to comply with B.S. 1210. Wire staple shall comply with B.S. 1494 or equivalent.
2.7. The contract surface of dowel, wedges etc. shall be glued with an approved adhesive.
2.8. Where glued Joinery and carpentry work is likely to come into contract with moisture, the glue shall be waterproof.
2.9. All dovetail joints shall be further strengthened with M.S. Cleats for cabinet furniture like tables, storage units etc.
2.10. Where boards/plywood has to be fixed on another boards/plywood the two surfaces shall be fixed together by applying special carpenter's adhesive and headless nails.

3.0 PAINT AND POLISHES:

3.1 All materials required for the works shall be of specified and approved manufacturer, delivered to the site in the manufacturer's containers with the seals, etc., unbroken and clearly marked with the manufacturer's name or trade mark with a description of the contents and colour. All materials are to be stored on the site of the work.
3.2 Spray painting with the approved machines will be permitted only if written approval has been obtained from the Architect/Employer. The paint used for sparing is to be specially prepared by the manufacturer for spray Thinning of paint made for brushing will not be allowed.
3.3 Wood preservative shall be Ascu Green Saver or any other equal and approved impregnating wood preservative at all concealed wood work shall be treated with wood preservative.
3.4 All brushes, tools pots, kettles, etc. used in carrying out the work shall be clean and free from foreign matter and at to be thoroughly cleaned out before being used with a different type of class of material.
3.5 All iron or steel surfaces shall be thoroughly scraped and rubbed with wire brushes and shall be entity free from rusting mill scale etc. before applying the priming coat.
3.6 Surfaces of new wood work which are to be painted are to be rubbed down and cleaned to the approval of the Architects/Employer.

3.7 All exposed teakwood surfaces and teak ply surfaces and surfaces which are not treated otherwise shall be finish with stained polish to the required shade and melamine matt finish.
3.8 All exposed cedar wood surfaces and clear ply surfaces shall be finished with ready mixed wax polish to give nature shade.
3.9 The tendered rates shall include cost of seasoning and providing wood preservative and as given in the specification

4.0 POLISH:-

4.1 Pure shellac varying from pale orange to lemon yellow color free from resin or dirt shall be dissolved methylated spirit at the rate of 140 gm of shellac to 1 litre of spirit. Suitable pigment shall be added to get the required shade.

4.2 The surface shall be cleaned. All unevenness shall be rubbed from smooth with the sand paper and well sets if variable shall be covered with a preparation of red lead and the size land on white hot Hoes an mgehtations on the surface small be stopped with plazsr's putty. The surface shall then be given a coat of won filler by mixing whiting (ground chalk) in methylated spirit at the rate of 1.50kg of whiting per litre of spirit. The required staining agent shall be added to get the required sand. The surface shall again be rubbed down perfect smooth with glass paper and wiped clean.

4.3 The polishing rubber, the most important implement in French polish shall consist of a pad of cotton wool., which acts as a reservoir for the polish and a soft white linen or cotton fabric similar to a well worn handkerchief, which acts as a filter. The rubber must never be dipped in to the polish. It should be charged by pouring the polish on the pad with the cover remove.

4.4 The surface shall be worked upon evenly a slow figure of eight motion until the surface is coated with a thin layer of polish. The object shall be to apply a series to thin coats, allowing only a few minutes for drying between the coats, when a level and even bodied surface is obtained the work is considered ready for the second stage is spiriting off.

Allowing the work to stand for at least eight hours, a fresh rubber with a double thickness of cover material shall be rubber with a double thickness or cover shall be taken and charged with methylated spirit. The surface shall be sprite off to remove the rubber marks and to give the brilliance of finish. The rubber shall be worked in the direction grain an continued till the surface is free from smears and rubber marks and left to harden off.

5.0 MALAMINE FINISH:

5.1. The malamine finish shall be applied on the French spirit polished surface.
5.2. The malamine coat of clean hard glaze shall be applied with a cloth pad. The surface shall then be left in or/any for at least six hours and further coats area applied with a paint brush. If the duration of gap is move than 2 hours between coats, the previous coat shall be rubbed down 24 hours between paper or a medium grade of steel wool. The matt finish shall be contained by giving a final coat of clean Ronseal matt coat.

6.0 TIMBER:

6.1 The timber shall be of the species stipulated in the schedule of Quantities/Drawings.
6.2 (a) Teak wood shall be of C.P. Teakwood variety.
6.3 (b) Wood for frame work/rough wood shall be hollock even though drawings may show Kail.
6.4 All dimensions given in the schedule of quantities and drawings are the required finished size.
6.5 Timber shall be well seasoned and kiln dried with a moisture content of 12% nominal +2% for teakwood. The contractor should get the timber tested for moisture content of wood at his own cost as per the directions of the Architects/Employer.
6.6 All timber shall be treated with preservatives as directed.
6.7 All timber shall be free from worm holes, loose or dead knots or other defects and shall not suffer from warping splitting or other defects. All timber shall be approved by the Architect/Employer before use.

6.8 MDF BOARD/BLOCK BOARD/PLUWOOD/PARTICLE BOARD:
6.9 MDF boards block boards/plywood/particle board etc. as specified in the approved list of manufacturers shall only be used.
6.10 Only B.W.R. grade phenol formaldehyde bonded boards to be used.
6.11 MDF board shall comply with I.S. 12406-1988. Manufacturers specification shall be followed in the use of MDF boards for the various usages.

7.0 SHOP DRAWINGS:

The contractor shall submit for approval all joinery details for total furniture. Shop drawings shall relate to site measurements and shall show in detail the construction of various parts of the work, the method of jointing, thickness and type of material, the finishes to be applied to the various exposed surfaces, details of anchoring, joints, welds, fastening and all other relevant information.

8.0 LAMINATES:

8.1 Thickness of the laminate to be used shall be 1.0 mm.

8.2 Joints in laminates will not be permitted until and unless the same is unavoidable or is required as per the drawings.

Measurements: Length and breadth of the plan area of the finished work shall be measured correct to a cm. no defections shall be made for openings provided, nor shall extra material or labour involved in such openings. Rate shall include provision access panel with MDF panel.

9.0 Great care must be exercised in cutting the RCC slabs/beams to locate suitable reinforcement for welding the M.S. flats to be provided for suspension of false ceiling system. The damage to the R.C.C. member shall be made good with cement mortar 1:2 (1cement:2coarse sand). The projecting portion of the M.S. flat below the R.C.C. member and any other steel member in the false ceiling system shall be painted with one coat or red oxide paint.

10.0 The tendered rates shall apply for all floors heights. The tendered rates shall include backing of plastered surface wherever Dado/ wall lining with marble /granite stone slabs are envisaged and the back has been plastered.

TECHNICAL SPECIFICATION - FOR CIVIL AND STRUCTURAL

1. EARTHWORK

General:

Excavation, Backfilling and Leveling. Excavation shall confirm to the limits indicated on the drawings and shall not be made below the levels fixed by the Architects or Consulting Engineer except where rock is encountered or for removal of unstable materials is required and any additional coast for additional offset shall be borne by the contractor. Unless otherwise specified provision for shoring, pumping, dredging and bailing out water whether subsoil or rain water shall be at the contractors own expense. Rock excavation shall include removal of ledge rock, concrete or masonry structures which required drilling or blasting and boulders larger than half cubic yard in volume where trenches are in deep or bad grounds, the sides of the trenches shall be supported with suitable timbering. Trenches shall be backfilled in selected excavated materials in 8" layer and carefully rammed and consolidated with addition of water if required, and compacted to 95% of maximum density at optimum moisture content to preclude subsequent settlement.

1.1 INDIAN STANDARDS

All relevant Standards as specified elsewhere in this Volume are applicable. Indian Standards to be followed are:

1)	IS 1498	Classification and identification of soils for general Engineering purpose.
2)	IS 3764	Safety code for excavation Work.
3)	IS 4081	Safety code for blasting and related drilling operation.
4)	IS 6313	Part-1 Code of practice for anti-termite measures in buildings: constructional measures. Part-2Code of practice for anti-termite measures in buildings: Pre constructional chemical treatment measures.
5)	SP 27	Hand book of method of measurement of buildings works.
6)		Explosive Rules 1940.

1.2 SITE CLEARANCE

1.2.1 Prior to the start of any activity of earth work the area under construction shall be cleared of shrubs, vegetation, grass, brushwood, trees and saplings of girth up to 30cm measured at a height of 1 metre above ground level All rubbish must be removed and stacked at distance of 50 cm outside the periphery of the area clearance or location as decided by the Architect.

1.2.2 The rate of such clearance is to be included in the rate of other earth-work items.

1.3 SETTING OUT

1.3.1 Bench Marks and Reference Lines shall be finalized by the Site Engineer. The contractor shall prepare detailed setting out drawings based on the layout of Architectural drawings and those shall be submitted to the Architect prior to commencement of work.

1.3.2 The contractor shall do the setting out with the use of Theodolite or like instruments at site, based on details given to him. He shall erect timber profiles, masonry pillars, burjis etc. for his use. All markings on these shall be painted with red colour and they shall be maintained for the entire duration of the project. Setting out shall be approved by the Architect before the commencement of any work.

1.3.3 The rate for the earth work items shall include expenses for all such work including labour, material and equipment / instruments etc,

1.4 EXCAVATION IN SOILS

1.4.1 Excavation over area

Excavation exceeding 1 m in width as well as 10 sq. in plan and 30 cm in depth shall be considered as excavation over area.

1.4.2 Surface dressing

Trimming of natural ground, excavated surfaces and filled up areas to remove vegetation and / or small inequality not exceeding 15 cm in depth shall be described as surface dressing.

1.4.3 Rough excavation

Excavation not requiring dressing of sides and bottom and reduction to exact levels, such as winning earth from borrow pits, hill side cuttings, etc, shall be described as rough excavation.

1.4.4 Surface excavation

Excavation exceeding 1 m in width as well as 10 Sq mtr on plan but not exceeding 30 Cm in depth shall be considered as surface excavation.

1.4.5 Trenches for pipes / cables

It shall be detailed with nominal dia of pipe / cable. Required bottom width, allowance for concrete foundation for laying pipes, working area, grip required for socketed pipe, return fill, ramming and removal of surplus soil shall be part of this item unless otherwise specified. It shall generally be measured in running meter unless otherwise noted in the BOQ.

1.4.6 Post holes

Independent post holes (or similar holes) each exceeding 0-5 Cum Shall generally be-enumerated. Rate shall include return fill, ramming and removal of surplus soil.

1.4.7 General

1.4.7.1 The excavated earth shall be thrown or disposed off beyond 50 m periphery of the building Earth suitable for backfilling shall be stacked separately.

Subsequent disposal of the surplus and unsuitable material shall be as per the respective items. Foundations, trenches shall be dug out to the exact dimensions as shown in the drawing or as directed by the Architect,

1.4.7.2 In firm soil, the sides of the trench shall be kept vertical up to a depth of 2 m. If the trench is to be deeper, if shall be in the form of steps of 50 cm, at every 2 m depth This shall be suitably increased or decreased as per site conditions and type of soil met with This shall be to the approval of the Architect. Sloping of sides also may be adopted.

1.4.7.3 The bed of trenches shall be firmly consolidated and leveled by watering and ramming of the soft soil. Defective spots shall be dug out and filled with concrete of the same mix as of PCC or as directed by the Architect, Cost of digging and filling with concrete shall be paid extra if excavation and PCC is measured separately.

If excavation is done to a depth greater than that required, excess depth shall be back filled with the same mix as of PCC or as directed. Cost of such concrete shall be to the contractor's account.

1.4.7.4 Excavated trenches shall have to be approved by the Architect prior to lying of PCC or any other Permanent Work

1.4.7.5. Excavation for drains shall be carried out with extra care to cut the sides and bottom exactly to the required shape, slope and gradient. Filling for excess excavation shall be done at the contractor's cost in consultation with the Architect.

1.4.7.6. Excavated materials shall not be placed within 1 m of the edge of the trench or half the depth of the trench, whichever is more.

1.4.7.7 Excavations for column footings shall be carried to depths indicated in the drawings. Safe bearing capacity at such depth shall be verified to comply design requirements. If ordered by the Architect, appropriate tests shall be carried out by the contractor.

1.4.8. Protection.

1.4.8.1 Fencing and / or other suitable measures for protection against risk of accidents due to open excavation shall be provided by the contractor at his cost.

1.4.8.2 Where excavation is to be carried out below the foundation level of an adjacent structure, and to avoid underpinning, precautions such as shoring and strutting, etc must be taken. No excavation should start till such measures are taken to the satisfaction of the Architect. Payments for such work shall not be made separately unless specified otherwise.

1.5 EXCAVATION SOFT ROCK

1.5.1 This shall be carried out by crowbars, pickaxes or pneumatic drills or any other suitable means. Blasting may be permitted if the contractor so desires but no extra money shall be paid for blasting. Measurement shall be in cubic meter.

1.5.2 Other general details same as clause 4.7 and its sub clauses.

1.6 EXCAVATION IN HARD ROCK

1.6.1 General

1.6.1.1 On meeting hard rock that requires blasting, the contractor shall inform the Architect. On approval in writing, blasting operation shall start if the contractor feels it necessary and so desires.

1.6.1.2 The contractor shall obtain the necessary license from the District Authorities for undertaking blasting work and explosive storing as per Explosive Rules 1940, and as updated. Explosive

shall only be procured from an authorized dealer. He shall be responsible for the safe custody and proper accounting of explosives. The Bank/Architect/PMC shall have access to the store.

1.6.1.3 The contractor shall be responsible for any accident to those working on the site, to the public or to property due to blasting operations,

1.6.1.4 Measurements shall be in cubic meter by stacking rock and applying predetermined deduction for voids.

1.6.2 Precautions

1.6.2.1 Safety measures to be adhered to shall be as detailed in IS 4081, Safety Code of Blasting (as amended from time to time, and to related drilling operations). Also digest No. 37 of C.R.C. and I.R.C.A. Road tariff No 18 shall be adhered to.

1.6.2.2 Blasting operation shall be earned out under the supervision of a responsible authorized agent of the contractor. Timings shall be as approved by the Architect in writing Lunch break will be preferred. The authorized agent of the contractor should be well conversant with the rules and regulations of blasting operations. Further the contractor shall be employing licensed blasters for actual operation.

1.6.2.3 All proper precaution for safety shall be taken. All persons shall be moved away to a distance not less than 200m. All entries shall be sealed and red flags displayed at prominent places.

1.6.2.4 Blasting shall be done only with gunpowder. Dynamite, gelignite, or any other high explosive shall be used only with written permission of the Architect.

1.6.2.5 The number of charges to be fired and the actual number of shots heard shall be counted and the contractor's agent shall satisfy himself by examining that all charges have exploded. Only then shall workmen be allowed to start work. Unexploded charges shall be flooded with water, a new hole drilled and exploded again.

1.6.2.6 The Architect shall be informed about all misfires, their causes and the remedial steps taken.

1.7 CLASSIFICAITON

1.7.1 All soils comprising any of the following;

a) Vegetable or organic soil, turf, sand, silt, loam clay, mud, peat, black cotton soil, soft shale or loose *murrum*.

b) Any mixture of soils (a)

c) Mud concrete below ground level.

d) Generally any material which yields to the ordinary application of a pickaxe and shovel or to *phawra,* rake or other ordinary digging implement and not affording resistance to digging greater than mentioned in (a) to (c}

e) Stiff heavy clay, hard shale, or compacted murrum requiring close application or a grafting tool or pick or both and shovel

f) Gravel and cobblestone (cobblestone is a rock fragment), usually rounded, having maximum dia in one direction of 75-300 mm.

Soft rock comprising any of the following.

a) Soling of roads, paths etc and hard core.

b) Macadam surfaces of any description, (water bound, grouted, tarmac, etc)

c) Lime concrete, stone masonry, in lime mortar and brick work in lime or cement mortar, below ground level.

d) Soft conglomerate, where the stones may be detached from the metric with picks, crow which may be quarried our split with a crowbar.

e) Limestone, sandstone, laterite, hard conglomerate or other soft or disintegrated rock which may be quarried or split with a crowbar.

f) Unreinforced cement concrete which may be broken up with crowbars or pickaxes and stone masonry in cement mortar, below ground level.

g) Boulders nor requiring blasting, rock fragments usually rounded by weathering, disintegration and exfoliation or abrasion water or ice, having maximum dia length in any direction of 500 mm, found loose, embedded etc.

h) Other varieties of rock which would normally be removed with pick, crowbars, wedges and hammer with only a little difficulty.

Hard rock comprising any of the following

Any rock or cement concrete in excavation for which the use of mechanical equipment or blasting is required. Reinforced cement concrete.

Boulders bigger than % cubic meter requiring blasting.

Hard rock as in (a) to (c) requiring blasting but prohibited from doing so for any reason and excavation has to be carried out by chiseling, wedging or any other agreed method.

1.8 FILLING

1.8.1 Filling shall be done where required with approved quality of earth- It may be from excavation and where possible, cutting and filling shall be done simultaneously to avoid double handling.

1.8.2 Filling shall be done in layers not exceeding 20 cm in depth. Earth used shall be free from roots, grass and rubbish and all lumps and clods exceeding 8 cm in any direction shall be broken down. Each layer shall be watered with optimum moisture content to achieve 90% consolidation. Consolidation shall be done by mechanical rammers or roller of minimum half-ton weight. Where the roller cannot work, wooden or steel rammers of seven to ten kg weight with flat base of 20 Sq.cm or 20 cm dia should be used. Labour for ramming shall be at least 1 for every 6 diggers. In embankment or banking, every third layer of earth shall be rolled and consolidated with power roller of minimum eight ton weight.

1.9. PLANKING AND STRUTTING

In case of deep trenches where the soil is soft and not capable of being retained without the help of support, planking / strutting as required shall be carried out. It shall be the responsibility of the contractor to take steps to prevent slide / collapse. Method of planking / strutting will be largely influenced by the type of soil encountered and as approved by the Architect.

1.10. DISPOSAL OF SURPLUS EARTH

1.10.1 Surplus earth shall be used to the maximum extent in the compound. Earth useful for filling shall be separately stacked as directed by the Architect from time to time. Approved quality earth shall e used in the filling. It shall be consolidated as detailed and approved by the Architect.

1.10.2 Rate for excavation shall include sorting out of useful materials.

1.10.3 Alt surplus and unusable earth shall be disposed off outside the plot but at a location approved by local authority and confirming to their specification. The constructor shall quote his rate for disposing off or carting away the items considering requirements and

Standards of the local authority with whose permission surplus and unusable earth shall have to be disposed off.

1.11 DEWATERING

Bailing or pumping out of water that may have accumulated due to rains, subsoil seepage, tidal waves, or any other means shall be carried on continuously and the area shall be kept dry for the following operations.

a) Measurements

b) Concreting or masonry work

c) Shuttering and reinforcement

d) Backfilling

e) Line out

f) Any other reason deemed fit by the Bank/Architect/PMC.

1.12 SAND FILLING

The sand shall be free from any organic and deleterious materials as detailed in BIS It should be suitable for compaction. Filling shall be in layers of 15 to 20 cm. Watered with optimum moisture content and mechanical rammers. Measurement shall be for compacted volume in cubic meters.

1.13 MEASURMENT

1.13.1 The following shall not be measured separately and allowance for the same shall be deemed to have been made in description of the main item.

b) Setting outworks, erecting profiles, etc.

c) Site clearance such as clearing of shrubs, brushwood, small trees not exceeding 30cm in girth measured at one meter above ground.

d) Unauthorized battering or benching of excavation.

e) Forming (or leaving) DEAD MEN or TELL-TALES in borrow pits and their removal after measurements.

f) Forming or leaving steps in the sides of deep excavation and their removal after measurements.

g) Excavations for insertion of planking and strutting.

h) Removing slips or falls in excavations.

i) Dewatering by bailing or pumping out of water in excavations from rains, sub-soil water, tides undercurrents etc.

j) Slinging or supporting pipes electric, cables etc met during excavation or while carrying out any other item of work.

k) Dressing, trimming of sides, leveling or grading and ramming of bottoms.

Soils, soft rocks, hard rocks shall be measured as per SP 27 Part I except for the followings:

a) Filling shall be in cubic meter for consolidated volume. The lift shall be considered from made up ground level

b) Planking and strutting required to be left in position shall be measured separately. The Architect's permission in writing shall have to be obtained for this. In no other case shall payment be made for planning and strutting, if carried out.

c) Lead and lifts shall be as per the BOQ.

d) Post holes, trenches for cables and pipes shall be measured as detailed in clause 5 and clause 4.6 and shall be part of the respective piping, cabling item.

e) Excavation shall be paid for in the PCC area, and level shown in drawings or as approved by the Architect Working space shall not be considered.

f) Back filling of foundation is part of excavation and not paid separately. Void percentage considered for computing net quantities shall be

- Loose Earth 20%
- Hard Rock 40%

These deductions shall be made from actual measurements. The Architect may at his discretion conform at start of work other predetermined percentage for deduction for particular project.

2 Anti-Termite Treatment

2.1 General:

Anti-Termite Treatment shall be as per ISl-6313 (Part ll)-1971 land latest revisions AND shall be carried out by an approved specialist agency as approved and directed by the Architect to the following general specifications:

2.2 Materials:

'CHLOROPYRIPHOS' mollifiable concentrate conforming to IS: 6439-1978 in approved concentration in water emulsion shall be used. Chemicals shall be brought to site of work in sealed original containers. The material shall be brought in at a time in adequate quantity to suffice for Hand operated pressure pump shall be used for uniform spraying of the chemical. To have proper check for uniform spraying of chemical, graduated containers shall be used. Proper check should be kept that the specified quantity of chemical is used for the required area during the operation.

2.3 Time of Application:

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

2.4 Treatment of Junction of Wall and Floor:

To achieve continuity of the vertical chemical barrier on inner wall surfaces from the ground level, small channel 30 * 30 mm shall be made at all the junctions of wall and columns with the

floor (before laying the sub-grade) and rod holes made in the channel up to ground level 150 mm apart and the chemical emulsion poured along the channel @ 7.5 liters / Sq.mt of the vertical wall or column surface so as to soak the soil right to bottom. The soil shall be tamped back into place after this operation.

2.5 Treatment of Soil along External Perimeter of Building:

After the building is complete, provide holes in the soil with iron rods along the external perimeter of the building at intervals of about 150 mm and depth 300 mm and filling these holes with chemical emulsion at the rate of 75 liters per Sq Mtr of vertical surface.

2.6 Vertical Surface:

In the event of the depth of the wall filling being more than 300 mm, the external perimeter treatment shall be extended to the full depth of filling up to the G.L. so as to ensure continuity of the chemical barrier.

2.7 Horizontal Surface along Perimeter:

Treatment of soil under apron (Plinth Protection) along external perimeter of building, top surface of the consolidated earth over which the apron is to be laid shall be treated with chemical emulsion at the rate of 5 liters per Sq Mtr of the vertical surface before the apron is laid. If consolidated earth does not allow the emulsion to soak through, holes up to 50mm to 75 mm center both ways may be made with 12 mm diameter mild steel rod on the surface to facilitate saturation of the soil with the chemical emulsion.

2.8 Treatment for Expansion Joints:

Anti-termite treatment shall be supplemented by treated through the expansion joint after sub grade has been laid 2 liters per linear meter of expansion joint.

1.9 Treatment of Soil Surrounding Pipes and Conduits:

When pipes and conduits enter the soil inside the area of the foundations, the soil surrounding the points of entry shall be loosened around each such pipe or conduit for a distance of 150 mm and to a depth of 75 mm before treatment is commenced. When they enter the soil external to the foundations, they shall be similarly treated unless they stand dear of the walls of the building by about 75 mm for distance of over 300 mm from Ground level.

2. CONCRETE AND MORTARS

INDIAN STANDARDS

All relevant Standards as specified elsewhere in this Volume are applicable.

Indian Standards to be followed are:

(1)	IS 269	Specification for Ordinary and low heat, Portland cement.
(2)	IS 383	Specification for Coarse and fine aggregates from natural Sources for concrete.
(3)	IS 456	Code of practice for plain and reinforced concrete.

(4)	IS 460 (Part I, II &III)	Specification for test sieves: i) Wire doth test service ii) Perforated plate lest sieve iii) Method of examination of test sieve
(5)	IS 516	Method of test for strength of concrete
(6)	IS 1199	Method of Sampling and analysis of concrete.
(7)	IS 1489	Specification for Portland pozzolana cement
(8)	IS 1542	Specification for Sand for plaster
(9)	IS 2116	Specification for Sand for masonry mortars
(10)	IS 2386 (Part I, II, & III)	Method of tea for aggregate concrete. i) Particle size and shape ii) Estimation of deleterious materials and organic impurities iii) Specific gravity, density, voids, absorption and bulking
(11)	IS 2646	Specification for Integral cement water proofing compound.
(12)	IS 3025	Methods of Sampling and test (Physical and Chemical for Water used in Industry
(13)	IS 3068	Specification for Broken brick (burnt clay) coarse Aggregate for use in lime concrete
(14)	IS 4031 (Part i to xii)	Method of Physical test for hydraulic cement
(15)	IS 4032	Method of chemical analysis for hydraulic cement.
(16)	IS 6452	Specification for high Alumina cement for structure use
(17)	IS 6909	Specification for super sulphated weather
(18)	IS 7861	Code of practice for extreme weather concreting i) Recommended practice for hot weather concreting ii) Recommended practice for cold weather concreting
(19)	IS 8041	Specification for Rapid hardening Portland cement,
(20)	IS 8112	Specification for high strength ordinary port land

		cement.
(21)	IS 9103	Specification for admixture for concrete
(22)	IS 11433	Specification for one part gun grade i) Poly sulphate based joint sealant: general requirements.
(23)	IS 12118(part l)	Specification for two parts poly sulphide based sealant: General requirements.
(24)	SP 23	Handbook on concrete mix
(25)	SP 24	Explanatory handbook on Indian Standards code for plain And reinforced concrete (IS 456)
(26)	SP 27	Handbook of method of measurement of building works.

3.1 MATERIALS

3.1.1 CEMENT

i) Cement shall be Ordinary Portland Cement (OPC) conforming to IS 269 for all purpose.

It shall be received in bags of 50 kg and each batch shall be accompanied with a test certificate of the factory. Also it shall e tested before use to ascertain its strength, setting time, etc. In no case cement has been stored over -4 -weeks shall be used unless tested as per the direction of the Bank/Architect/PMC prior to use in the works.

ii) Cement shall be stored in such locations so as to prevent deterioration due to moisture dampness. A dry and water proof shed shall be best suited for this. Bags shall be stacked on rigid water-proof platforms about 15 to 20 cm clear above the floors and 25 to 35 cm dear or away from the surrounding walls. A maximum high stack of 12 bags is permitted Stacks shall be so arranged that the first batches are used first, and (FIFO) that they permit easy access for inspection and handling.

iii) The following other types of cement may be used in works if specified or with prior approval of the Bank/Architect/PMC in writing purpose. Specialist literature shall be consulted for guidance regarding use of these types of cement.

Rapid hardening Portland cements conforming to IS 8041.

Portland Pozzolana Cement (PPC) conforming to IS 1489-Part-1

High strength Ordinary Portland Cement conforming to IS 8112.

High alumina cements conforming to IS 6452.

Super sulphated cement conforming to IS 6909.

3.1.2 COARSE AGGREGATE

i) Coarse aggregate shall be obtained from natural sources such as stone, gravel etc, crushed or uncrushed or a combination thereof from approved quarried. Aggregate shall

be hard, strong, dense, durable, clean and free from veins and adherent coating. It shall be free from soft, feeble, thin, elongated or laminated pieces and shall be roughly cubical in shape. It shall consist of coarse material most of which is retained on 4.75 mm IS sieve

ii) Coarse aggregate shall not contain any harmful material such as iron, pyrites, coal, mica shale or similar laminated material neither shall it contain clay, alkali, soft fragments, sea shells, organic impurities etc. in such quantities that adversely affects the strength and durability of the concrete. In addition to the above, in reinforced concrete the aggregate shall not contain any material, which might attack the reinforcement. The maximum quantities of deleterious materials in the coarse aggregate when determined in accordance with IS 2386 Part I and Part II "Method of test for aggregates for concrete' shall not exceed the limits laid down in table 1 of Annexure.

iii) Aggregate crushing value, impact value, abrasion value and soundness of aggregate shall respectively be in accordance with Para 3.3, 3.4, 3.5 and 3.6 of IS 383.

iv) Grading of coarse aggregate shall be in conformity with the requirements laid down in IS 383. See Table 2 and Table 3 of Annexure.

v) Source of aggregate shall be from an approved Government location. It shall be tested prior to the approval of the Architect from an approved testing laboratory. In case available aggregates do not meet certain requirements of IS 383 or any other specification, required processing shall be carried out by the contractor at his cost. No extra cost towards these processes, treatment or combination of both shall be paid, it shall be the duty of the contractor to make sure that aggregate material received by him is from Government approve quarries and with fully paid royalties, taxes, duties etc. as may be in force from time to time for respective locations.

vi) Aggregates shall be stored in such a way that it does not get mixed with mud, grass vegetables and other foreign matter. The best way is to have a hard surface platform made out of concrete, bricks or planks. It should be to the approval of the Architect.

vii) Coarse aggregate shall have a minimum specific gravity of 2.6 (Saturated surface dry basis). Aggregate below this specific gravity shall not be used without the special permission of the Architect.

viii) One a specific source of supply of coarse aggregate is approved; the source shall not be changed without the prior approval of the Architect.

3.1.3 FINE AGGREGATE

i) Natural sand deposited by stream or glacial agencies as a result of disintegration of rock is the best form of fine aggregate. The fine aggregate shall confirm to following standards.

i. For plain and reinforced concrete: IS 383 Specification for coarse and fine aggregates from natural sources for concrete.

ii. Mortar and grout : IS 2116 Specification for sand for masonry mortars.

iii. For plastering : IS 1542 Specification for sand for plaster (Class A grading)

3.1.3.1

i) Some times it is obtained from crushed stone screening but often contains a high percentage of dust and clay. It tends to be flaky and angular. This type produces harsh concrete and should be avoided.

ii) Sea sand should not be used unless approved by the Architect. If approved, the required treatment shall be done at the contractor's cost.

3.1.3.2 Sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain any appreciable amount of clay. Sand shall not contain harmful impurities such as iron, pyrites, coal particles, lignite, mica shale or similar laminated material, alkali, and organic impurities in such form or quantities as to affect the strength of durability of concrete or mortar. Also it should not contain any material liable to attack the steel reinforcement.

i) When tested as per IS 2386 Part I and Part II, fine aggregate shall not exceed permissible quantities of deleterious materials as given in table 1 of Annexure.

ii) Fine aggregate shall be thoroughly washed at site with clean fresh water such that the percentage of all deleterious materials is within the permissible limits laid down.

3.1.3.3 Grading of fine aggregate shall conform to IS and shall fall within limits of one of the four zones given in table 4 of IS 383 and of Annexure.

3.1.3.4 Damp and moist sand increases the volume and is called bulking. Due allowance is to be made while preparing the mixes based on volume measurements. It shall be determined as per IS 2386 Part III Appendix A- For rough guidance table 5 of Annexure gives the relation between moisture content and percentage of bulking.

3.1.3.5 Storing of aggregate shall be as given in clause 2.2.6.

3.1.4 WATER

i) Water used for mixing and curing shall be clean, reasonably clear and free from objectionable quantities of silt, oils, alkalies, acids, slats so as not to weaken mortar, or concrete or cause efflorescence or attach the steet in RCC while curing. It shall be free of elements, which significantly affects the hydration reaction or otherwise interferes with hardening of concrete during curing or those elements, which produced objectionable stains or deposits. Potable water is generally satisfactory but is shall be tested prior to use in the works.

ii) Water tested shall be in accordance with IS 3025. Maximum permissible limits of deleterious materials in water as given in IS 456 are reproduced for ready reference in table 6 of Annexure.

iii) Suitability of water shall be ascertained by the compressive strength and initial setting time test as specified under:

a) Average 28 days compressive strength of at least three 15 cm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water. Preparation and testing in accordance of IS 516.

b) The initial setting time of tests blocks made with proposed cement and water to be used shall not be less than 30 minutes and shall not differ by ± 30 minutes from the initial setting time o f control test block prepared with the same cement

and distilled water Preparation and testing of block shall be in accordance with IS 4031 iv) The PH value of water shall not be less than 6 and more than 9

v) Water storage tanks shall be such as to prevent any deleterious materials getting mixed with it.

vi) Water shall be tested and approved in writing by the Bank/Architect/PMC prior to use in the works.

vii) Sea Water

Seawater in concrete shall not be permitted unless specifically approved in writing by the Bank/Architect/PMC for purpose stated. The Bank/Architect/PMC under unavoidable circumstances may allow mixing or curing of seawater in concrete construction, which are permanently under seawater.

3.1.5 ADMIXTURE

i) These are substances other than cement, aggregate and water and shall be permitted to be used to modify the properties of concrete for single or a combination of purposes. This shall be used only on the written approved for specific purpose and at the cost of the contractor. Good concrete shall be achieved without the aid of any admixtures.

ii) Admixtures should be free from chlorides and sulphate, which might affect concrete or any other material which may cause problems to the concrete in the due course of time. Also it should have no effect on the reinforcement in case of Reinforced Cement Concrete.

iii) Admixtures generally in use are classified as under

a) Accelerators

b) Retarders

c) Workability agents

d) Water -repelling agents

e) Air-entraining agents

f) Gas-forming agents.

These are manufactured and sold by various companies under brand names. The contractor proposing to use any of them shall submit to the Architect technical literature with its chemical composition, purpose of use and method recommended by the manufacturer and what he proposes to follow at site for strict control,

iv) The contractor's proposal shall accompany the following with his request to use admixture.

a) The trade name of the admixture, its source and the manufacturer’s recommended method of use.

b) Typical dosage rates and the possible detrimental effects of under and over-dosage.

c) Whether the admixture contains chloride in any free form or any other chemical present as an active ingredient, which is a likely cause of corrosion of reinforcement or deterioration of concrete

d) The average expected air content of freshly mixed concrete containing an admixture, which causes air to be entrained when used at the manufacturer's recommended rate of dosage.

3.2 CONCRETE

Concrete is prepared by mixing graded aggregate stone along with cement, in a specified proportion. Mixing shall be done by a mechanical mixer. Manual hand mixing shall be permitted in specific cases with the written permission of the Architect on account of small quantity or location or any other reason acceptable to the Architect.

3.2.1 CEMENT CONCRETE

This shall be classified as plain cement concrete or reinforced cement concrete. Plain cement concrete shall be in leveling course under foundations, floors, copings etc. and shall include form work as part of the work-Reinforced cement concrete shall be at all locations and comprises form work, reinforcement and concrete Payment of reinforced cement concrete may be composite or item wise as specified in the BOQ.

3.2.1. Concrete shall be classified its compressive strength at the 28th day. The concrete grades shall be as designated in table 2 of IS 456:2000 and are given as ready reference in table -7- of Annexure.

3.2.2. BOQ shall specify various types of concrete aimed to be used in works. It shall be the responsibility of the contractor to carry out design mixes and approval of the same shall be obtained from the Architect at least 35 days in advance from the actual pouring of concrete at site in the permanent works. The basic aim of mix design shall be to find the most economic proportion of cement, aggregates and water which will give the desired strength of concrete, proper workability and durability. Also it is important that the mix should be easily worked with the help of equipment available at site. The operations involved at site are, measurement of materials, their mixing, placing, compacting, finishing required and curing. The design shall be carried out strictly to IS specifications and IS code practice 456, SP 23 and SP 24

Further the contractor should ensure that the minimum cement content per cubic meter of reinforced concrete should not be less than that stipulated in table 23, 24, 25 and 26 of SP 23. For ready reference refer table 8 and 9of Annexure, but the BOQ shall specify minimum cement content for each item.

3.2.3. For expected strength of cubes tested on the 28"^{1} day the design mix at preliminary test and work site shall be as per table 10 of Annexure. The water cement ratio shall be 0.5 to 0.52. Additional water may be permitted only at the discretion of the Structural Engineer The slump shall be 25 mm to 35 mm depending upon the location and type of work Higher slump with use of plasticizers shall be permitted

3.2.4. Design mix and trial mixes

3.2.4.1.As stated above in clause 3-1.2 the contractor shall submit, at least 5 weeks in advance, to the Architect the mix design that the proposes to use at site. The mix design shall also give basic details (when tested according to IS 1199 and IS 2386 - Part III, 1963) such as,

a) Slump

b) Bleeding

c) Compacting factor

d) Vee-Bee time

e) Cement required for one cubic meter of concrete.

3.2.4.2 On receipt of this, the Architect may immediately order to carry out work site test before the final approval. This shall be done with mixer and materials actually being used at site.

This shall give the contractor additional chance to check for himself actual workability and make sure that the mix proposed by him will be fully satisfactory with regards to slump, segregation, bleeding, water -cement ratio and workability.

5 cubes shall be taken from each of the 3 batches to test the mix. Cubes shall be cast, stored, cured, transported and tested to IS 516. The test may be carried out at site or laboratory as approved by the Architect.

Trial mixes shall be approved provided that average strength of 3 consecutive cubes is not less than that specified and that one out of three may give a value less than specified but limited to a maximum of 90% of the specified strength.

3.2.4.3.In case the trial mix falls below the above criteria, the Architect shall order fresh trial mixes to be made as before, until the desired strength is arrived at.

3.2.4.4.This design mix and trial mix hold good so long as the materials continue to be of the same quality and from the same sources. For any change, the Architect may order fresh design mix and trial mixes to be carried out before the same is used at site.

3.2.4.5.It is the responsibility of the contractor to prepare and get the cubes tested and to provide all the material, labour, moulds, equipment, casting and curing facility, charges for testing etc.

Further, the contractor shall have to provide and maintain all the equipment and staff at the site throughout to cany out the following tests in a small laboratory or get these tests from approved laboratories without extra cost to the contract.

a) Slump

b) Grading of coarse and fine aggregates.

c) Silt content of sand.

d) Moisture content of coarse and fine aggregates.

e) Slump test of concrete.

f) Concrete cube test.

The contractor shall maintain full records of all above tests in a register.

The format of records shall be prepared in consultation with the Architect and either he or his representative shall have full access to the contractor's laboratory.

The contractor shall include charges for the above work in his rates and no extra whatsoever shall be admissible on this account of designing, testing maintaining laboratory etc.

3.3 Concrete Mix

1 READY MIX CONCRETE (RMC)

1.1 CEMENT

1.1.1. The type of cement used for this work shall be **Ordinary Portland Cement (OPC)** only.

1.1.2. Cement shall be used in the order in which it is received. Cement in bags in storage for more than -3- months shall be re-tested before use.

Aggregates: Used for concrete shall be in accordance with the requirements of IS 456.Ref. IS 4926:2003 R.M.C .code of practice clause 4.4

1.1.3. TESTING:-

A sample taken once for every 1000 bags shall be tested. Tests shall be carried out for Fineness, initial and final setting time, compressive strength (IS: 4031) and the results approved by the Engineer, before use of the cement in permanent works. Samples shall be taken immediately on receipt of cement at site. The methods and procedure of sampling shall be in accordance with IS: 35S55

1.1.4 The Engineer may specify other forms of sampling and tests including chemical analysis (IS. 4032). If in his opinion the cement is of doubtful quality, the costs of such additional tests shall be bome by the contractors.

1.2. MIXERS AND VIBRATORS:-

1.2.1. For all structural concrete work the contractor shall provide platform types of weighing machinery of a capacity not less than 200 kg.

1.2.2. The contractor shall provide concrete mixers (!S:l79l)-Batch type concrete mixers (ls>2439)-roller APN mixer and vibrators (IS :2505)-concrete vibrators Immersion type (IS:20506) - screed-board concrete-vibrators(IS 250) - screed board concert vibrators (IS :4656)-form-vibrators for concrete supplied by recognized manufacturers.

1.3 CONVEYING:

Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods which will prevent segregation and/or loss of ingredients. In case such segregation occurs invade concrete shall be remarked before being placed in final position. 11 shall be deposited in final position as early as practicable, but always within a period of 30 minutes after mixing. When initial set has taken place in Concrete before it is placed in final position, such concrete shall be rejected and taken away from the site to a distance and disposed off as ordered by the Engineer's Representative.

1.4 GRADE OF CONCRETE:

The Concrete is designated as M-15, M-20, M-25, M-30. The letter M refers to the Mix and the number represents the characteristic compressive strength in mpa (Mega Pascal's). Minimum content of cement as per table 5 of IS 456; 2000

1.5. TRIAL MIXES:

1.5.1. The Contractor is entirely responsible for the design of Concrete mixes. The designs however to be approved by the Architect at least B weeks before commencing any concreting in the works and which have been tested in an approved laboratory. A dean dry mixer shall be used and the first batch discarded.

1.5.2. The required average strengths of different grades of concrete at 28 days, for which the mixes shall be designed, are specified below:

Grade Concrete	Characteristic strength at 28 days (mpa)	Target Mean Strength at 7^{th} day(mpa)	F' cm (Mpa) at 28 days
M15	15	18	24
M25	20	21	29
M25	25	23	24
M30	30	26	39
M35	35	31	44
M40	40	36	49
M45	45	40	54

The mixes are designed to yield mean strengths (F'cm) greater than the corresponding specified characteristic strengths (F' ck) as indicated in above table. The difference between F'cm and F'ck is called the current Margin. The value of the cur margin has been set at 9 Mpa for all grades of concrete. The concrete mixes shall be designed on the basis of required strength, desired workability, the maximum size of aggregate and also upon the various grades of cements as specified in IS 10262-1982. Accordingly the required cement content shall be ascertained. The Contractor may be allowed to use either 7proved plasticizers or increased cement content to achieve the required strengths at his own cost.

1.5 3 for each grade a total of 18 cubes shall be made. Of these 18 cubes made, not more than 6 may be made on any day and further of the 6 cubes made in one day, not more than 2 cubes, each representing a different batch of concrete shall be tested at the age of -7 - of 28 days. The making of the cubes, their curing, storing, transporting and testing shall be in accordance with Indian Standards IS. 516. The test shall be carried out in a laboratory approved by the Architect.

1.5.4. If the average strength of the concrete cubes falls below the required strength, fresh preliminary mixes for that grade shall be made as before, until the trial mixes yield cubes of compressive strength at 28 days greater than the required average strength at that age.

1.5.5. Whenever there is a significant change in the quality of any of the ingredients for concrete, the Architect may at his discretion, order the carrying out of fresh trial mixes. All costs for trial mixes and tests shall be to the Contractor's account and held to be included in the contract rates,

1.5.6. Before commencing the work, the contractor shall submit to the Architect for approval full details of all preliminary trial mixes and tests.

1.5.7. When the proportions of a concrete mix have been approved by the Architect, the Contractor shall not vary the quality or source of the material or the mix without written approval of the Architect.

1.6 CONCRETE CUBE TEST:

Quality of hardened concrete will be certified by the following procedures

1.6,1. The Engineer or his representative shall select random batches of concrete for examination without warning the Contractor and sampling will generally be done at point of discharge from the mixer.

1.6.2. Rom the batches thus selected, 6 concrete cubes shall be made from any single batch, of these. 6 cubes may be made from any single batch. Of these 6 cubes thus made, 3 cubes (each cube

representing Concrete of different batches) shall be tested at 7 days and the remaining 3 cubes shall be tested at 28 days.

1.6.3. All cubes shall be made, cured, stored, transported and tested in accordance with Indian standards. The tests shall be carried out in a laboratory approved by the Engineer.

1.6.4. At least 6 cubes shall be made on each days concreting until 60 cubes have been made for each grade of concrete. This is lie initial period.

1.6.5 After the initial period, subject to the acceptance of the Engineer, the frequency at which the I cubes shall be made may be reduced as follows: 1 set of 6 cubes, on each day's Concreting consisting of.

a) 1 set for every 10 Cum. or part thereof of concrete for critical structural elements like columns, large cantilevers, plus:

b) 1 set for every 40 Cum, or part thereof for all other elements. If concrete is latched at more than one point simultaneously, the above frequency of making cubes shall be followed at each point of batching.

c) Of the cubes if each set shall be tested at 7 days and the remaining 3 cubes shall be tested at 28 days from the day of casting the cubes.

1.7. ACCEPTABILITY CRITERIA:

1.7.1. The strength requirement of any particular grade of concrete will be considered satisfactory if the 28 days compressive strengths of individual sets (each set consists of 3 cubes) and of individual cubes satisfy the following requirements:

1.7.1.1 **FOR THE FIRST FIVE SETS:**

a) The average strength determined from any group of three consecutive test cubes exceeds the specified characteristic strength (f ck) by not less than 0.8.

b) Only one individual cube test result in any set may fall below the specified characteristic strength provided that this value is not less than 95 % of the specified characteristic strength.

1.7.1.2. Provided that the average strength of any fifteen consecutive cubes exceeds the specified characteristic cube strength by at least 0.9 times the current margin. All the subsequent test results may be considered acceptable if.

a) The average strength as determined from any group of three consecutive lest cubes exceeds the specified characteristic strength (V ck) by not less than 0.6 limes the current margin.

b) Only one individual cube test result in any set may fall below the specified characteristic strength provided this value is not less than 90 % of the specified characteristic strength.

1.7.1.3.Whenever a mix is redesigned due to a change in the quality of Aggregate or of cement or for any other reason, it shall be considered a new mix and initially be subject to the acceptability criteria as stated above.

1.7.1.4.The above specification is based on an assumed standard deviation of 5.5 Mps, and a probability of concrete strengths failing below the desired minimum strength of 1 to 20. In case quality control is very good at site and the cube test results consistently show a standard deviation better than the standard deviation assumed here, the Engineer may in his discretion

reduce the required target strength fcm for any particular grade of concrete, and in current the current margin.

1.7.1.5. If the concrete produced at site does not satisfy the above strength requirements, the Architect will reserve the right to require the Contractor to improve the methods of batching, the quality of the ingredients and redesign the mix with increased cement content if necessary. The Contractor shall not be claimed any extra cost for the extra cement used for the modifications stipulated by the Engineer for fulfilling the strength requirements specified.

1.7.1 .6. It is the complete responsibility of the Contractor to design the concrete mixes by approved standard methods and to produce the required concrete conforming to specifications and the strength requirements approved by the Engineer. It is expected that the contractor will have competent staff to carry out this work.

1.8. As frequently as the Architect may require, testing shall be carried out in the field for

1. Moisture content of sand
2. Moisture content of Aggregates
3. Silt content of sand.

1.9 FAILURE TO MEET SPECIFIED REQUIREMENTS:

If from the cube-test results it appears that some portion of the works has not attained the required strength, the Architect may order that portion of the structure be subjected to further testing of any kind whatsoever as desired by the Architect including, if so desired by him, full load testing of the suspected as well as adjacent portions of the structure as specified in the Conditions of contract. Such testing shall be at the contractor's cost. If the strength of concrete in any portion of the structure is lower than the required strength, but is considered nevertheless adequate by the Architect so that demolition is not necessary, the Contractor shall be paid a lower rate such lower strength concrete as determined by the Architect.

1.10. As frequently as the Engineer's Representative may require, testing shall be carried out in the field for

1. Moisture content of sand
2. Moisture content of Aggregates
3. Silt content of sand
4. Grading of sand
5. Slump test of concrete
6. Grading of Aggregates
7. Concrete cube test

The Contractor shall provide and maintain at all times, until the works are completed, equipment and staff required for carrying out these tests at his own cost. The Contractor shall grant the Architect or his representative full access to this laboratory at all times and shall produce on demand complete records of all tests carried out on site. Before concreting commences on any section of the works the contractor shall obtain approval of the Architect or his Representative as regards the form and reinforcement confirming with the drawings. He shall also indicate to Architect in writing and obtain his approval for position of construction joints the Architect or his representative's approval shall not relieve the Contractor of any of his obligations to comply with the provisions of this Specification or contract.

1.11. ADMIXTURES**:**

Approved admixtures and air entraining may be permitted by the Engineer at his discretion provided that the strength requirements are not affected by their use. Any cement saving due to their use will be to the benefit of the EMPLOYER. The admixture will not be paid for separately. (IS 4926: 2003 Ready mix concrete code of practice clause 4.50)

1.12. TRANSPORTING, PLACING, COMPACTING AND CURING:

1.12.1. Transporting, placing, compacting and curing of concrete shall be in accordance with IS: 456. For workability ref to clause 6.2 of IS 4926:2003 RMC code of practice

1.12.2. All rubbish etc. Inside the shuttering and curing of concrete shall be washed out immediately prior to placing of concrete. A layer is placed and separate batches shall follow each other so closely that the succeeding layer shall immediately below have taken initial set. The method of segregation, concreting of any portion or section of the work shall be carried out in one continuous operation and no interruption of concreting work will be allowed without approval of the Engineer or his representative. It should be held in position until air bubbles cease to come to the surface and then slowly withdrawn so that the concrete can flow into the space previously occupied by the vibrator. The vibrator shall not be dragged through the concrete nor used to help heaps of concrete to spread out. It may be used vertically, horizontally or at an angle depending on the nature of the work.

1.12.3. To secure even and dense surfaces free from aggregate pocket, vibration shall be supplemented by tamping or rodding by hand in the comers of forms and along the form surfaces while the concrete is plastic.

1.12.4. A sufficient number of spare vibrators shall be kept readily accessible to the place of deposition of concrete to assure adequate compaction in case of breakdown of those in use.

1.12.5. Form vibrators wt used shall be clamped to the sides of formwork and shall not be fixed more than 450 mm. above the base of the new formwork and concrete shall be filled not higher than 230 mm. above the vibrator. The formwork must be made serially strong and watertight where this type of vibrator is used. Care must be taken to guard against over vibration especially where the workability or the concrete mix is high since this will encourage segregation of the concrete. All concrete shall be protected from falling earth during and after placing Concrete placed in ground containing deleterious substances shall be kept free from contract with such ground and with water draining there from during placing and for a period of seven days or as otherwise instructed thereafter. Approved means shall be taken to protect immature concrete from damage by debris, excessive loading, abrasion, vibrations, deleterious ground water, mixing with earth or other materials and other influences that may impair the strength and durability of the concrete.

2. **CONCRETE AT SITE**

2.1 Weight batching shall be preferred at site but the Architect may permit designed mix to be converted to volumetric if requested by the contractor on specific grounds. The contractor shall provide required boxes to measure the ingredients of concrete.

2.2 The contractor shall provide concrete batch mixes, vibrators, weight batches conforming to relevant IS specification. The capacity and number of mixers and vibrators required at site from time to time shall be to the approval of the Architect. No equipment from site shall be removed without the prior written approval of the Architect. The contractor shall also maintain a platform weighing scale of capacity 300 kg with fraction upto 100 Gms at the site

2.3 As directed by the Architect, a weekly or periodic calibration of all machines shall be done and records of these calibrations shall be maintained in a register.

2.4 Regular maintenance of machinery shall also be carried out on a weekly basis or as directed by the manufacturer of machines

2.5 The mixer shall be run for a minimum period of 2 minutes after all materials are loaded in full quantity. The concrete produced shall be uniform in colour and consistency.

2.6. The placing temperature of concrete shall not be more than 34° C. If it is more, the Architect may order addition of ice or chilled water to the concrete. Also the contractor shall take the following precautions.

a) Mixers and weight batches shall be painted with white colour

b) Aggregate storing bins shall not be exposed to the Sun.

c) Water shall be sprinkled on aggregates well before concreting to keep the temperature low.

3. LAYING OF CONCRETE

Concreting shall commence only after form work is approved, reinforcement is recorded and permission to proceed with concreting has been approved in writing from the Bank/PMC/Architect.

Formwork should be clean, free from sawdust, pieces of wood or any other foreign material. It should have been treated by form releasing agent prior to the laying of reinforcement and concrete.

Concrete shall be as gently deposited as is practically possible. In its final position to avoid re-handling and shall be so deposited that segregation of aggregates does not occur. In case of deep trenches and footing, if may be done with the help of a chute. Columns and walls shall be so adjusted in form work so that maximum depth is 1.5 meter unless consented to by the Bank/PMC/Architect. Concrete from wheelbarrows shall not be dumped away from the face concrete already in place. It shall be dumped into the face of concrete already in place.

Concrete onto a sloping surface shall be discharged by providing a chute with a baffle and a drop at its end so that the concrete remains on the slope.

Columns and walls shall be concreted in the operation to their full height to avoid any horizontal construction joints as far as possible.

All slabs, beams, wooden planks and cat-walk shall be provided clear of reinforcement

Concrete shall be placed in position within 30 minutes from the time it is produced. Concrete shall be laid during normal working hours- Concreting at night or on holidays shall be permitted only on the written approval of the Bank/PMC/Architect

4. COMPACTION OF CONCRETE

Concrete shall be thoroughly compacted, as depositing shall proceed by means of suitable vibrators. The vibrators shall maintain the entire concrete under treatment in an adequate state of agitation and shall continue during the whole period occupied by placing of concrete. Care shall be taken not to over- vibrate the concrete. While withdrawing needles no holes should be visible in concreting. Compacting shall be completed before the initial setting time. Concrete already set shall not be disturbed by successive vibrations.

It shall be ensured that the needle vibrators are not applied on reinforcement, which may destroy the bond between concrete and reinforcement. When electric vibrators are in use, the standby petrol vibrator must always be available at the concreting point.

5. **SHRINKAGE CRACKS**

Concreting shall be avoided in very warm weather, if necessary; it shall be covered with damped Hessian within 2 hours of placing of concrete.

To achieve good results the concrete shall be immediately covered with a plastic sheet and not allowed any direct wind contact. This shall eliminate shrinkage cracks.

6. CONSTRUCTION JOINTS

In large pours, it is practically not possible to carry on concreting continuously. Hence construction joints shall be provided. Location of construction joint shall be submitted by the contractor for approval of the Architect Such joints shall be kept to a minimum The joints shall be at places where shear forces nil or minimum and these shall be straight and at right angles to the direction of the main reinforcement. Slop ends provided shall be with necessary slots for reinforcement bars to pass feely without bending or any other obstruction. Also a trapezoidal fillet nailed on stop board shall be provided to form a regular keyed joint. Joints shall be straight and truly vertical or horizontal.

Before commencement of concrete, adjacent concrete stopper and surfaces shall be chipped and roughened to expose aggregate, then wire brushed and cleaned. The concrete surface shall be sprayed with water for 24 hours before casting and kept wet until casting.

True horizontal joints shall also be provided with a keyed joint by inserting planed greased timber.

It shall be treated as above prior to the start of fresh concreting.

For vertical joints neat cement slurry shall be applied on the surface just before concreting- For horizontal joints, the surface shall be covered with a layer of mortar about 10 to 15 mm thick composed of cement and sand in the same ratio as the cement and sand in the concrete mix. This layer of cement slurry shall be freshly mixed and applied just before concreting.

7. EXPANSION JOINTS

Expansion joints shall be formed and located as detailed in the drawing.

8. **CURING**

Curing of concrete is most important. There shall be no compromise on this activity and It is for the contractor to arrange for everything necessary to make sure that the concrete is cured to the complete satisfaction of the Architect. As said above in clause 3.1.8, after concrete has begun to harden i.e. about 1 to 2 hours after laying. It shall be protected from quick drying with moist or damped Hessian doth or any other material approved by the Architect. After 24 hours of laying of the concrete. the surface shall be cured by flooding with water or covering with damp Hessian cloth for a period of 7 days to keep it moist.

For the next 7 days the surface shall be kept wet all the time by sprinkling water continuously.

For membrane curing, details as listed in 12.5 of SP 24 shall be followed.

9. **FINISHING**

Concrete shall be finished keeping in mind the next operation to be carried out over the surface. For guidance the following points shall be noted but the Architect shall be consulted prior to start of concreting and his decision in this regard shall be final.

a) Roof slab shall be troweled even and smooth with a wooden float

b) The surface that will receive plaster shall be roughened immediately.

c) Surfaces that will be in contract with any masonry work shall be roughened immediately.

d) The surface that will receive mosaic floor or IPS or any other type of tiled work shall be roughened while it is green. Every care shall be taken not to disturb the freshly laid concrete.

10. **INSPECTION AND CORRECTIVE MEASURES**

On removal of form work, the surface shall be examined by the Architect. Till such time, no remedial measures shall be carried out by the contractor. All patching, rectification or chipping shall be done only on the Architect's instructions. In case of any violation of this rule, the concrete poured stands rejected. The decision of the Architect in this regard shall be final and binding on all parties.

Sagged, bulged, patched, honeycombed work shall stand to be rejected for surface that are exposed, or required fair face finish or decorative textured finish. The Architect may permit any work found structurally safe and areas of unexposed faces, for repairing. As directed by the Architect these works shall be retained and the cost of repair shall be at the contractor's account.

10.1. Cracks observed shall be brought to the notice of the PMC/Architect who shall examine them. It shall be kept under observation and a record shall be maintained for a period of 45 days. It shall be shown to the Structural Engineer and the following procedure shall be followed.

i) Cracks not developing further and in the opinion of Structural Engineer not detrimental to the strength of the construction shall be grouted with non-shrinking cement slurry or as directed by the Architect.

ii) Cracks developing further and in the opinion of the Structural Engineer, detrimental to the strength of construction, shall be tested as per the relevant Indian Standard.

i) Based on result of the test, the PMC/Architect in consultation with the structural engineer shall order remedial measures or order the contractor to dismantle construction, cart away the debris, replace the construction and cany out all the consequential works thereto.

iv) Cost of the above shall be borne by the contractor if the failure was on his part In case it is due to design faults, it shall be borne by the employer.

v) The decision of the Bank/PMC/Architect in this matter shall be final and binding on all parties. This decision shall not be open for arbitration.

11. QUANTUM OF CUBES AND TESTING

The minimum frequency of cube casting shall be as follows. Each sample shall consist of 6 cubes

Concrete quantity	Number of Samples.
Up to 5 cum in a day	1

5 cum. to 15 cum.	2
15 cum. to 30 cum.	3
30 cum. to 50 cum	4
More than 50 cum.	4 + one additional per each 50 cum. or part thereof.

Three cubes shall be tested on the 7tfl day and other three cubes on the 28th day.

12. ACCEPTANCE OF WORK

It shall be as given in IS 456:2000, SP 23 and SP 24. The guidance brief is as under;

Part or element of work shall be deemed to be accepted, provided the results of the 28th day cube testing conform to the criteria stated as under

a) The average of the three consecutive cube's strength shall not be less than the specified strength

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

c) If the individual cube strength exhibits more than 33% of the specified strength, such a cube shall be classified as freak and the criteria in (a) and (b) shall be applied to the remaining two cubes and their acceptability determined.

d) If the concrete tests fail to meet the acceptance criteria of the minimum strength required for respective grades of concrete, the Architect may take one of the following decisions:

i) Instruct the contractor to carry out such additional tests (e.g. core tests, load tests etc) and / or remedial measures to ensure the soundness of the structure at the contractor's expense.

ii) Any decision to accept the work shall be entirely at the discretion of the engineer who may a reduction in the rate of the appropriate item.

ii) The work will be rejected and any consequential action as needed shall be taken at the contractor's expense including cutting out and replacing a part or whole of the work.

3.4. CONCRETING UNDER SPECIAL CONDITIONS

3.4.1 WORK IN EXTREME WEATHER CONDITIONS

During hot or cold weather the concreting should be done as per the procedure set out in IS 7861 Part I or IS 7861 Part II or as directed by the Bank/PMC/Architect.

3.4.2 UNDERWATER CONCRETING

The procedure set out under 132 of IS 456 shall be followed or as directed by the Bank/PMC/Architect.

3.4.3. CONCRETING IN SEAWATER

The procedure set out under 13.3 of IS 456 shall be followed or as directed by the Bank/PMC/Architect.

3.4.4. CONCRETING IN AGGRESSIVE SOILS AND WATER

Guidelines laid down in 13.4 of IS 456 shall be followed together with the instruction of the Bank/PMC/Architect.

3.4.5. MEASUREMENTS

3.4.5.1.All works shall be measured in the decimal system.

a) Dimensions shall be measured to the nearest 0.01 meter except for thickness of slab which shall be measured to the nearest 0.005 meter.

b) Areas shall be worked out to the nearest 0.01 sq. m.

c) Cubic contents shall be worked out to the nearest 0.01 cu. m.

3.4.5.2.All measurements of cutting shall, unless otherwise stated, be held to include the consequent waste.

3.4.5.3.Cement concrete work shall be classified as under

a) Concrete cast-in-situ Plain and reinforced

b) Precast concrete Plain and reinforced

c) Pre-stressed concrete Cast-in-situ or pre-cast

3.4.5.4 All concrete, except as hereinafter provided, shall be measured in cubic meters.

3.4.5.5. The price of concrete shall include ingredient material, mixing, transporting, hoisting to any height and lowering to any depth, pouring or laying, consolidating, leaving pockets, holes and protecting them till the next operation or completion of work, hacking the surface to provide key for further work including cleaning, wetting surface etc. and preparing construction joints as described in clause 3-19 of this section.

3.4.5.6.Concrete processed in a special manner for any specific purpose, such as cooled, heated, waterproofed, acid-proofed, heat-resistant shall be measured separately.

3.4.5.7Admixtures shall be used if necessary at the request of the contractor for workability and the price for that shall deemed to be included in the contractor's quoted price of concrete.

3.4.5.8.No reductions shall be made for;

a) Ends of dissimilar materials (for example beams, posts, girders, purlins, corbels and steps) up to 500 sq, cm in section.

b) Opening up to 0.1 Sq Mtr

c) Volume occupied by reinforcement

d) Volume occupied by drainage, water pipes, conduits, etc. not exceeding 100 sq.cm in cross sectional area.

e) Small voids each not exceeding 40 Sq.mt. in section.

f) Small moulds, drip moulds, chamfers, splays, rounded or covered angles, beads, grooves and rebates upto 10 cm in depth and width.

3.4.5.9Expansion joints shall be measured in running meter or sq. m. as the case may be. Price shall include required shuttering, special treatment if any, filler and finishing material as detailed in drawing or the BOQ.

3.4.5.10 Water proofing of concrete shall be measured separately as an extra over ordinary concrete stating the quantity of water proofing material inliers or kilograms.

3.4.5.11. Surface treatment shall be measured in square meters stating number of coats and proportioning of water proofing liquid to water

3.4.5.12. Cement grouting shall be measured in square meters and the mix specified.

3.4.5.13. Grouting of holding-down bolts and providing temporary boxing or wedges to form holes shall be enumerated. The mix shall be specified. The price shall include required shuttering, grouting etc.

3.4.5.14. To keep surface dry while concreting, dewatering due to rains and seepage shall be included in the price of concrete.

4 MORTARS

4.0.1. Mortars shall be prepared by mixing fine graded aggregate with cement, in the proportion specified for respective items of work as detailed in the BOQ. Mixing of mortars shall be done by mechanical mixers only. Hand mixing may be permitted in specified cases on the written permission of the Architect.

4.0.2. Mortars shall be specified by proportion only and not by strength, volumetric mixing shall be based on dry volumes of each ingredient. For convenience, measurement shall correspond to volume of one cement bag i.e. 0.035 Cu.mt. Boxes shall be of size of 40 x 35 x 25 cm. These shall be marked as mortar mixing boxes by red paint and shall be used throughout the contract. Hand mixing or mechanical mixing proportions shall be done with the use of these boxes.

4.1. CEMENT MORTAR

4.1.1. Cement mortar shall be prepared by mixing cement and sand in specified proportions. Proportioning shall be carried out as detailed above. Sand shall be added suitably to allow for bulk age, if required. Bulk age shall be determined as specified in IS 2386 Part III. Cement and sand added to mixer shall be thoroughly mixed and water shall be added to it gradually after addition of water the mixer shall run for a minimum of 3 minutes. The mortar mixed shall be consumed within 30 minutes of its mixing.

5. Reinforced Cement Concrete & Mortar Works General:

This section covers the requirements for furnishing of cement concrete including materials proportioning batching, mixing, testing, placing, compacting, finishing jointing, curing and alt other work as required for cast-in-place reinforced concrete. Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, water, with or without admixture as approved, proportioned and mixed as specified herein.

5.1 INDIAN STANDARDS

All relevant Standards as specified elsewhere in this Volume are applicable. Indian Standards to be followed are:

(1)	IS 269	Specification for Ordinary and low heat, Portland cement.
(2)	IS 383	Specification for Coarse and fine aggregates from natural Sources for concrete.
(3)	IS 456:2000	Code of practice for plain and reinforced concrete.
(4)	IS 460 (Part I, II &III)	Specification for test sieves: i) Wire doth test service ii) Perforated plate lest sieve

		iii) Method of examination of test sieve
(5)	IS 516	Method of test for strength of concrete
(6)	IS 1199	Method of Sampling and analysis of concrete.
(7)	IS 1489-PART1	Specification for Portland Pozzolana cement
(8)	IS 1542	Specification for Sand for plaster
(9)	IS 2116	Specification for Sand for masonry mortars
(10)	IS 2386 (Part I, II, & III)	Method of tea for aggregate concrete. i) Particle size and shape ii) Estimation of deleterious materials and organic impurities iii) Specific gravity, density, voids, absorption and bulking
(11)	IS 2646	Specification for Integral cement water proofing compound.
(12)	IS 3025	Methods of Sampling and test (Physical and Chemical for Water used in Industry
(13)	IS 3068	Specification for Broken brick (burnt clay) coarse Aggregate for use in lime concrete
(14)	IS 4031 (Part i to xii)	Method of Physical test for hydraulic cement
(15)	IS 4032	Method of chemical analysis for hydraulic cement.
(16)	IS 6452	Specification for high Alumina cement for structure use
(17)	IS 6909	Specification for super sulphated weather
(18)	IS 7861	Code of practice for extreme weather concreting i) Recommended practice for hot weather concreting ii) Recommended practice for cold weather concreting
(19)	IS 8041	Specification for Rapid hardening Portland cement,
(20)	IS 8112	Specification for high strength ordinary port land cement.

(21)	IS 9103	Specification for admixture for concrete
(22)	IS 11433	Specification for one part gun grade i) Poly sulphate based joint sealant: general requirements.
(23)	IS 12118(part l)	Specification for two parts poly sulphide based sealant: General requirements.
(24)	SP 23	Handbook on concrete mix
(25)	SP 24	Explanatory handbook on Indian Standards code for plain And reinforced concrete (IS 456)
(26)	SP 27	Handbook of method of measurement of building works.

REINFROCEMENT AND FORM WORK

1.0. INDIAN STANDARDS

All relevant Standards as specified elsewhere in this Volume are applicable.

Indian Standards to be followed are:

(1)	IS 226	Specification for structural steel standard quality
(2)	IS 228	Methods for chemical analysis of steels
(3)	IS 280	Specification for mild steel wire for general engineering purpose
(4)	IS 303	Specification for plywood for general purpose.
(5)	IS 432	Specification for mild steel and medium tensile steel bars and hard drawn steel wires for concrete reinforcement.
	Part-1	Mild steel and Medium tensile steel bars.
	Part-2	Hard drawn steel wire
(6)	IS 456	Code of practice for construction and design of reinforced concrete
(7)	IS 723	Specification for steel counter sunk head wire nails.
(8)	IS 808	Dimensions for hot rolled steel beams, channels and angle section

(9)	IS 814	Covered electrodes for metal arc welding of structural steel.
(10)	IS 961	Specification for structural steel: high tensile steel bars.
(11)	IS 1139	Hot rolled MS. medium tensile steel and high field strength deformed bars for concrete reinforcement.
(12)	IS 1387	General requirements for supply of metallurgical materials.
(13)	IS 1599	Method for bend test for steel products other than sheets, strip, wire and tube.
(14)	IS 1608	Method of tensile testing: steel products
(15)	IS 1730	Dimensions for steel plates, sheets and strip for structural and general engineering purpose.
	Part-1	Plates
	Part-2	Sheets
	Part-3	Strips
(16)	IS 1786	Specification for cold worked steel high strength deformed steel bars for concrete reinforcement (Superseding IS 1139)
(17)	IS 1977	Specifications for structural steel: ordinary quality.
(18)	IS 2062	Specification for structural steel: fusion welding quality.
(19)	IS 2502	Code of practice for bending and fixing of bars for concrete reinforcement
(20)	IS 3696	Safety Code of scaffolds and ladders :
	Part-1	Scaffolds
	Part-2	Ladders
(21)	IS 4014	Code of practice for steel tubular scaffolding.
	Part-1 &2	
(22)	IS 4082	Recommendation on stacking and storage of construction materials at site.
(23)	IS 8989	Safety code for erection of concrete framed structures
(24)	IS 9417	Recommendations for welding cold worked steel bars for reinforced concrete construction.

2. REINFORCEMENT

2 1. Reinforcement bars used in construction shall be mild steel or medium tensile round bars and high strength deformed bars.

2.1.1. **M.S. Plain**

Rolled mild steel and medium tensile steel plain round bars used in concrete shall conform to IS 432 Part I. Steel received shall conform to the following IS with regards to manufacturing and chemical composition.

i) M.S. bar Grade I Steel designation Fe 410-S of IS 226

ii) M.S. bar Grade II Steel designation Fe410-O of IS 1977

iii) Medium Tensile Steel designation Fe 540 W-HT IS 961 Steel bars

2.1.2. National sizes and tolerances shall be as specified in IS 432 Part I. Physical requirements shall be determined in accordance with IS 1608 read in conjunction with IS 226. For ready reference of minimum requirements, properties are tabulated in table 11 of the Annexure.

2.2. Tor Steel

2.2.1. High strength deformed bars for use as reinforced in concrete shall be of grade Fe 415, Fe 500 and Fe 550 conforming to IS 1786.

2.2.2. Chemical composition shall conform to IS 1786 when made as a relevant part of IS 228. Permissible limits shall be as shown in table 12 of the Annexure,

2.2.3. Welding of cold work steel bars in reinforcement shall be permitted as per IS 9417 (Recommendation for welding cold worked steel bars for RCC)

2.2.4. Nominal sizes, cross sectional areas and their mass shall be as specified in IS 1786, allowing due consideration for tolerance specified therein.

2.2.5. Physical properties

a) !t shall satisfy IS 1599 test for bend and re-bend test in conjunction with IS 226

b) Bond requirements shall be deemed to have been satisfied if it meets clause 4.0 of IS 1786

c) Tensile, proof stress and percent elongation shall be as per table 3 of IS 1786 and reproduced as table 13 of Annexure for ready reference.

2.3 Quality of Material

2.3.1. Material received at site shall have ISI certification mark. Each bundle or coil containing the bars shall be suitably marked with ISI certification mark Also bars shall be marked to identify categories. This shall be done as per IS 1387

2.3.2. In case bars are without ISI certification mark, the manufacturer shall give a certificate stating process of manufacturer, chemical composition and mechanical properties. Each certificate shall indicate the number or identification mark of the batch production / cast to which it applied. Corresponding number or identification mark should be found on the material-

2.3.3. All reinforcement material shall be free from loose mill scale, excessive rust, loose rust, pitting, oil, grease, paint, mud or any foreign deleterious material present on the surface. Cleaning shall be done to the satisfaction of the Architect.

2.3.4. Each batch brought at site shall be tested prior to use for respective specification/ Physical properties Cost of all such tests shall be borne by the contractor. Material acceptable as per IS shall be allowed into the works. All rejected material shall be removed from site by the contractor within 3 days of rejection. If the same is not done, the Architect shall impose a penalty of Rs. 5007- per metric ton per day. This will be without any appeal and shall not be subjected to arbitration.

2.3.5. Reinforcement bars received at site shall be stored on hard concrete platform and clear of the ground with the use of timber sleeper, concrete sleeper or any other means. Reinforcement material shall be kept covered by tarpaulins or plastic to avoid corrosion and other contamination. It is advised to follow storage methods as described in IS 4082.

2.4. Miscellaneous

2.4.1. Cover blocks shall be of non-corrosive material such as plastic but not wooden or broken bricks or stone. Specially PVC made cover spacers shall be used in the Works. Concrete cover spaces may me permitted by the Architect. Such concrete spaces shall be cast from concrete and not cement mortar. Strength of these blocks shall be equal to the strength of concrete in use. These should be fully cured prior to use in works.

2.4.2. Binding wire shall be 16 gauge annealed wire conforming to IS 280. Binding shall be done with double wire. It shall be free from rust. oil. paint, grease, loose mill scale or any other deleterious material undesirable for the reinforcement and concrete or which may prevent adhesion of concrete with reinforcement.

2.4.3. Deformed bars for concrete reinforcement and rolled mild steel and medium tensile steel conforming to IS 1139 shall be allowed in construction provided they are approved by the Architect.

2.4.4. Weight payable for reinforcement per meter shall be as follows:

1	6 mm	0.222 kg/Rmt
2	8 mm	0.395 kg/Rmt
3	10 mm	0 617 kg/Rmt
4	12 mm	0.888 kg/Rmt
5	16 mm	1.578kgYRmt
6	18 mm	1.998 kg/Rmt
7	20 mm	2.467 kg/Rmt
8	22 mm	2 984 kg/Rmt
9	25 mm	3.853 kg/Rmt
10	28 mm	4. 834 kg/Rmt
11	32 mm	6. 313 kg/Rmt
12	36 mm	7.990 kg/Rmt
13	40 mm	9.865 kg/Rmt

2.5 Fabrication of reinforcement

Reinforcement shall be fabricated as per the drawing. Bending shall be done mechanically with use of machine or if approved with hand but to the correct radius, with proper tools and platform and shall conform to IS 2502. Bending of material shall be cold bending only. Material shall be inspected for visible defects such as cracks, brittle, excessive rust, loose mill scale etc. Cracked ends of bars shall not be used in Works. Also the bars should be free from any

deleterious material and hence the best practice shall be to hose down reinforcement just prior to concreting.

It is important that bending, straightening, cutting etc. shall be carried out in a manner not injurious to the material and the safety of the persons working should be ensured.

2.5.1. Anchoring of bars and stirrup shall be provided exactly as detailed in the structural drawing or as directed by the Architect.

2.5.2. **Lapping of bar**

Laps shall be strictly as per the drawing or as directed by the Structural Engineer for general guidance, the following principles shall be followed as given in IS 456.

a) Splices shall be provided as far as possible away from sections of maximum stress and be staggered.

b) Not more than half of the total bars shall be spliced at a section

c) Where more than one half of the bars are spliced at a section or where splices are made at points of maximum stress, special precautions shall be taken, such as increasing the length of lap and / or using spirals or closely spaced stirrups around the length of the splice.

d) Lap splices shall not be used for bars larger than 36 mm diameter, for larger diameters, bars may be welded. In cases where welding is not practical, lapping of bars larger than 36 mm diameter may be permitted and additional spirals should be provided around the lapped bars.

e) Lap length including anchorage value of hooks in flexural tension shall be LD (as defined in 25.2.1 of IS 456) or 30 dia whichever is greater and for direct tension 2 LD or 30 dia whichever is greater. The straight length of lap shall not be less than 15 dia or 20 cm. Where LD is the development length as described in 25.2.1 of IS 456.

f) When splicing of welded wire fabric is to be carried out, lap splices or wires shall be made so that the overlap measured between the extreme cross wires shall be not less than the spacing of cross wires plus 10 cm.

g) The lap length in compression shall be equal to the development length in compression, calculated as described in 25.2.1 of IS 456 or as specified in drawing but not less than 24 dia.

2.5.3 Spacing of bars

Bars shall be placed in position as shown in the drawing. Following guidelines as given in IS 456 shall be followed in case of difficulties or shall be carried out as directed by the Architect.

a) Horizontal distance between two parallel main reinforcing bars shall usually not be less than the greatest of the following.

i) The diameter of the bars, if the diameters are equal,

ii) The diameter or larger bar, if the diameters are unequal, and

iii) 5 mm more than the nominal maximum size of coarse aggregate (by using reduced size of aggregate in congested reinforced area, conditions given hereof should be overcome)

iv) Greater horizontal distance should be provided. But when needle vibrators are used, distance between bars of a group may be reduced to two-third of the nominal maximum size of the coarse aggregate, provided sufficient space is left between groups of bars to enable the vibrator to be immersed.

v) Where there are two or more rows, the bars shall be vertically in line and the minimum vertical distance between the bars shall be 15 mm two third the nominal maximum size of the aggregate or the maximum size of bar, whichever is more.

2.6 Cover to reinforcement

Reinforcement shall have concrete cover and the thickness of such cover (exclusive of plaster or other decorative finish) shall be as specified in drawing or as directed by the Architect. The following guidelines are to be observed in the absence of the above.

a) At each end of the reinforcing bar, not less than 25 mm. nor less than twice the diameter of such bar.

b) For a longitudinal bar in a column, not less than 40 mm, nor less than the diameter of such bar. In case of columns of minimum dimension of 200mm or under, whose reinforcing bars do not exceed 12 mm, a cover of 25 mm.

c) For longitudinal reinforcing bar in beam, not less than 25 mm, nor less than the diameter of such bar

d) For tensile, compressive, shear or other reinforcement, in slab not less than 15 mm, nor less than the diameter of such bar and

e) For any other reinforcement, not less than 15 mm, nor less than the diameter of such bar.

f) Increased thickness shall be provided in case the concrete members are in the surrounding of harmful chemicals; saline atmosphere etc. and the cover shall be 50 mm or more as directed by the Architect.

g) For concrete members totally immersed in seawater, the cover shall be 40 mm more than specified above (a) to (f).

This shall be 50 mm more for periodical immersion in seawater.

h) Concrete cover should not exceed 75 mm in any case. Cover to reinforcement shall be as specified in the drawing or as directed by the Architect.

Details given in sub Para (a) to (h) are for guidance and shall be followed in absence of any specific direction.

2.7. Fixing in position

Correctly cut and bent bars shall be accurately placed in position as detailed in the drawing. Unless otherwise specified by the Architect, reinforcement shall be positioned within the tolerance as under

a) For effective depth 200 mm or less ±10 mm

b) For effective depth more than 200 mm ± 15 mm

But in no case shall the cover be reduced by more than 5 mm of that specified. There shall be no compromise on cover for foundation work

Reinforcing bars shall be held in position during the placing of concrete by use of PVC or concrete cover blocks (made of equal / of higher grade strength of well-cured concrete in use) steel chair spacers, steel hangers, supporting wires, etc. and secured by tying with an annealed binding wire of 16 to 18 gauge as approved by the Architect.

Layer of bars shall be separated by precast concrete spacer blocks or spacer bars. Reinforcement shall be in correct position prior to start of concreting. No reinforcing bar shall be placed on freshly laid concrete for adjusting bar spacing. Care shall be taken to maintain reinforcement in position and keep it clean, throughout the period till it is embedded in the concrete. For maintaining cover, pieces of broken stone or brick or wooden blocks shall not be used at any stage.

Binding wire used shall conform to IS 280.

2.7.1 Welded joints or mechanical connections

Welded joints or mechanical connections in reinforcement may be used but in all cases or important connections, tests shall be made to prove that the joints are of the full strength of the connected bars. Welding of reinforcement shall be done in accordance with IS recommendation.

2.7.2. Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care should be taken to ensure that at no time is the radius of the bend less than 4 bar diameters in case of plain mild steel or 6 bar diameters for deformed bars. Care shall be taken when bending back bars to ensure that the concrete around is not damaged / disturbed.

2.7.3. Welding rods used shall conform to IS 814: covered electrodes for metal arc welding of structural steel. Work shall be carried out by a competent welder. Samples from Work site shall be taken at regular Intervals and tested. Frequency and number of samples shall be as directed by the Architect.

2.8 Measurements

Reinforcement shall be measured as follows:

2.8.1. Lengths of different diameters of bars actually used included authorized overlaps shall be measured nearest to a centimeter and their weight calculated as given in table 2.4.4 shall be used.

2.8.2. Chairs and spacer bars shall not be measured and paid. The contractor shall account for all these in his quoted price.

2.8.3. In case of welded coupled joints, measurement for payment shall be equivalent to the length of overlap, as per design

2.8.4. Price build-up shall include, in addition to cost of material.

a) Cover blocks of PVC or concrete.

b) Spacer bars, chairs and unauthorized overlaps (Allowed for convenience)

c) Cutting, bending, placing and fixing in position.

d) Binding wire as approved.

e) Wastage / Rolling margin.

f) Cleaning of bars.

2.8.5. For purpose of reconciliation, maximum wastage permitted shall be 5% of the actual material used. Balance amount shall be borne by the Contractors.

3. OPENING / INSERTS

3.1. All required openings and pockets should be provided as detailed in the drawing. They may be enumerated or paid on area basis as detailed in the BOQ. The contractor shall provide for the required materials, labour, for fixing and supporting during concreting In his quoted price. It is imperative that all openings and pockets shall be de-shuttered with care and all comers of openings shall be preserved. All openings/pocked shall be in a correct line and level. After concreting, the openings shall be secured against any accident by proper covering and guardrail and warning notice, if any.

3.2 The contractor shall clean and grout the pocket at a later date with a non-shrinking compound added to the grout mix or non-shrinking cement shall be used. It shall be well-cured and protected to correct line and level till handling over.

3.3 Inserts are material such as timber, steel, plastic, and dowels. Bolts, locks, brackets, pipes, etc. left in concrete partly or fully embedded to receive connection with foreign member at a later date. These may be fabricated by the contractor or provided by the EMPLOYER as received from specialist, manufacturer, etc. These shall be protected from weathering and damage in course of the construction. The cleaning required after concreting and any treatment such as oiling, greasing or covering with paint etc. shall be carried out by the contractor at his cost.

3.4 It is very important that the providing and fixing as contemplated in the BOQ shall be carried out with the "utmost precision" and to the entire satisfaction of the Architect. Any deviation from that as shown in the drawings or instructions shall be rectified by the contractor at his own cost and responsibility

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Wood Work

1. Door Frame

1.1 Timber for door, window and ventilators frames shall be as specified. Timber shall be sawn in the direction of the grains. All members of a frame shall be of the same species of timber and shall be straight without any warp or bow. Frames shall have smooth, well-planed (wrought) surfaces except the surfaces touching the walls, lintels, sill etc., which may be left clean sawn. Rebates, rounding or moulding shall be done before the members are jointed into frames. The depth of the rebate for housing the shutters shall be 15 mm, and the width of the rebates shall be equal to the thickness of the shutters. A tolerance of ± 2 mm shall be permitted in the specified finished dimensions of timber sections in frames.

1.2 Joints

The Jamb posts shall be through tenoned in to the mortise of the transoms to the full thickness of the transoms and the thickness of the tenon shall be not less than 2.5 cm. The tenons shall closely fit into the mortise without any wedging or filling. The contact surface of tenon and mortise before putting together shall be glued with polyvinyl acetate dispersion based adhesive conforming to IS 4835 or adhesive conforming IS 851 and pinned with 10 mm dia hard wood dowels, or bamboo pins or star shaped metal pins. The joints shall be at right angles when checked from the inside surfaces of the respective members. The joints shall be pressed in position. Each assembled door frame shall be fitted with a temporary stretcher and a temporary diagonal brace on the rebated faces.

1.3 Fixing of Frames

The frames shall be got approved by the Engineer-in-Charge before being painted, oiled or otherwise treated and before fixing in position. The surface of the frames abutting masonry or concrete and the portions of the frames embedded in floors shall be given a coating of coal tar. Frames shall be fixed to the abutting masonry or concrete with holdfasts or metallic fasteners as specified. After fixing, the jamb posts of the frames shall be plugged suitably and finished neat. Vertical members of the door frames shall be embedded in the floor for the full thickness of the floor finish and shall be suitably strutted and wedged in order to prevent warping during construction. A minimum of three hold fasts shall be fixed on each side of door and window frames one at centre point and other two at 30 cm from the top and bottom of the frames. In case of window and ventilator frames of less than 1 m in height two hold fasts shall be fixed on each side at quarter point of the frames. Hold fasts and metallic fasteners shall be measured and paid for separately.

1.4 Measurements

Wood work wrought, framed and fixed shall be measured for finished dimension without any allowance for the wastage or for dimensions beyond specified dimension. However, in case of members having mouldings, roundings or rebates and members of circular or varying sections, finished dimensions shall be taken as the sides of the smallest square or rectangle from which such a section can be cut. Length of each member shall be measured over all to the nearest cm so as to include projection for tenons. Width and thickness shall be measured to the nearest mm and the quantity shall be worked out in unit of up to three places of decimal.

1.4 Rate

The rate shall include the cost of material and labour involved in all the operations described above including the hold fasts and one coat of A.T.T. at the back side

2. Flush Door

2.1 General :

All flush doors shall be of approved make external quality, laminated full solid core block board construction as per IS:2202 to IS:1959. They shall be faced on each face with high quality decorative or commercial veneers as required and shall have approved teakwood edge lipping. Block board core stock shall be of approved species of timber, well seasoned and proofed against termites by preservative chemical treatment. Veneers of decorative flush doors and block boards adjacent to one another shall be selected so that they match, to the satisfaction of the Architect.

2.2 Size and Thickness:

Flush door and block boards shall be of the required size and thickness. Flush doors shall be ordered to a size little more in width than shown on the scheduled so that after trimming it fits the opening between rebates perfectly.

2.3 Louvers and Vision Panels:

Where shown in the drawing and schedule flush doors shall be provided with kiln seasoned hardwood louvers to match face veneer or glazed vision panels as per standard manufacturers details Size of openings shall be as shown in drawings.

2.4 Rebating:

In case of double leaves shutters, the meeting of the styles shall be rebated by one third of the thickness of shutter. The rebating shall be either splayed or square type. Where lipping is provided, the depth of lipping at the meeting of styles shall not be less than 35 mm.

2.5 Fittings

Details of fittings to be provided shall be as per the schedule of fittings shown in the drawings All fittings shall be heavy duty of approved make

2.6 Fixing in Masonry Openings:

a) Fixing with Lugs:

i) Doors, windows and ventilators unit shall not be 'built in' as the work proceeds but opening shall be left out and frames fitted afterwards so that the minimum specified clearance between opening and unit frame is left around. The size of the opening shall first be checked and cleared of obstruction, if any. The position of the unit and fixing holes shall be marked on the jamb. Necessary holes shall be made in the masonry and lugs not less than 10 cm long 15*3 mm size fixed in cement concrete blocks 15 * 10' 10 cm size of 1:3:6 mix (1 cement: 3 coarse sand: 6 graced stone aggregate 20 mm nominal size). The frames of units shall be set in the opening by using wooden wedges at the jamb, head and sill, (wedges shall preferably be placed near the points where *a* glazing bar meets the frames and be plumbed in position)

ii) After it, the frame shall be fixed with the lugs with 20 mm, long and 6.3 mm dia G.I. Counter sunk machine screws and nuts. In case of flush opening which are rendered smooth, wedges shall be removed and gap between unit and jambs shall be filled with cement mortar

iii) In case of flush jamb with external 'fair faced' finished the gap between the opening and frame shall be filled with mastic from inside till it oozes out on external face. The oozing mastic shall be cleaned and flush pointed. The internal gap shall be filled with mastic to about 1/3 rd depth and the rest with cement mortar.

iv) In case of rebated and jambs finished 'fair faced' externally the mastic shall be freely applied to the inside channel of frame, jamb and sill, so as to ensure a watertight joint. After the unit is firmly fixed in position surplus mastic shall be cleaned and flush pointed, as shown in drawing.

b) Fixing with Screws and Plugs:

In RCC work where lugs cannot be embedded due to reinforcement bars etc rawl plugs or other approved of metallic fasteners such as Dash Fasteners of the required size and type as approved shall be used.

Metal Insets in RCC & Brick Work

1 General:

Anchor bolts, rolled steel sections sleeves, pipes, inserts, etc. shall be galvanized and shall be fixed or inserted as shown or directed. The Contractor shall supply and place in the shuttering all such inserts as may be required for sanitary, electric or work of any other trade. Work shall be done exactly as required for the purpose, to the satisfaction of the Architect.

2 Miscellaneous M.S. Works

2.1 Quality of Steel:

All mild steel used in this work shall be tough with even surface and shall cleanly rolled, sound and free from flaws, cracks, crop ends and other defects.

2.2 Workmanship:

All work shall be carried out as per drawing in a neat and good craftsman like manner by specially skilled men known for good quality wont..

2.3 Measurements to be checked:

The Contractor shall check all measurements at site and with surrounding works and make necessary adjustments in the drawings, if required to suit actual site conditions to the approval of the Engineer before starting fabrication.

2.4 Assembly:

Work carried out in sections shall be carefully assembled. All members shall be secured together or to the anchors by welding or as shown in the details. AH welds shall be ground smooth and made to match surrounding surfaces and finished to the satisfaction of the Architect

2.5 Setting in Lead:

Where the work is fixed to concrete it shall be set in lead. In exterior locations, the end of the main structural support near the point of embedding shall be cleaned and covered with a solar and a bronze sleeve or umbrella shall be set on the steel upright to cover the joint and sealed by blow lamp.

3 Aluminum Doors and Windows

3.1 General:

Aluminum doors, windows, etc. shall be electro treated natural anodized free of scratches and any other blemishes or any other approved colour and shall be of sizes as shown on drawings. The details shown on the drawings indicate generally the sizes of the component parts and the general standards. These may be varied slightly on approval to suit the standards adopted by the manufacturers of the aluminum work. Before proceeding with any manufacture, the contractor shall prepare and submit complete manufacturing and installation drawings for approval of the Engineer and no work shall be performed until the approval of these drawings are obtained. All requisite materials and labour as specified here under shall be fully covered under the rates prices for proper execution and completion of the work. Weather-strip, gaskets and sealants shall be of high quality material capable of resisting local environment exposure and performance requirements. Interior primary sea be a compression type weather seal.

3.2 Shop Drawings & Samples:

The contractor shall submit shop drawings and samples of each type of windows, ventilators and other aluminum work, to the Engineer for his approval. The shop of commencing the work.

Aluminum sections to be used for doors, windows, ventilators and fixed glazing etc. shall be fabricated from Hindalco, Indal, Jindal or equal approved extruded sections. The sections shall be extruded form aluminum alloy IS:63400 WP/AA : 6063 T6/BS:HE 9 WP approved equivalent, of commercial quality and free from all defects impairing appearance, strength and durability. The permissible dimensional tolerances of the extruded sections shall be such as not to impair the proper and smooth function/operation and appearance of doors and windows. For any excess weight of section used nothing extra shall be paid.

3.4 Fabrication:

Doors, windows, ventilators, etc. shall be fabricated by an approved specialist firm. All doors and windows shall have mechanical joints. The aluminum sections joints shall be designed to withstand a minimum wind load of 175 kg. Per Sq Mtr the designed sections shall also ensure that the maximum deflection of any framing shall not exceed L/175 of the span of the member. All members shall be accurately machined and fitted to form hairline joints prior to assembly, The jointing accessories such as cleats, brackets etc. shall be of such material as not to cause any bimetallic action. The design of the joint and accessories shall be such that the accessories are fully concealed. The fabrication of doors, windows, etc. shall be done in suitable sections to facilitate easy transportation, handling and installation. Adequate provision shall be made in the door and window members for anchoring to supports and fixing of hardware and other fixtures as approved by the Engineer. The aluminum sections shall confirm to the following parameters also:-

a) The minimum tensile strength shall be 19 kgf/ mm2,

b) The maximum allowable deviation in length from a straight line shall be 0.5 mm/meter.

c) The maximum allowable deviation from straight shall be 1 degree.

d) The maximum permissible twist shall be 0 5mm/metre.

e) The maximum variation in flatness shall be not more than 0.125 * Width/25.

3.5 Anodizing:

All surfaces of windows, ventilators & fixed glazing etc. shall be natural anodized in approved shade to conform 615:1868-1968 Grading-8. Anodic coating shall be of a minimum thickness of 0.025mm. The testing shall be done by Eddy current method as per IS: 6012 for thickness and relevant test for sealing and colour variation measurements shall also be carried out. Sulphuric acid shall be used as the electrolyte for the anodic process. The anodizing shall be carried out in an approved manner to achieve the desired colour. Prior to anodizing all aluminum shall be rendered uniform in appearance free from disfiguring scratches, stains or other blemishes and etched in a caustic soda solution.

3.6 Protection of Anodized Finish:

Requisite tests shall also be required to be carried out at site as instructed by the Architect and contractor shall arrange all assistance and equipments required for these tests at site for which no extra payment shall be made to the contractor. All aluminum members shall be wrapped with self adhesive non staining PVC tapes manufactured by Messrs, Bhavan & Son, Bombay or equivalent, approved by the Bank/PMC/Architect.

3.7 Handling:

Fabricated materials shall be created in an approved manner to protect the material against any damage during transportation. The loading and unloading shall be carried out with utmost care.

3.8 Installation:

Just prior to installation, the doors, windows etc. shall be stacked on edge on level bearers and supported evenly.

If so specified or directed by the Bank/PMC/Architect, window/door frames shall be fixed to 25mm thick 2^{nd} class hard wood rough ground. Width of rough ground shall be exactly the same width of the frames. Wooden rough grounds shall be fixed to masonry surrounds with approved fasteners. The face of rough ground to receive frames shall be in true line, level and plumb- When the rough ground is property secured and all major internal and external finishing works are over, the assembled doors/windows shall be placed in correct final position in the opening and fixed to rough block through cadmium plated machine screws of required size and spacing. Then all joints shall be sealed with approved silicon sealants. Sizes, details, spacing, etc. given above are approximate and indicative only. They can be varied at the option of Architect to suit particular sizes and situations and the contractor shall carry out the instructions of the Architect in this regard at no extra cost to the owner. The contractor may suggest alternative methods of fixing and anchoring for consideration of the Architect, while the decision of the Architect in this regard shall be final and binding.

In the case of composite windows the different units are to be assembled first. The assembled composite units should be checked for line, level and plumb before final

fixing is done. Units may have to be assembled in their final location if the situation so warrants.

Where aluminum comes into contact with masonry, brickwork, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that is trimmed off to a dean line on completion. The contractor shall be responsible for assembling composite units, bedding and pointing with mastic inside and outside, at the transoms and mullions, placing the doors, windows, etc. in their respective openings. After the doors/windows have been fixed in their correct assigned position, the open hollow sections abutting masonry/concrete shall be filled with cement grout (1 cement :3 coarse sand) densely packed and finished neat without causing any scratch/damage to Aluminum sections. Final packing grout shall be of the expanding type made by approved additive. The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.

3.9 Epdm Gaskets;

EPDM gaskets of approved size and profile shall be provided and installed at all locations as shown and as called for to tender the doors windows etc. Absolutely air tight and weather tight. Samples of the gaskets shall be produced for approval and procure after approval only.

3.10 Sealant:

The gaps between frames and supports and also any gaps in the window sections shall be raked out as directed and filled with approved silicon sealant of approved colour and make to ensure complete water-tightness. The silicon sealant shall be of such colour, and composition that it would not stain the masonry/concrete work, shall receive paint without bleeding, will not sag, or run and shall not set hard or dry out under any conditions of weather. Silicon sealant shall be applied with special gun as per manufacturer's recommendation by a specialist firm approved by Engineer.

3.11 Fittings:

Nylon rollers, Stainless Steel frictional hinges, shutter entilift curbs, buffers, handles, locks and other fittings shall conform to the relevant I.S. specifications and quality and manufacture as approved by the Engineer. Fittings shall retain the casements rigidly in both the open and dosed position; hinges shall be wrapped and protected until after the completion of the building. Hinges shall be close-up type and shall be opening as shown. These hinges shall work in conjunction with friction adjusters as a hold open device or additional friction for controlled operation.

Rollers shall be heavy duty type and allow free sliding movements without any friction.

3.12 Final Cleaning:

The PVC wrapping, protecting and anodized finish shall be retained till the glazing work is commenced. After the glazing and all work connected with installation of windows is complete all aluminum work shall be washed with a suitable thinner and left in a finished condition, in approved uniform appearance and free from all marks and blemishes.

Flooring

1. Glazed Tile in Dado:

1.1 Tiles:

The tiles shall be of approved make/manufacturer. They shall be flat, and true to shape and free from cracks, crazing, spots, chipped edges and comers. The surface shall be of uniform shade except for patterned tile

The tiles shall be of nominal sizes of 200 * 100 cm or as shown. The thickness of the tiles shall be 5 to 6 mm unless comerwise required or shown

1.2 Colour and Pattern:

The tiles shall be white, colored or patterned as specified.

1.3 Preparation of surfaces:

The joints shall be racked out to a depth of at least 12 mm in masonry walls, while the masonry is being laid. In case of concrete walls, the surfaces shall be backed and roughened with the wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting /dado is commenced.

1.4 Mortar:

12 mm thick plaster of cement mortar 1:3 shall be applied and allowed slightly to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at close intervals.

1.5 **Laying of Tiles:**

The tiles shall be soaked in water, adequately washed clean, and a coat of neat cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plane and lines. The tiles shall be set in the required pattern and butt jointed. The joints shall be as fine as possible and uniform. Top of dado shall be truly horizontal and joints truly vertical except where otherwise indicated. Where full size tiles cannot be fixed these shall be cut to the required size and their edges rubbed smooth. Care shall be taken to ensure that as far as possible cut tile are in non-exposed locations. Works shall be carried out in all areas only after a sample panel has been approved by the Architect.

1.6 Pointing:

After laying is complete, the joints shall be cleaned off the gray cement grout with wire brush and all dust and loose mortar removed. The joints shall then be flush pointed with white cement slurry added with approved pigments to match the colour of tiles.

1.7 Curing and Finishing:

The surface shall be deaned and kept wet by sprinkling water for seven days. The finished surface shall be clear, free of patches and glossy and shall not sound hollow. Finished dry surfaces shall be washed with mild organic acid, if so required. The finished surface shall meet the approval of the Architect.

WATERPROOFING

Waterproofing will be done as per specification given in BOQ which will be specified in DSR & BSR work will be done as per these specifications.

Plastering and Rendering General

1 Scope:

This section shall cover internal and external plastering/rendering works as shown in the drawings.

2. Mortar:

The mortar of specified mix shall be used. Cement and sand shall be tested as specified.

3. **Scaffolding:**

Stage scaffolding shall be provided for plastering work as per Standard Practice and as directed by Engineer. This shall be independent of the walls.

4. **Plaster to Extend:**

All interior plaster shall be extended up to 12 mm below the skirting or dado level at no extra cost wherever required.

5. **Preparation of Surface:**

Joints of Concrete block work walls shall be raked-out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scraping.

Shuttering imperfections of all concrete shall be roughened by hacking with chisel and all resulting dust and loose particles cleaned and the surface shall be thoroughly hacked or bush hammered to the satisfaction of Architect. The surface shall be thoroughly cleaned and kept wet as specified before plastering is commenced.

6 Approval of Engineer to be taken:

No plastering work shall be started before all conduits, pipes, fittings and fixtures clamps, hooks, doors and window frames etc. are embedded, grouted and cured and all defects removed to the satisfaction of Architect. A sample of plasterwork shall be prepared and got approved before proceeding with the work. Special approval shall be taken from Architect before starting each plastering work. No cutting of finished plaster shall be allowed. No portion shall be left out initially to be patched up later on.

7 Exterior Plaster:

7.1 **General:**

Exterior plaster shall be 20 mm thick, unless otherwise specified, generally sand faced the base coat shall be about 12 mm thick with coarse sand applied after the base coat has set but not dried. The base coat shall be 1:6 (1 cement: 6 coarse sand) and second coat shall be 1:4 cement mortar (1 cement: 4 coarse sand). Acrylic water proof chemical @ 0.5 kg. Per 50 kg. of cement or as recommended by the manufacturer shall be admixed with the plaster, wherever specified in the item.

7.2 Mixing:

The ingredients shall be mixed in specific proportions by volume. The mixing shall be done in a mechanical mixer or by hand mixing on water-tight platform. The cement and sand shall first be mixed thoroughly dry in the mixer. Water shall then be added gradually and wet mixing continued for at least a minute until mortar attains the consistency of a stiff paste and uniform colour. Mortar shall be used within 30 minutes of addition of water Mortar which has partially set shall not be used and removed from the site immediately.

7.3 Application of Plaster

7.3.1 General:

Wall plastering shall be started after the completion of ceiling plaster from top and gradually worked down towards floor. It shall not, at any place be thinner than as specified. To ensure even thickness and a true surface, plaster pads of about 75 mm * 75 mm shall be first applied horizontally and vertically at not more than 2 m interval over the entire surface to serve as gauges. The mortar shall then be applied to the wall/surface between the gauges and finished even. All comers, junctions and rounding shall be truly vertical or horizontal and finished carefully. Generally work in an enclosure shall be completed in one day. For larger areas if the work has to be suspended at the end of the day, plaster shall be cut clean to line. Where recommencing, the plastering, edge of old work shall be scrapped, cleaned and wetted with cement putty before restarting plastering.

7.3.2 Base Coat:

The mix shall be stiff enough to cling and hold when laid. On walls, the mix shall be laid in long even spreads upwards and across using sufficient pressure to force it into the key on the backgrounds. The mortar shall be laid as uniformly as possible. The average thickness shall not exceed that specified. This coat shall be allowed to stand firm till before scratching for key. The surface shall then be combed or cross-scratched with a wire scratchier.

7.3.3 Second Coat:

A reasonable time (not more than 48 hours) shall be allowed after the application of the base coat for thorough drying before the application of the second coat. After soaking base coat thoroughly with water the mortar for second coat shall be applied with a feather edge rule to a true and even surface. The surface shall then be thoroughly scoured with a wood hand float, and any inequalities filled in. Over working shall be avoided

7.3.4 Single Coat Work:

Single coat work shall be finished smooth as specified in second coat work. Special care shall be taken to secure bond with the concrete/brick wall.

7.3.5 Plastering over Steel Surfaces:

Where plastering is to be done over steel surface, suitable expanded metal covering the steel surface and secured to the adjoining wall/concrete surface with an overlap of 200 mm shall be provided.

7.3.6 Plastering at Junction of Masonry/ R-C.C:

All junction of Masonry wall with R.C. structures e.g. column, beam etc. shall be plastered after providing and fixing of approved G.I. chicken Wire mesh 250 mm wide centrally over the length of junction either vertically or horizontally to the satisfaction of Engineer. G. I. Chicken Wire Mesh of required width shall also be fixed over the chasing for conduits, pipes etc. on masonry wall before plastering is commenced.

8. Neeru Finish:

8.1 Material:

Wherever specified, the plastered surface shall be finished with Neeru Lime class C (i.e. pure fat lime) conforming to IS: 712-1964 shall only be used and sand shall be of approved quality passing through IS Sieve No.60 (0.599 mm) for preparation of Neeru. Water shall be free from chemical impurities and salts' conforming to relevant IS code. Lime shall be slaked and mixed with sufficient water to form thick paste. It shall be reduced to a fine paste by grinding. It shall then be passed through a fine sieve (3 mm mesh) to remove all unslaked particles and foreign matter and allowed to mellow under water for at least 10 days in large slaking tanks. The surplus water on the top shall be prepared by mixing together 4 parts of this lime paste and 1 part of fine sieved sand by volume. Jute fiber finely chopped shall be added to the mixed mortar at the rate of 4 kg of Jute to every cubic meter of lime sand mixture. The mixture shall then be properly ground to a fine paste between two stones or *a* mill.

8.2 Preparation:

The Neeru thus prepared shall be kept moist till used and this moist neeru must be consumed within a period two weeks.

The plaster surface shall be combed lightly by wire brushes or nails before it is completely set to form key for Neeru. The under coat shall be only combed evenly but not soaked before the application of Neeru.

8.3 Application:

Neeru shall be applied to the prepared and partially set plastered surface with steel trowel to a thickness slightly exceeding 1.5 mm and rubbed down to 1.5 mm (1/6") thickness finally and polished to perfectly smooth and even finish, working from top to bottom. While toweling, soap stone powder contained in thin muslin bags shall be dusted over the surface and work on. Moistering shall be commenced as soon as the plaster has hardened sufficiently and is not susceptible to injury, socking of wall to be avoided and only as much water as can be readily absorbed shall be used. The surface shall be kept sprinkled with water for 14 days minimum Instant Neeru of approved make can also be used in the manner recommended by the manufacturers.

7. Painting, Varnishing and Rendering General

9.1 Materials:

All materials shall be the best of their kind and of approved manufacture for each item. Painting materials such as shellac, thinner, oils, driers, rollers, brushes, etc. shall be of the best approved quality and type. If for any reason, thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by Engineer shall be used.

9.2 Sealed Containers:

Approved paints, oils or varnishes shall be brought to the site of work by the Contractor in their original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work.

The empty containers shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from Engineer.

9.3 Storage:

All materials shall be stored in a neat and orderly fashion in one single dean space. Care shall be taken to maintain this place as clean and dust-free as possible

9.4 Specialized Workmen:

All work shall be done by the specialized skilled workmen experienced in the trade.

9.5 Works as per Manufacturer's Instructions:

All work shall be done strictly as per this specification and manufacturer's printed instructions. In case these specifications differ in any way from manufacturer's instructions, the latter shall apply.

9.6 Finished Surface to Engineer's Satisfaction:

AH finished surface shall be required texture (smooth, rough or any other) and of even shade to the satisfaction of Engineer

9.7 Protection:

Alt work done shall be thoroughly protected from damage at all times by suitable methods approved by Engineer. All other adjacent work or materials not received the finish at that time shall also be thoroughly protected by suitable canvas or paper covering or by other approved method.

9.8 **Damages to be made good:**

Any damage or disfigurement of other works shall be immediately made good. Alt paint and varnish spots and other stains shall be thoroughly and carefully removed from all floors, doors, windows, fittings, furniture, glass, hardware and all other surfaces required, by approved paint removers and the places left dean and tidy to the satisfaction of Engineer.

9.9 Intimation before Starting:

No work under this section shall start without approval from Engineer.

9.10 Samples:

Before starting work under this section large size samples of all work shall be prepared by the Contractor for approval. Only after specific approval has been given to the samples, work shall commence. The actual work done shall be done as per the approved samples.

9.11 Preparation:

All surfaces to be finished shall be thoroughly brushed and cleaned of mortar drops, dust, dirt, fungi, rust, mill-scale, efflorescence and all other extraneous material all loose places and scales shall be removed by scrapping. Surfaces shall be thoroughly, sand-papered to a smooth finish. Further preparation work shall be done as specified under different types of finishes. Before starting printing all floors shall be washed clean and wiped dry.

8. **White Washing & Colour washing:**

10.1 Surface Preparation:

The surface shall be thoroughly brushed free from mortar droppings and foreign matters. All plaster damages shall be made good to the satisfaction of Engineer by cement sand mortar and curing till sufficiently before the painting work is taken up.

10.2 Material:

The white wash shall be prepared from fresh shell time to which shall be admixed with sufficient quantity of whiting and gum. The lime and whiting shall be made into thin cream and screened through dean coarse cloth.

Fevicol DDL as per manufacturer's instructions shall be added to the cream, Indigo up to 3 gms per kg. Of lime dissolved in water shall then be added to the composition. Water at the rate of about 5 liters per kg. of lime shall be added to produce a milky solution.

10.3 Application:

In case of colour washing approved mineral colours not affected by lime shall be added to the white wash in required quantities instead of indigo.

The wash shall be applied with approved brushes in 3 coats Each coat shall be allowed to dry before applying the next. In case the surface does not present a smooth and uniform finish throughout to the satisfaction of Engineer more coasts shall be added as required at no extra cost.

11. Cement Paint:

11.1 **Preparation of Surface:**

For new work, the surface shall be thoroughly cleaned of all mortar dropping, dirt, dust algae, grease and other foreign matter by brushing and washing. The surface shall be thoroughly wetted with clean water before the cement paint is applied.

In the case of old work, all loose pieces and scales shall be removed and the surface shall be cleaned of all dirt, algae, oil etc. by brushing and washing. Pining in plaster shall be made good and a coat of best quality water proof cement paint shall be applied over patches after wetting them thoroughly.

11.2 Preparation of mix:

Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish.

Cement paint shall be mixed with water in two stages The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously. The lids of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hygroscopic qualities.

11.3 Application:

The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work.

The second coat shall be applied after the first coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For new work, the surface shall be treated with three or more coats of water proof cement paint as found necessary to get a uniform shade.

For old work, the treatment shall be with one or more coats as found necessary to get a uniform shade.

11.4 Precaution:

Water cement paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, paints etc. It shall not be applied on gypsum, wood and metal surfaces.

12. Painting with Synthetic Enamel Paint

12.1 General:

Synthetic enamel paint (conforming to 15:1932-1964) of approved brand and manufacturer and of the required colour shall be used for the top coat and undercoat of shade to match the top coat as recommended by the manufacturer shall be used.

12.2 **Commencing Work:**

Painting shall not be started until Engineer has inspected the items of work to be painted, satisfied himself about their quality and given his approval to commence the painting work. Painting of external surface should not be done in adverse feather condition like hail storm and dust storm. Painting except the priming coat, shall generally be taken in hand after practically finishing all other builder's work.

The rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the taint work being started.

12.3 **Painting on New Surface:**

Preparation of surface shall be as specified above or as the case may be.

12.4 Application:

The number of coats including the undercoat shall be as stipulated in the item.

a) Undercoat:

One coat of the specified paint of shade suited to the shade of the top coat shall, be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.

b) Top Coat:

Top coats of specified paint of the desired shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

12.5 Preparation of Surface

a) Wood Work:

The surface shall be cleaned and all unevenness removed as specified above. Knots if visible shall be covered with a preparation of red lead. Holes and indentations on the surface shall be filled in with glazier's putty or wood putty and rubbed smooth before painting is done. The surface should be thoroughly dry before painting.

b) Iron and Steel Work:

The priming coat shall have dried up completely before painting is started. Rust and scaling shall be carefully removed by scrapping or by brushing with steel wire brushes. All dust and dirt shall be carefully and thoroughly wiped away.

13. Textured Wall Rendering:

13.1 General:

Where so specified or directed by the Engineer, textured wall rendering of approved make and of approved sample shall be used two or more coats as per recommendation of the manufacturer- All the coats of rendering shall have same binding medium. Different binding medium as the under coat should not be used- The rendering shall have non fading properties & shall be resistant to ultra violet rays. As the rendering is acrylic co-polymer based material therefore curing by water should not be done.

13.2 Commencing Work:

Rendering shall not be started until Engineer has inspected the items of work to be rendered and satisfied himself about the application and given his approval to commence the rendering work. Rendering of external surface should not be done in adverse weather condition like hail storm, dust storm and rain.

Rendering except the base coat, shall generally be taken in hand after practically finishing all other builder's work.

The rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the paint work being started.

13.3 Application:

Number of coats including the under quote shall be as specified by the manufacture & approved by the Engineer. Base quote is to be applied with brush. Finishing coats of rendering shall be applied with smooth rollers in desired shade given uniform finish ensuring minimum consumption of 0.25 kg. of material per Sq.mt.

13.4 Scaffolding

Double scaffolding having two sets of vertical supports shall be provided. The supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be used.

TABLE - 1 (Sec. I 2.2.2, 2.3.2.1)
LIMITS OF DELETERIOUS MATERIALS (AGGREGATES)
[IS 383 - Table 1]

SR. No.	Deleterious substance	Method of test	Fine Percentage Aggregate		Coarse Percentage Aggregate	
(1)	(2)	(3)	(4) Weight, Max Uncrushed	(5) Weight, Max Crushed	(6) Uncrushed	(7) Crushed
i)	Coal and lignite	IS : 2386 (Part-ll)	1.00	1.00	1.00	1.00
ii)	Clay Lumps	-do-	1.00	1.00	1.00	1.00
iii)	Material finer than 75 - (MU) IS Sieve	IS : 2386 (Part-1)	3.00	15.00	3.00	3.00
iv)	Soft fragments	IS : 2386 (Part -II)	-	--	3.00	-
v)	Shale	IS : 2386 (Part -II)	1.00	--	-	-
vi)	Total of percentage of all deleterious materials (except mica) including SI. No. (i) To (v) for Col. 4, 6 and 7 and SI, No. (i) and (ii) for Col. 5 only	-	5.00	2.00	5.00	5.00

Note: - 1 The Presence of mica in the fine aggregate has been found to reduce considerably the durability and compressive strength of concrete and further investigations are underway to determine and extent of the deleterious effect of mica, It is advisable, therefore, to investigate the mica content of fine aggregate and make suitable allowance for the possible reduction in the strength of concrete mortar,

Note: - 2 The aggregate shall not contain harmful organic impurities (tested in accordance with IS: 2386 [part - ii]) in sufficient quantities to affect adversely the strength or durability of concrete. A fine aggregate which fails in the test for organic impurities may be used, provided that, when tested for the effect of organic impurities on the strength of mortar, the relative strength at 7 and 28 days, reported in accordance with 7 of IS : 2386 [Part - VI] - 1963 is not less than 95% percent.

TABLE - 2 (Sec. I 2.2.4)
GRADING OF COARSE AGGREGATES
[IS 383 - Table 2]

IS Sieve Designation	Percentage passing for single - sized Aggregate of Nominal Size						Percentage passing for Graded Aggregate of Nominal Size			
	63mm	40 mm	20mm	16 mm	12.5mm	10 mm	40 mm	20mm	16 mm	12.5 mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
80mm	100	------	------	------	------	------	100	------	------	------
63 mm	85 to 100	100	------	------	------	------	------	------	------	------
40 mm	0 to 30	85 to 100	100	------	------	------	95 to 100	100	------	------
20 mm	0 to5	0 to20	85 to 100	100	------	------	30 to 70	95to100	100	100
16 mm	----	----	----	85 to 100	100	------	------	------	90 to100	------
12.5mm	----	----	—	--	85 to 100	100	------	------	------	90 to 100
10 mm	0 to 5	0 to 5	0to20	0 to 30	0 to 45	85 to 100	10 to 35	25 to 55	30 to 70	40 to 85
4.75 mm	----	----	0 to 5	0 to 5	0 to 10	0 to 20	0 to 5	0 to 10	0 to 10	0 to 10
2.36 mm	----	----	----	----	----	0 to 5	----	----	----	----

TABLE - 3 (Sec. I 2.2.4)
ALL-IN AGGREGATE GRADING
[IS 383 - Table 5]

IS Sieve Designation	**Percentage for ALL IN Aggregate of**	
	40mm Nominal Size	20 mm Nominal Size
(1)	(2)	(3)
80mm	100	----
40mm	95 to 100	100
20 mm	45 to 75	95 to 100
4.75mm	25 to 45	30 to 50
600 micron	8 to 30	10 to 35
150 micron	0 to 6	0 to 6

TABLE - 4 (Sec. I 2.2.3)
GRADING OF FINE AGGREGATES
[IS 383-Table 4]

IS Sieve Designation	Percentage Passing for			
	Grading Zone I	**Grading Zone II**	**Grading Zone III**	**Grading Zone iv**
10mm	100	100	100	100
4.75 mm	90 to 100	90 to 100	90 to 100	95 to 100
2.36 mm	60 to 95	75 to 100	85 to 100	95 to 100
1.18mm	30 to 70	55 to 90	75 to 100	90 to 100
600 micron	1 5 to 34	35 to 59	60 to 79	80 to 100
300 micron	5 to 20	8 to 30	12 to 40	15 to 50
150 micron	0 to 10	0 to 10	0 to 10	0 to15

NOTE - 1 for crushed stone sands, the permissible Limit on 150 micron IS Sieve is increased to 20 percent. This does not affect the 5 percent allowance permitted in 4.5 applying to other sieve sizes.

NOTE - 2 Fine Aggregate complying with the requirements of any grading zone in this table is suitable for concrete but the quality of concrete produced will depend upon a number of factors including proportions.

NOTE - 3 where concrete of high strength and good durability is required, fine aggregate conforming to any one of the four grading zones may be used, but the concrete mix should be properly designed. As the fine aggregate grading becomes progressively finer, the is, from Grading Zones I to IV, the ratio of fine aggregate to coarse aggregate should be progressively reduced. The most suitable fine to coarse ratio to be used for any particular mix will, however, depend upon the actual grading, particle shape and surface texture of both fine and coarse aggregates.

NOTE - 4 it is recommended that fine aggregate conforming to Grading Zone IV should not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mix proportions.

TABLE - 5 (Sec. I 2.3.4)

MOISTURE CONTENT & BULKING PERCENTAGE RELATION FOR SAND

Moisture- Content % by weight	Bulking & (Volume)
2	15
3	20
4	25
5	20

TABLE - 6 (Sec. I 2.5.2)
PERMISSIBLE LIMITS FOR SOLIDS (in water)

Particulars	Permissible Limit, Maximum
Organic	200 mg/l
Inorganic	3000 mg/l
Sulphates (as SO_4)	2000 mg/l for plain concrete work and 1000 mg/l for reinforced concrete work
Suspended matter	2000 mg/l

TABLE-7 (Sec l 3.1.1)
GRADE OF CONCRETE
[IS 456 - TABLE 2]

GRADE DESIGNATION	**SPECIFIED CHARACTERISTIC STRENGTH AT 28 DAYS COMPRESSIVE (N/mm2)**
M 10	10
M15	15
M20	20
M25	25
M30	30
M35	35
M40	40

NOTE - 1 in the designation of a concrete of mix, letter M refers to the mix and the number to the specified characteristic compressive strength of 15 cm cube at 28 days, expressed in N/Sq. mm.

NOTE - 2 M 5 and M 7.5 grade of concrete may be used for lean concrete bases and simple foundations for masonry walls. These mixes need not be designed.

NOTE - 3 Grades of concrete tower than M 15 shall not be used in reinforced concrete.

TABLE-8 (Sec. I 3.1.1)

MINIMUM CEMENT CONTENT REQUIRED IN CEMENT CONCRETE TO ENSURE DURABILITY UNDER SPECIFIED CONDITIONS OF EXPOSURE

[SP - 23 - Table 23 & IS 456 - Table 19]

EXPOSURE	PLAIN CONCRETE		REINFORCEMENT	
	MINIMUM CEMENT CONTENT	MAXIMUM WATER CEMENT RATIO	MINIMUM CEMENT CONTENT	MAXIMUM WATER CEMENT RATIO
(1)	(2)	(3)	(4)	(5)
	Kg/m^3		Kg/m^3	
Mild - for example, completely protected against weather, or aggressive conditions, except for a brief period of exposure to normal weather conditions during construction.	220	0.7	250	0.65
Moderate - for example, sheltered from heavy and wind driven rain and against freezing, whilst saturated with water; buried concrete in soil and concrete continuously under water.	250	0.6	290	0.55
Severe - For example, exposed to sea water, alternate wetting and drying and to freezing whilst wet, subject to heavy condensation or corrosive fumes.	310	0.5	360	0.45

NOTE -1 when the maximum water cement ratio can be strictly controlled, the cement content in the above table may be reduced by 10 percent.

NOTE - 2 the minimum cement content is based on 20 mm, aggregate. For 40 mm aggregate, it should be reduced by about 10 percent; for 12.5 mm aggregate, it should be increased by about 10 percent.

TABLE-9 (Sec. I 3.1.2)

REQUIREMENT FOR CONCRETE EXPOSED TO SULPHATE ATTACK

[SP - 23 - Table 24 & IS 456 - Table 20]

CLASS	CONCENTRATION OF SULPHATES EXPRESSED AS SO_3			TYPE OF CEMENT	REQUIREMENTS FOR DENSE FULLY COMPACTED CONCRETE MADE WITH AGGREGATE COMPLYING WITH IS : 383-1970"	
	IN SOIL		IN GROUND WATER			
	TOTAL SO_3 (PERCENT)	SO_3 IN 2:1 WATER EXTRACT g/l	(PARTS PER 100 000)		MINIMUM CEMENT CONTENT	MAXIMUM FREE WATER / CEMENT RATIO
1)	Less than 0.2	-----	Less than 30	Ordinary Portland cement or Portland slag cement or Portland Pozzolana cement	280 kg/m^3	0.55
2)	0.2 to 0.5	-----	30 to 120	Ordinary Portland cement or Portland slag cement or Portland Pozzolana cement Super sulphated cement	330 kg/m^3 310 kg/m^3	0.50 0.50
3)	0.5 to 1.0	1.9 to 3.1	120 to 250	Super sulphated cement	330 kg/m^3	0.50

TABLE-10 (Sec. I 3.1.3)

COMPRESSIVE STRENGTH OF CUBE EXPECTED FOR PRELIMINARY & WORK SITE

CONCRETE MIX	SPECIFIED STRENGTH	28th DAY CUBES TEST		7th DAY WORK
	Kg/Sq. cm.	PRELIMINARY TEST Kg/Sq. cm.	WORKSITE TEST Kg/Sq. cm.	Kg/Sq. cm.
M 10	100	135	100	70
M 15	150	200	150	100
M20	200	260	200	135
M25	250	320	250	170
M30	300	380	300	200

NOTE -1 This table applies only to concrete made with 20 mm aggregate complying with the requirement of IS : 383 - 1970* placed in near-neutral ground water of pH 6 to 9, containing naturally occurring sulphates but not contaminants, such as ammonium salts. For 40 mm aggregate the value may be reduced by about 15 percent and for 12.5 mm aggregate, the value may be increased by about 15 percent. Concrete prepared from ordinary Portland cement would not be

recommended in acidic conditions (pH 6 or less). Super sulphated cement gives an acceptable life, in minerals acids, down to pH 3.5, provided that the concrete is dense and prepared with water / cement ratio of 0.4 or less.

NOTE- 2 The cement contents given in class 2 are the minimum recommended. For SO3 contents near the upper limits of class 2, cement contents above-these minimum are advised.

NOTE - 3 where the total $S0_3$ in Col. 2 exceeds 0.5 percent, then a 2:1 water extract may result in a lower site classification if much of the sulphate is present as low solubility calcium sulphate.

NOTE - 4 For severe conditions such as thin sections under hydrostatic pressure on one side only and sections partly immersed, considerations should be given to a further reduction of water-cement ratio, and if necessary an increase in the cement content to ensure the degree of workability needed for full compaction and thus minimum permeability.

NOTE- 5 Portland slag cement conforming to IS: 455 with slag content more than 50 percent
exhibits better sulphate resisting properties.

NOTE - 6 Ordinary Portland cement with the additional requirement that C3 A content be not more than 5 percent and 2 C_3 A + C_4 AF (or its solid solution 4 Gao, Al_2 O_3 Fe_2 O_3 + 2CaO, Fe_2 O_3) be not more than 20 percent may be used in place of super sulphated cement.

* Specification for coarse and fine aggregates from natural sources for concrete (second revision)

TABLE-11 (Sec. II 2.1.2)
MECHANICAL PROPERTIES OF BARS
MILD STEEL & MEDIUM TENSILE STEEL BARS
[IS 432 Tables - 1]

SR. NO.	TYPE AND NOMINAL SIZE OF BARS	ULTIMATE TENSILE STRESS	YIELD STRESS	ELONGATION" PERCENT
		MIN.	MIN,	MIN.
I.	Mild Steel Grade I For bars up to and including 20 mm For bars over 20 mm, up to and including 50 mm	410 410	250 240	23 23
2	Mild Steel Grade II For bars up to and including 20 mm For bars over 20 mm, up to and including 50 mm	370 370	225 215	23 23
3	Medium Tensile Steel For bars up to and including 16 mm For bars over 16 mm, up to and including 32 mm For bars over 32 mm, up to and including 50 mm	540 540 510	350 340 330	20 20 20

* Elongation on a gauge length 5.65 √So where so is the cross sectional area of the test piece.

TABLE -12 (Sec. II 2.2.2)
CHEMICAL COMPOSITION
HIGH STRENGTH DEFORMED BARS
[IS 1786]

Constituent	For ladle analysis of steel when made as per relevant parts of IS 228 Percent Maximum*			For product analysis Variation, Over Specified Maximum Limit, Percent, Max
	Fe 415	Fe 500	Fe 550	Limit % Maximum
Carbon	0.30	0.30	0.30	0.02
Sulphur	0.060	0.055	0.055	0.005
Phosphorus	0.060	0.055	0.050	0.005
Sulphur & Phosphorus	0.11	0.105	0,10	0.010

NOTE - 1 For guaranteed weld ability, the percentage of carbon shall be restricted to 0.25 percent maximum.

NOTE - 2 Addition of micro alloying elements is not mandatory for any of the above grades. When strengthening elements like Nb, V, B and Ti are used individually or in combination, the total contents shall not exceed 0.30 percent; in such case manufacturer shall supply the purchaser or his authorized representative a certificate stating that the total contents of the strengthening elements in the steel do not exceed the specified limit.

TABLE-13 (Sec. II 2.2.5)
MECHANICAL PROPERTIES OF HIGH STRENGTH DEFORMED BARS AND WIRES
[IS 1786 Table-3]

SR. NO.	PROPERTY	GRADE		
		Fe 415	Fe 500	Fe 550
(1)	(2)	(3)	(4)	(5)
I)	0.2 percent proof stress/yield stress, Min, N/Sq. mm	415.0	500.0	550.0
II)	Elongation, percent, min, on gauge length 5.65 VA, where A is the cross sectional area of the test piece	14.5	12.0	8.0
III)	Tensile strength, Min	10 percent more than the actual 0.2 percent proof stress but not less than485.0N/Sqmm.	8 percent more than the actual 0.2 percent proof stress but not less than 545.0 N/Sq mm.	6 percent more than the actual 0.2 percent proof stress but not less than 585.0N/Sq mm.

TECHNICAL SPECIFICATATION FOR SANITARY / WATER SUPPLY WORK

1.1 Salt Glazed Stone ware Pipes

Stoneware pipes shall be salt glazed, free from cracks, deformities and imperfections in glazing they shall be cylindrical, straight and to standards dimensions. They shall be made of hard burnt stoneware of dark grey color and thoroughly glazed and shall give sharp color more when struck with a light hammer. The pipes shall conform to the requirements of Indian Standard no. IS:651-1980 and shall be of Perfect Potteries of Dalmia or approved equivalent make.

1.2 Cement Concrete Pipes

Cement concrete pipes where called for on the drawing shall be centrifugally spun reinforced cement concrete pipes. Pipes shall be perfectly sound, cylindrical, straight with uniform bore through out. Cracked or wrapped pipes with uneven texture shall not be used. Pipes shall be of NP2 class manufactured by Indian Rume Pipe Co. or approved equivalent and shall conform to Indian Standard IS:458-1971. Adequate number of suitable collars as required shall also be supplied along with the pipes.

1.3 Cast Iron Pipes

C. I. Pipes where called for on the drawings shall be good tough quality dark grey on fracture and capable of being worked with a drill or file. CI pipes and fittings shall be sound with smooth inner and outer surface free from laps, pinholes and other imperfections and shall ring clearly when struck all over with a light hard hammer. The CI pipes shall be provided with a coating of tar or similar material. The coating shall be smooth and tenacious and hard though not to flow when exposed to a temperature of 77 degree centigrade but not so brittle at temp. of 0 degree centigrade so as to chip off when lightly scribed with a pen knife. CI water main pipes shall conform to Indian Standard IS: 1536 and IS: 1537 the fittings shall conform to Indian Standard IS: 1538. Pipes and fittings for drainage (soil, waste, and vents) shall conform to IS: 3989-1870 and /or IS: 1729-1864 as specified. The pipes shall be of socket & spigot type.

1.4 Galvanized Iron Pipes

Galvanized Iron pipes and fittings where called for on the drawings shall be of galvanized mild steel or galvanized wrought iron. The pipes shall be medium or heavy class as required as per item. Galvanization of pipe shall conform to IS 4736. The fittings shall be 'R' brand fittings.

All pipes and fittings shall be of heavy class manufactured by Indian Tube Company or Bharat Steel Tubes. The fittings shall be R brand fittings for all as approved (heavy class) ISI make. The pipes and fittings shall conform to Indian Standard IS: 1239 Part I and Part On delivery to site, the pipes shall be painted with one coat of approved set aside primer.

1.5 **Copper Pipes**

Copper pipes where called for shall be light gauge copper pipes suitable for hot water distribution. The fittings shall be of copper other compression type or capillary type. The pipes and fittings shall be obtained from an approved manufacturer. The pipes shall generally conform to Indian Standard IS: 1545-1969.

1.6. **PVC Pipes**

PVC pipes where called for small be either unplasticised PVC pipes or high density polythene pipes supplied with appropriate fittings. The pipes & fittings shall be of 10 Kg per Sq Mtr pressure class.

PVC pipes shall be handled with care and stored in a place protected from the sun. All PVC pipes and fittings shall be manufactured by NOCIL or WOVIN or approved equivalent. PVC pipes and fittings shall conform to Indian Standards IS: 4958-1972 or IS: 4958-1968.

1.7 **Asbestos Cement Pipes**

Asbestos cement pipes for drainage purposes shall conform to Indian Standard IS:1626-1960. The pipes shall be perfectly sound, strength, free of cracks with a uniform bore through out. The pipes shall be of socket & spigot type. Asbestos cement pipes for water supply shall conform to Indian Standard IS:1992-1960 and of approved make to be approved by Architect. Suitable fittings as recommended by the pipe manufacturer shall also be supplied along with pipes.

1.8 **Sanitary Fixtures**

All glazed vitreous china Sanitary ware fixtures shall be of best Indian make of approved manufacture conformity to IS:2556. These shall be nonporous and fully vitreous with all the visible portions perfectly glazed and should be absolutely free from hairline cracks, pinholes and local depressions. These shall have perfectly symmetrical uniform and smooth curves.

1.9 **Water Supply Fittings**

All supply fittings, including mixing fittings and accessories shall be brass/ copper, heavy chromium plated of the make and design specified. The fittings shall be cast fittings of screw type, machined and threaded properly for fixing to the supply pipes. The plating shall conform to Indian Standard IS: 4827-1968.

The fittings shall be supplied complete with chromium plated matching flanges, nuts and extension piece of required lengths. Metallic washers where required shall also be of chromium plated brass. All bib cocks and top cocks shall conform to Indian Standard IS : 781 – 1967, pillar cocks to filler, shower arm, rose, spouts and other fittings shall match the supply fittings and screws shall be similar to fittings . All washers shall conform to Indian Standard IS : 4326-1967.

1.10 Waste Fittings

All waste fittings, (waste, chain, pop-up, overflow, spreaders, caps etc) shall be of brass/ copper, heavy chromium plated of the make and design specified and matches the supply fittings. They shall conform to Indian Standard IS : 2963 – 1964.

1.11 Bottle Traps

Bottle trap (for wash basins, sinks, urinals etc) shall be deep seal (minimum 6cm seal, cast brass bottle traps, heavy chromium plated. All bottle traps shall be provided with suitable cleaning eye, extension piece, flare nuts- all chromium plated. Bottle traps shall be of approved make and design. Traps for wash basins shall be 32mm (1 – ¼") for sinks and urinals 40mm (1-1/2inch dia).

1.12 Wall Flange

Wall flange shall be provided on all walls, floors, columns etc. wherever supply and disposal pipes pierce through them. These wall caps shall be of chromium plated brass supply fittings the receiving pipes and shall be large enough to cover the punctures properly.

1.13 Valves

All valves (gate, globe, check) shall be either all brass or gun metal valves suitable for the particular service. All valves shall be of the particular duty and design called for similar to leader or approved equivalent valves shall be tested to 21 kg/Sqm pressure at manufacturer's works.

Valves shall either be of screw type or flange type with suitable flanges and non corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valve. Gate, globe and check valves shall conform to Indian Standard IS : 778-1971 and non return valves to swing check type reflex non return valves IS : 5312 (Part I 1969).

Sluice Valves

Sluice valves where called for shall be flanged sluice valves or GI body. The spindle, wall seat and edge nuts shall be of non metal. They shall generally have rising spindle and shall be of the particular duty and design called for. The valves shall be supplied with suitable flanges, non corrosive bolts sand asbestos fiber gaskets. The valves shall be of Kirloskar make or other approved equivalent as specified Sluice valves shall conform to Indian Standard IS : 7090 – 1969 and IS : 2906 – 1969.

Ball Valves with floats

Ball valves with floats to be fixed in storage tanks shall consist of cast brass lever arms having copper balls (28 SWB) screwed to the arm integrally. The copper ball shall have bronze welded seams. The closing / opening mechanism incorporating the piston & cylinder shall be of a non – corrosive metal and include washers. The size and construction of ball valve and float shall be suitable for desired working pressure operating

the supply system. Ball valves shall be supplied with brass hexagonal blackouts to secure them to the tanks and a socket to connect the supply pipe. Al ball valves with floats shall conform to Indian Standard IS : 1703 – 1968. The polyethylene float shall conform to IS : 9762.Floor Traps and Urinal Traps

Floor traps and urinal traps shall be of CI of the size required of approved design incorporating a deep seal (6 cm minimum) and venting device unless otherwise indicated. The traps shall be supplied with a specially CI extension piece with required number of sockets in appropriate directions to receive the waste/ soil pipes from wash basin / bath tub / urinal.

1.14 **Fire Hydrant Landing Valves**

Fire hydrant landing valves shall be of gun metal, 63mm dia instantaneous coupling type with blank caps. They shall be with single or double outlet 'as called for' where indicated all hydrants shall be supplied with standard stand posts. All fire hydrants shall conform to Indian Standard IS: 909 – 1965 and IS : 936-1965 and stand pipes to IS : 5714 – 1970. All hydrants shall be of approved make and designs and should carry fire insurance Association approval.

1.15 **LAWN HYDRANTS**

Lawn hydrants shall be of 2.5cms size unless otherwise indicated. All hydrants shall be provided with gate valves and threaded nipple to receive hose pipes where called for lawn hydrants shall be located in masonry chambers of appropriate size as indicated.

1.16 **Water Meters**

Water meter of approved make and design shall be supplied and installed at locations as shown. The water meters shall meet with the approval of the local supply authorities. Suitable valves and chambers to house the meters shall also be provided along with meters.

1.17 Pipe Hangers Brackets etc.

Sturdy hanger, brackets and saddles of approved design shall be installed to support all pipe lengths which are not embedded over their entire run. The hangers and brackets shall be fabricated from suitable MS rolled sections. The hangers and brackets shall be adjustable heights and painted with red oxide primer. Clamps, collar & saddlers to hold pipes shall be provided with suitable gaskets. The brackets and hangers shall be designed to carry the weight of pipes safely. All pipes and fittings shall be secured near every joint and half way through every pipe length, unless otherwise specified.

1.18 Grating for floor traps, Urinal traps & floor drains.

Grating made of 3mm thick brass heavily chromium plated shall be installed to cover all floor traps and floor drains. The gratings shall be of

size required and the square or circular in shape as called for. The gratings shall be supplied complete with matching chromium plated brass screws and brass rings to fasten the gratings to the floor in traps.

1.19 **Insulation Material**

The material for insulation shall be vermin proof fiber glass wool. The material shall have a thermal conductivity value of K = 0.404 MW/CM/Co and a density not less than 25 kg per cum. Samples of insulating material shall be submitted for approval.

1.20 **Pipe Sleeves**

Adequate number of sleeves pipe insert (s) of CI or mild steel shall be provided where pipes cross through concrete, masonry and similar work. The pipe inserts shall be of a size larger than the pipe to be housed. The pipe inserts shall be of a size larger than the pipe to be housed. The pipe inserts shall have a flange welded in the center around its circumference. In order to provide water tight and secure fixing into the structure, the pipe inserts shall be provided with removable 1 plug to keep foreign matter out till installation of the service pipe across the sleeve.

1.21 **COWLS**

Cowls or cast iron of proper size shall be supplied to cover all open terminals of soil, waste, vent
& rain water pipes. The cowls shall be of the indicated design, vent away type, bitumastic coated and provided with a tail piece to fit smoothly in the receiving pipe.

2. **LAYING AND JOINING OF PIPES**

2.1 Alignment of Grade

All pipes shall be laid true to alignment and gradients as shown on the drawings. No deviations from the lines, depths of cuttings or gradients called for on the drawing shall be permitted without the approval in writing by the Architect/PMC. In subzero temperature regions the pipes shall be laid below frost level.

2.2 Setting out Trenches

The contractor shall set out all trenches, manhole and such other works to true gradient and alignment as called for. He shall provide the necessary instruments for setting out and specification of the same.

All trenches shall be laid to true grade and in straight lines and as shown on the drawings. The trenches shall be laid to proper levels by the assistance of boning rods & eight rails which shall be fixed at intervals not exceeding 10 meters or as directed by the Architect.

2.3 Excavation trenches for pipes

The trenches for pipes shall be excavated with bottoms formed to levels and gradients as shown on the drawing, or as directed by the Architect to sort & filled in ground the Architect may require the trenches to be excavated to a greater depth than shown on the drawings and to fill up such additional excavation with concrete 1:5:10 consolidated to bring the excavation to the required levels as shown on the drawings.

All excavation shall be properly protected where necessary by suitable timbering as approved by the Architect/PMC. Excavations below water table shall be done after dewatering of the trenches. No blasting shall be allowed without prior approval in writing from the Architect/PMC. It shall be carried out under through and competent supervision with the written permission of the appropriate authorities taking full precautions connected with blasting operations. All excavated earth shall be kept sufficiently clear of the trenches.

2.4 Protection of Existing pipes etc.

All pipes, water mains, cables etc met in the course of excavations shall be carefully protected and supported. Care shall be taken not to disturb the cables. The removal of which shall be arranged by the contractor.

2.5 Back filling

Refilling of the trenches shall not be commenced until the length of the pipes therein has been tested and approved.

2.6 Welding

All welding shall be executed only by skilled, qualified, certified welders utilizing standard tools and accessories. Welding shall be done strictly as per Indian Standard IS : 6227 – 1966 and IS : 023-1964.

The operation of surfaces, the welding process and finishing of the joints shall be subject to the approval of the Architect/Engineer. All welded joints shall be structurally sound and absolutely seal poof.

2.7 Drilling & Cutting

Drilling & cutting or installed pipe work and masonry shall be restricted to absolute minimum. Where such cutting and drilling is unavailable, it shall be executed only with prior permission of the Employer/Architect/PMC.

All cutting and drilling shall be predetermined and suitable sockets and specials shall be employed to effect necessary connections. All cutting & drilling shall be executed by skilled workmen with proper tools.

The disturbed surface shall be restored to the satisfaction of the Employer/Architect/PMC.

2.8 **Marker Plates**

Marker plates indicating the particular service installed shall be provided along the route of pipe trenches. Marker plates shall be of mild steel with the type of service and the direction of flow painted on it. The markers shall be set firmly in a concrete base and installed at all corners and turning points. Over straight runs, markers shall be spaced at 100 meter center generally.

2.9 **Laying of pipes & jointing of pipes**

a. General : The pipes shall generally be laid with sockets leading uphill and shall rest on solid and even foundations for the full length of the barrel. To accommodate sockets, depressions shall be formed in the foundation sufficiently deep to allow ample space for the pipe jointer to work right round the pipes. Each separate pipe shall be individually set for line and levels as described under 'Alignment and Grade' and Selling out. Pipes shall always be installed in accessible positions except where absolutely and necessary and indicated the pipes shall be installed in wall chase / floor.

b. Salt Glazed Stoneware pipes: The laying & jointing of stoneware pipes shall be executed in accordance with code of practice for laying of glazed stoneware pies IS :4127:1967. Salt glazed stoneware pipes shall be jointed as follows:

Tarred gasket shall be first wrapped round the spigot of each pipe and the spigot shall be placed into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and the gasket caulked tightly home so as not to fill more than quarter of the total depth of the socket. The remainder of the socket shall then be filled with a mixture of cement mortar 1:1 one part of cement & one part of washed fine sand.

When the socket is filled, a fillet shall be formed round the joint with trowel making an angle of 45degrees with the barrel or the pipe after the joint is made. Any extraneous material shall be removed from the inside of the joint with a suitable scrapper. The newly made joint shall be protected until set from sun, drying winds, rain or dust. The joint shall be cured by keeping it continuously damp for seven days. The inside of the pipes shall be left absolutely clear in bore & free from cement mortar or any other obstruction.

The joint shall be tested to a test pressure of 100 Cm for two hour without developing leaks / fall in pressure. Before commencing of test, the pipeline shall be filled with water and maintained for 24 hours under head is 0-.6m water. In case of leaks the piping shall be re-done in such portion and the test repeated till achieving satisfactory result.

c. Cement Concrete Pipes :Concrete pipes shall be laid and jointed as described in IS : 783:1939, code of practice for laying of cement concrete pipes.

After setting out the pipes, the collar shall be centered over the joint and filled in with tarred gasket till sufficient space is left on either side of the collar to receive the mortar.

The space shall then be filled with cement mortar 1:2 (1 Cement: 2 Washed Coarse Sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 to the longitudinal axis of the pipe on both sides of the collar. The joints shall be cure for at least seven days. The joints shall be tested to a head of 100 Cms for two hours without developing leaks/ fall in pressure. In case of leaks the piping shall be redone in such portions and the test repeated till achieving satisfactory result.

d. Cast Iron Pipes : CI pipes shall be laid and jointed in conformity with the code of practice for laying of cast Iron pipes IS: 3114-1965. CI pipes shall be jointed by best quality caulking lead free from all impurities. In wet trenches, joints shall be made with lead wool. The spigot shall be centered in the adjoining socket by tightly caulking in sufficient turns of tarred gaskin to leave unfilled the required depth of socket for lead. Where the gaskin has been caulked tightly home, a jointing ring shall be placed round the barrel and against the face of the socket. Melton lead shall then be poured into fill the reminder of the socket in one operation. The lead shall then be solidly caulked with suitable tools by hammering right round the joint to make up for the shrinkage of the molten metal on coping and shall preferably finish 3mm behind the socket face.
Lead for caulking shall conform to IS : 782 – 1966 . The quantity of lead to be filled per joint in various sizes of CI pipes shall be as follows:

i) **Drainage Pipes**

50mm (2″) pipe	-------- 0.7 Kg / joint (35mm deep)
80mm (3″) pipe	--------- 1.2 Kg/ joint (40mm deep)
100mm (4″) pipe	----------1.5 Kg/joint (45mm deep)
150mm (6″) pipe	---------- 2.4 Kg/joint (45mm deep)

ii) **Water Main Pipes** **Lead / Joint**

80mm (3″) pipe	1.8 Kg
100mm (4″) pipe	2.2 Kg
125mm (5″) pipe	2.6 Kg
150 mm (6″) pipe	3.4 Kg
200mm (8″) pipe	5.0 Kg

The joints and pipes laid for water supply system shall be tested to a pressure of 12 Kg/sq.cm for two hours without developing leaks/ fall in pressure , the drainage pipe lines and joints shall be tested to a head of 150 Cm for two hours without developing leaks / fall in pressure. In case of leaks the piping shall be redone in such portion and the test repeated till achieving satisfactory result.

e. Galvanized Steel Pipes : Galvanized steel pipes shall be jointed with screwed and socket joints using screwed fittings. Care shall be taken to remove any burr from the ends of the pipes after thread cutting. White lead or an equivalent jointing compound of proprietary make shall be used, according to the manufacturer's instructions. With a grummet of a few strands of fine yarn while tightening. Compounds containing red lead shall not be used because of the danger of contamination of water. Any threads exposed after jointing shall be painted with bituminous paint to prevent corrosion.

Pipes & joints laid for water supply system shall be tested to a pressure of 7 kg per sq cm and that of fire fighting system to a pressure of 10.50 kg per sq cm for two hours without developing leaks/ fall in pressure. In case of leaks the piping shall be redone in such portions and the test repeated till achieving satisfactory result.

f. Mild Steel Pipes : Mild steel pipes & fittings shall be generally jointed by welding unless otherwise satisfied. All welding shall be done by qualified welders in accordance with Indian Standard IS : 824 –1964. All welded joints shall be tested to a pressure of 15 kg per sq. cm. For two hours without developing leaks/ fall in pressure. In case of leaks the piping shall be redone in such portions and the test repeated till achieving satisfactory result.

g. Copper Pipes : Copper pipes and fittings shall be binded either by compression joints or capillary joints as recommended by the pipe manufacturer. Screw threading shall not be done. Connections to pillar cocks, stop cocks and other water fittings shall be affected by using standard coupler as recommended by manufacturers where capillary joints are used, proper grade of solder as recommended by the manufacturer shall be utilized. Compression joints shall be tested to a pressure of 7 kg per sq. cm. For two hours without developing leaks/ fall in pressure.

In case of leaks the piping shall be redone in each portions and the test repeated till achieving satisfactory result. Copper pipes shall be held in position by brass on copper clips. The piping should be supported at an interval of 150 cm by approved saddles. Proper tools & suitably trained labor shall be employed for laying and jointing copper pipes.

h. **PVC pipes**: PVC pipes and fittings shall be laid and jointed by skilled workmen strictly as per the instructions of manufacturer. The installed piping system shall be subject to a low pressure testing of 4 kg / sq.cm and then to high pressure testing of 7 kg./ sq.cm. without developing leaks/ fall in pressure pipes and joints shall be tested to a pressure of 7 kg per sq. cm. without developing leaks/ fall in pressure.

i. **Asbestos Cement pressure pipes**: AC pressure pipes shall be laid & jointed as per manufacturer's instructions. Suitable specials, CI detachable joints, joint collars, rubber rings, mild steel bolts and cement concrete thrust pads shall be provided adequately to ensure tha the piping system perform efficiently under the working conditions. The asbestos pressure pipes and joints shall be tested to a pressure of 7 kg per sq cm without developing leaks / fall in pressure.

j. **Pipe Insulation** : All pipe work and fittings shall be brushed and cleaned. All dust, dirt, mortar and oil removed. The pipes shall then be cleaned with chemical solution suitable for the material of the pipe. Where insulation is to be applied over copper pipes, fiber glass wool of suitable thickness shall be applied over the entire run of piping. In case of mild steel and galvanized pipes. The pipes shall first be given a cost of Zinc Chromate primer followed by two coats of approved synthetic enamel paint. Insulation consisting of fiber glass wool of suitable thickness shall then be applied over the piping system.

Fiber glass shall have a density of 25 Kg/cm. and the value of 0.404 MW/CM/Co. Polythene sheets shall then be wrapped round the above and held in position by galvanized chicken mesh. Cement plaster 1:3 (1 Cement: 3 Coarse washed sand) shall then be applied over chicken mesh in two coats to a minimum thickness of 20mm.

The thickness of insulation to be applied shall be as follows:-

Sizes of pipes / fittings	**Thickness of Insulation**
a. 15mm / 20mm dia	20 mm
b. 25mm , 32mm & 40 mm dia	25 mm
c. Over 40mm dia	40 mm

The insulation shall be continuous over the entire run of piping, fittings & valves. The insulation shall be applied only after the piping systems are satisfactorily tested for the desired working pressure. The completed insulation shall restrict the heat loss heat gain in the piping system to the absolute minimum. The total heat gain or heat loss by the insulated piping system shall not exceed thirty per cent of the heat gain or heat loss by a similar un=insulated piping system.

Insulation work shall be carried out by skilled workmen special trained in this kind of work.

VALVES

Valves shall be provided at accessible locations on every branch from main lines as shown in the drawings. In case of valves with screwed female inlet/ outlet, each valve shall be provided with a union on either side and installed in piping system. On external lines, valves shall be installed in brick masonry chambers wit a frame and cover as shown in the drawings.

3.0 PIPING SYSTEMS – INSTALLATION, INSPECTION AND TESTING

Soil, Waste, Vent & Antisyphon pipes

Unless specified otherwise all soil and waste pipes in shafts, ducts and in concealed locations e.g (false ceiling) shall be of sand CI pipes, and that located in basement floor / service floor shall be of CI spun pipes class 'LA'.

The soil pipe shall be of minimum diameter of 100mm and waste pipes 80mm. Pipes shall be fixed by means of stout clamps in two sections,

bolted together built into the walls wedged and neatly pointed as directed and approved by the Employer/Architect/PMC keeping 50mm distance from the walls.

Where indicated, the soil & waste pipes shall be continued upwards without any diminution in its diameter without any bend or angle to the height shown in the drawings.

Unless specified otherwise soil and waste pipes from urinal / wash basin / sinks upto the floor trap shall be of GI medium class pipes. All the traps of water closets and urinal traps shall be provided with antisyphon / vent pipes as shown in the drawings and as directed by the Employer/Architect/PMC. All terminal manholes shall be provided with vent pipes. This may be dispensed with if the upper floor soil stacks connecting to such manholes are vented. All soil, waste and vent pipes shall be given two coats of approved paint.

3.1 All connection between soil, waste & ventilation pipes & branch pipes shall be made by using pipe fittings with inspection doors & cleaning. The doors shall be provided with 3mm thick rubber insertion packing and when closed and bolted shall be air and water tight.

Where soil, waste and ventilating pips are accommodated in shafts/ ducts, adequate to cleaning eye shall be provided.

3.2 Cold water supply Pipes

A water supply piping system to cater for all domestic, requirements shall be installed as called for on the drawings. Unless specified otherwise the piping system shall consist of galvanized steel pipes and fittings of medium class and CI spun pipes and fittings of water mains (Class LA quality).
As far as possible, all piping inside the buildings shall run in shafts or ducts provided for this purpose. No unsightly exposed runs will be permitted. Outside the buildings, the piping shall be installed as far as possible 60cm. below finished grade. Where called for all galvanized steel piping embedded either in trenches or in concrete and masonry fiber glass tissue sheathing laid in bitumen. Gate valves (built into chambers were required) shall be provided as indicated on the drawings to regulate the flow of water.

The piping shall be given two coats of approved paint as mentioned under painting and color coding. All CI pipes buried on an embedded shall be given two coats of bitumastic paint.

Water Storage Tanks

The water storage tanks to be provided shall be fabricated from 10 gauge galvanised sheet steel or mild steel electrically welded, stiffened adequately with angle iron frames and rigidly built. The tanks shall be of sizes and capacities called for the capacities mentioned are net excluding boards. The water storage tanks shall be painted internally with two coats of Shalimar special purpose paint. All paint being applied over a coat of primer. Suitable rolled steel joints (duly painted) and supporting brick masonry pillars shall also be provided. All tanks shall be provided

with necessary inlet, outlet, overflow, drain out connections including float valves and ball cocks. All holes shall be punched or cut neatly to correct size and provided with suitable brass check nuts and bushes to receive connection. The punctures shall be made leak proof after the connections are effected. All tanks shall be provided with suitable mosquito proof manhole covers of adequate size to facilitate cleaning and maintenance. (Overflow and vent pipe openings shall be provided with brass puff grating.

Hot Water Supply

A hot water supply system consisting of galvanized steel pipes and fittings of heavy class (C) shall be installed by the contractor. In walls, these shall be wrapped with 1mm thick fiber glass tissue set in bitumen. Adequate number of expansion fittings shall be provided to take care of expansion and contraction. Air locks releasing devices & dewatering / blows / off devices at suitable points shall also be provided in the piping system.

The completed hot water piping system shall be tested to the test pressure mentioned under laying of pipes for two hours without any fall in pressure. The insulated piping system shall be given two coats of approved paint.

Rain Water Pipes

Rain water down takes shall be galvanized mild steel pipes or CI pipes as called for in drawings. The fittings & specials for the pipes shall be of the same materials as the pipes. The installation of rain water pipes shall be carried out as described in relevant clauses under laying & jointing of pipes. Rain water pipes shall be given two coats of approved paint.

Storm Water Drainage

Contractor shall install a storm water drainage system as called for in the drawings. The system shall consist of RCC NP2 class pipes.

Colour Code Identification

All piping shall be colour coded as per IS 2065 – 1972.

4. ANCILLARY STRUCTURE

4.1 Manhole

Excavation, filling back and ramming, disposal of surplus earth, preparation or bottoms and sides etc shall be carried out as described earlier under trenches for pipes. Manholes shall be of sizes and depths as called for in drawings. The manhole shall be built on a base of concrete 1:2:4 (1 Cement : 2 Coarse Sand : 4 aggregate) of 150mm thickness for manholes from 1500mm depth to 2500 mm depth and 300mm thickness for manholes of depth greater than 2500mm.

The walls shall be of brick / stone work of thickness as shown in the drawings in cement mortar 1:3 (1 Cement: 3 Coarse Sand). The joints of

brick / stone work shall be raked and plastered internally and externally with cement plaster 1:3 (1 Cement : 3 Coarse Sand) to a thickness of 13mm and finished with a coat of neat cement provided in the bottom of manholes, semi circular channels of the same diameter as the pipes. Above the horizontal diameter the sides of channel shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel an appropriate fall suitably rounded off in the direction of flow in the main channel shall be given. Rungs of CI of suitable dimensions shall be provided in all manholes over 800mm depth. These rungs shall be set at 30cms intervals in two vertical rungs at 380 mm apart horizontally. The top rung shall be 450mm below the manhole cover. Unless otherwise mentioned manholes shall be constructed to requirements of Indian Standard IS : 4111 (Part – I) 16/ "Code of Practice for ancillary structures in sewerage system manholes". All manholes shall be constructed so as to do water tight under test. All angles shall be rounded to a 75mm radius. The benching at the sides shall be carried up in such a manner as to provide no edgement for any splashing in case of accidental flooding.

Manholes covers and frames shall conform to the requirements of Indian Standard IS : 1726 – 1960 . Manhole covers with frame shall be of CI of an approved make. The covers and frame shall generally be double seat of 600 x 450mm or 500mm dia of 50 kg or 116 kg in weight. Where manholes are located in driveways and such other areas, the covers & frames shall be 560mm dia or 255 kg.

4.2 Gully Traps

Gully trap where called for on the drawings at the feet or all waste pipes shall be salt glazed gully traps of approved make with 100mm or 150 mm dia outlet. The gully trap shall be embedded in CC 1:2:4 and a masonry chamber of internal size 300mm x 300mm shall be built around upto ground level and plastered with CM 1:3 and finished with floating coat of neat cement. All gully trap and in the top a cast iron sealed cover 300mm x 300mm weighing 7.3 kg shall be provided.

4.3 Grease Traps

Grease traps shall be provided on kitchen waste before it confluence with the main sewer lines. Grease traps shall be built in brick masonry and shall generally have the same specification of manholes. The sizes & locations shall be as shown in the drawings. Grease traps shall be provided with drop inlet, drop outlet and baffle wall. Grease trap shall be provided with 2 nos. double seal manhole cover and frame.

4.4 Catch Basin

Catch basin shall be of sizes and depths as called for in the drawings and shall be provided in the locations as shown in the drawings. Catch basins shall be provided with CI grating with frame for effective collection and disposal of surface storm water.

4.5 Intercepting Tap

Building sewer line connection to main Municipal sewer shall be made through Intercepting trap provided in the manhole as shown in the drawing.

Intercepting trap shall be of approved make salt glazed stoneware with suitable outlet fitted with brass airtight stopper with galvanized iron chain. The intercepting traps shall be set in and surrounded with cement concrete 1:2:4 150mm thick built into brick work and connected to drain.

6. MISCELLANEOUS WORKS

6.1 Connection to RCC water tanks

The contractor shall provide all inlets, outlet, washouts, vents, ball ducts, overflow, control valves and all such other piping connections including level indicator in water storage tanks are called for:

Suitable float controls of an approved make, securely fixed to the tank and set in a position that water inlet into the tank is cut off when filled upto the full water line. The water level in the tank shall be adjusted to 25mm below the line or the overflow pipe. Full way gate valve of approved make shall be provided as near, the tank as practicable on every outlet pipe from the storage tank except the overflow pipe.

The overflow pipe shall be placed as to allow the discharge of water being readily seen. The overflow pipe shall be of size indicated. A stop valve shall also be provided on the inlet water connection to the tank.

The outlet pipes shall be fixed above the bottom of the tank as indicated. A washout pipe shall be provided at the bottom of the tanks towards which the floor of the tank is stopping to enable the tank to be emptied for cleaning.

6.2 Connections to Pools and Cooling Towers etc.

The contractor shall provide water supply and waste disposal connections to the various pools and cooling towers as shown on drawings.

6.3 Connection to Mechanical Equipment Supplied by other Agencies

All inlets, outlets, valves, piping and other incidental work connected with installation of all mechanical equipments supplied by other agencies shall be carried out by the contractor in accordance with the drawings, requirements for proper performance of equipment, manufacturer's instructions and the directions of the Employer/Architect/PMC.

The equipment to be supplied by other agencies consist mainly of kitchen, laundry, air conditioning, boiler, water treatment, sewerage treatment, swimming pool and other similar equipments. The connections to the various equipments shall be either with union or with flange. The work of effective connections shall be executed in consultation with and according to the requirements of equipment

supplies under the directions of Employer/Architect/PMC. The various aspects of connection work shall be executed in a manner similar to the work of respective trades mentioned elsewhere in these specifications.

6.4 Disinfection of Piping System and Storage Tanks

Before commissioning the water supply system, the contractor shall arrange to disinfect the entire system as described in the succeeding paragraph. The filtered water and thoroughly flushed out. The storage tanks shall then be filled with water again and disinfecting chemical containing chlorine added gradually while tanks are being filled to ensure through mixing. Sufficient chemical shall be used to give the water a dose of 50 parts of chlorine to one million parts of water. If ordinary bleaching powder is used, the proportions will be 150 grams of powder to 1000 liter of water. The powder shall be mixed with water to a creamy consistency before being added to the water in the storage tank. If a proprietary brand of chemical is used. The proportions shall be specified by the makers. When the storage tank is full, the supply shall be stopped and all the taps on the distributing pipes opened successively, working progressively away from storage tank.

Each tap shall be closed when the water discharge begins to mell of chlorine. The storage tank shall be filled up with water from supply pipe and added more disinfecting chemical in the recommended proportions. The storage tank and pipe shall then remain charged at least for three hours. Finally the tank and pipes shall be thoroughly flushed out before any water is used for domestic purposes.

7. MODE OF MEASUREMENT

7.1 Pipes

All pipes viz stoneware RCC, AC, PVC, GI, MS,CI water main pipes etc shall be measured in linear lengths along the center line inclusive of all fittings e.g. elbows, tees, bends, reducers, bushes, unions etc . The rates shall include also the cost towards hangers, clamps, making chase / holes in walls / labs and bringing them to original condition and shape. Deductions in length of pipes shall be mad eon account of manhole chambers. Unless specified otherwise excavation and refilling shall be measured separately.

7.2 Fixtures

All fixtures shall be measured in numbers along with the fittings as specified in the respective items of schedule. The rate of fixtures shall also include cost towards mounting brackets, painting to brackets, excavation and bedding concrete.

7.3 Brass / Chromium Plated fittings etc.

All the fittings shall be measured in numbers with the accessories as specified in the respective items of schedule.

7.4 Valves

Valves shall be measured in numbers; these shall be of flagged type or down type as specified in the schedule. Rate of flagged valves shall also include cost towards the flange provided on both the sides on pipes, gaskets, drilling holes and providing bolts and nuts.

7.5 Ancillary Structures

All ancillary structures viz. Manhole, gully traps, valves chambers, catch basins shall be measured in numbers, including all the items specified in the schedule against the respective items. Earth work in excavation and refilling for ancillary structures shall be measured separately.

Earthwork in Excavation and back filling All the excavations involved for laying of pipes and for ancillary structures shall be measured under this item. Width of excavation for pipe laying shall be internal diameter of the pipe plus 30 cms subject to a minimum width of 50 cms . Depth shall be as indicated in the drawings.

The rate for item excavation shall also include cost towards back fitting and spreading as specified in schedule.

SPECIFICATIONS FOR SERVICES

1.0 General

1.1 The drawings for services are diagrammatic but shall be followed as closely as actual construction permits. Any deviations from the drawings shall be in conformity with architectural and structural drawings. The dimensions designated by the manufacturers shall take precedence over the drawings.

11.5At completion of work the Contractor shall submit one set of tracings and two sets of prints of "As-Built-Drawings". These drawings shall, among others, include invert levels, pipe runs, diameters, location of valves, access panels, layout of equipment, piping connections and such other information for maintenance & future extensions. Guarantees given by manufacturers shall be assigned to the Employer along with names & addresses of manufacturers, suppliers and information about spare parts.

12.5All site test shall be carried out with prior intimation to the Bank Engineer / Architect. All defects shall be rectified and tests conducted again to the satisfaction of the Bank Engineer / Architect. In addition to the test required by the specifications, the Contractor shall also conduct tests required by the Architect and by the Municipal or other Authorities.

13.5All work shall be executed by competent and licensed persons. The contractor shall maintain liaison with Municipal and other controlling Authorities. He shall obtain their approvals and certificates as required by the bye – laws at appropriate stages.

14.5No cutting / chasing shall be done in load bearing structural members without prior approval of the Asstt. Engineer. Sleeves and openings shall be provided during the progress of construction in preference to cutting at later date.

15.5The Architect may require typical mock up(s) to be installed in advance for approval. Undamaged materials from the mock up shall be allowed to be reused in the work.

16.5Unless otherwise described in the item CI / SCI pipes and fittings shall be a spigot and socket type.

17.5G.I. pipe spouts shall be paid as per item of G.I. pipes (internal work). Cutting and making good is included. The free ends may be skew-cut.

18.5Wherever use of G.I. pipes is called for the same shall be medium class (class – B)

2.0 Materials :

2.1 The materials shall conform to the specifications and in absence thereof to Indian Standards. The products should bear the ISI Mark.

2.2 The makes of materials for use in this work are broadly approved as per list given below. The Contractor shall, however, get particular makes and samples approved before ordering:

2.3 Notwithstanding any interim or final approval the Contractor remains responsible for satisfactory performance of all fittings & fixtures. The liability of the Contractor is not limited by any approval of the make of materials.

LIST OF Civil & Interior APPROVED BRANDS / MAKES

MATERIAL	MANUFACTURER/BRAND NAME
Cement (OPC)	Ambuja, Ultratech, Binani , L&T
White Cement	Birla White, J.K.White
Anti termite	Thiddan (35 E.C.), Dursban – 20 TC, Trishul, PEST CONTROL INDIA LTD
Kerbstone & Interlocking paver	NIMCO PREFAB, UNISTONE, MODERN and equivalent
AAC blocks	BILT or approved equivalent
Flush doors, commercial block Boards, Ply etc.	Greenply, Merino, Archid, Centuary
TMT Bar	Tata, Sail, RINL
Ready Mix Concrete	ACC, Ultratech, RMC India
POLY CARBONATE SHEETING :	GE PLASTICS, POLYGAL, SUNLITE
NONMETALLICHARDENER COMPOUND	FOSROC, STP, CICO, SIKKA
Block board/Plywood	**Green ply**, **Century**, **Archid** and **other approved makes** Only.
Particle Board	Deco Board, Eco board, Novapan or Appr. eq.
Paints	Asian , Berger, Nerolac, ICI
Surface texture wall coating	Unitile, Heritage, OIKOS, Asian, Acro paints
Ceramic Tiles	Kajaria, Bell, Johnson, Orient BEll
Vitrified Tiles	Kajaria, Bell, Johnson, OrientBell
Adhesive	Fevicol, Vamicol
Vitreous China Sanitary ware	Hindustan, Neycer, Cera, Parryware

BILL OF QUANTITY

PREAMBLE:- TO BE READ ALONG WITH DRAWINGS.

1. RATES TO BE QUOTED BOTH IN FIGURES AND WORDS.
2. ALL PAGES TO BE SIGNED AND STAMPED BY THE TENDERER.
3. THE RATE OF THE ITEMS SHALL BE APPLICABLE FOR ANY FLOOR LEVEL/ ANY NUMBER OF FLOORS, OR ANY QUANTITY.
4. THE SPECIFICATION OF THE ITEMS SHALL BE AS PER LATEST INDIAN STANDARD CODES UNLESS OTHERWISE SPECIFIED.
5. ALL MATERIALS SHALL BE AS PER APPROVED LIST AND SHOULD BE OF Ist QUALITY UNLESS OTHERWISE SPECIFIED.
6. THE RATES ARE INCLUSIVE OF ALL DUTIES AND TAXES OF ALL GOVERNMENT, MUNICIPAL OR ANY OTHER STATUTORY BODY APPLICABLE FROM TIME TO TIME.
7. RATES SHALL BE FOR ITEMS COMPLETE IN ALL RESPECTS AS PER DRAWING, INSTRUCTIONS AND APPROVAL OF THE ARCHITECT.
8. THE QUANTITIES ARE APPROXIMATE AND TENTATIVE WHICH MAY VARY DURING COURSE OF EXECUTION. THE RATES QUOTED AGAINST PARTICULAR ITEM SHALL NOT BE CHANGED WITH VARIATION IN QUANTITIES.
9. MAKING OF ANY CUTOUT / OPENING FOR ELECTRICAL / AIR – CONDITIONING WIRING / FITTING IN ANY OF THE ITEM OF FALSE CEILING, PARTITIONS, PANELING MASONRY WORK ETC. AND FINISHING EDGES JAMBS / CILLS / SOFFITS OF THE OPENING SHALL NOT BE PAID EXTRA.
10. THE TENDERER SHALL VISIT THE SITE AND SHALL SATISFY HIMSELF AS TO CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED. HE SHALL ALSO CHECK, ASCERTAIN THE LOCATIONS OF ANY EXISTING STRUCTURES OR EQUIPMENT OR ANY OTHER SITUATION WHICH MAY AFFECT THE WORK. NO EXTRA CLAIM AS A CONSEQUENCE OF IGNORANCE OR ON GROUND OF INSUFFICIENT DESCRIPTION WILL BE ALLOWED AT A LATER DATE.
11. THE QUOTED PRICE FOR ITEMS SHALL INCLUDE ALL ACCESSORIES, CONSUMMABLES ETC. AS REQUIRED TO MAKE THE ITEM COMPLETE IN ALL RESPECTS, COMPATIBLE WITH OTHER RELATED / ASSOCIATED ITEMS AND FULLY FUNCTIONAL.
12. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY ERROR, DIFFICULTY IN EXECUTION / DAMAGES INCURRED OWING TO DISCREPANCY IN DRAWINGS WHICH HAS BEEN OVERLOOKED BY HIM AND HAS NOT BEEN BROUGHT TO THE NOTICE OF THE ARCHITECT.
13. THERE ARE NUMBER OF ITEMS GIVEN IN THE TENDER WHERE IN BASIC RATES INCLUDING ALL TAXES EXPECTED HAS BEEN MENTIONED IN THE TENDER. THESE ITEMS SHALL BE PURCHASED BY THE CONTRACTOR FROM THE MARKET ONLY AFTER THE APPROVAL OF QUALITY AND RATES BY THE ARCHITECT.

14. ALL HIDDEN SURFACES OF BOARD / PLY / WOOD WORK TO BE PAINTED WITH ANTI BACTERIAL PAINT FROM NAV AIR INTERNATIONAL FR 881 (VIPER) (WHITE COLOUR AS PER MANUFACTURER'S SPECIFICATIONS ON WOOD / BOARD).

CONTRACTOR SHALL APPOINT TECHNICALLY QUALIFIED FULL TIME SITE SUPERVISOR TO MONITORING THE DAY TO DAY PROGRESS.