TENDER COPY

PART-I

INDIAN BANK

TENDER FOR TECHNICAL BID

Construction of RCC Road at Sitapur Zonal office

CLIENT :

INDIAN BANK
Sitapur Zonal Office
Near Raja College Ground
Civil Lines, Sitapur,U.P. 261001

Architect & Consultants

M/S. Mohit and Associates
L-2/554 Vineet Khand,Gomti Nagar,Lucknow
MO-9582218092

Name of the contractor:
.....
.....
.....

Last date of submission of tenders	18.07.2025 upto 15.00Hrs. at Indian Bank, Zonal Office Sitapur , Estate Department, **Sitapur,U.P. 261001**
Date of opening Tender	19.07.2025 upto 15.30Hrs. at Indian Bank, Zonal Office Sitapur , Estate Department, **Sitapur,U.P. 261001**
Cost Of Tender	Free Of Cost.

This Tender Documents Contain 117 nos. Pages.

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NOTE: The Tenderers shall satisfy themselves before submitting that no page of document listed is missing from their tender and each page has been initialed by them

FORM OF TENDER

TO
Indian Bank
Sitapur Zonal Office
Near Raja College Ground
Civil Lines, Sitapur,U.P. 261001

Dear Sirs,

SUB: Invitation of Bids for Construction RCC road and allied Civil at Indian bank Premises Campus located at Zonal office, Sitapur (UP)

Having examined the Prequalification, drawings, specifications, conditions and schedule of quantities prepared by you, and satisfying ourselves as to the location of the site and working conditions, I/We hereby offer to execute the above works at the respective rates which I/We have quoted for the items in the Schedule of Quantities.

I/We herewith deposit **Rs.22,000/- (Rupees Twenty Two Thousand only)** by crossed demand draft payable at Sitapur and drawn in favour of Indian Bank as Earnest Money Deposit for the due execution of the works at my/our tendered rates, together with any variations should the work be awarded to me/us.

In the event of this tender being accepted, I/We agree to enter into and execute the necessary contract required by you. I/We do hereby bind myself/ourselves to forfeit the aforesaid Earnest Money Deposit of **Rs. 22,000/- (Rupees Twenty Two Thousand only)** in the event of our refusal or delay in signing the Contract Agreement. I/We further agree to complete the work within the stipulated time specified in the Appendix to General Conditions of Contract.

I/We agree to keep our tender open for 120 **(One Hundred Twenty) days** from the date of opening of Envelope No.1.

I/We enclose the completed tender documents duly signed under sealed envelopes and the Earnest Money Deposit Rs._____ (Rupees _____ _____only) by Bank Draft / Bank Guarantee No. …….. dated ……. Issued by …….

Thanking you,

Yours faithfully,

[To be signed by the Authorized Representative of
Tenderer who has the Power to do so]

Place:
Date :

Witness Signature:
Name:
Address:
Seal:

NOTICE INVITING TENDER

Indian Bank, Zonal Office, Premises Dept. ,Zonal office ,Sitapur (UP) invites sealed bids under Two Bid System containing Part-I (Technical Bid) & Part –II (Financial Bid) from Established /Reputed Civil Contractor complying with minimum qualification criteria for Construction Concrete Road and allied Civil works as per Bill Of Quantities and specification in Indian Bank Premises at Sitapur Zonal office.

Name of work	Construction RCC road and allied Civil works at Indian bank Premises Campus located at Zonal office, Sitapur (UP)
Estimated cost of work (approx.)	**Rs.22,00,000.00 (Rupees Twenty Two Lacs Only)**
Earnest money	**Rs. 22,000.00 (Rupees Twenty Two Thousand Only)** by crossed demand draft/ Banker's Cheque favoring INDIAN BANK payable at **Sitapur**
Validity of Tender	**120 days from the date of opening**
Initial Security Deposit	**2% of the bid amount (i/c EMD amount) excluding GST**
Retention Money	**8% against each RA bill excluding GST**
Total Security Deposit (IMD+ SD)	**10% of the project cost. (Initial Security Deposit 2% and Retention Money 8%) 50% will be released after 15days of payment of the final bill and the balance 50% will be released after the Defect liability Period of One year**
Site Visit	Intended participators are requested to visit site from 03/07/2025 to 18/07/2025 in office hours.
Pre-Bid Meeting	**At 11:00 A.M. on 19/07/2025 at Indian Bank,** Sitapur
Time of Completion	45 calendar days from the date of handover of site c including rainy season.
Submission of Tender	Before 15:00 Hrs. on 18/07/2025.
Opening of Part I (TD) of tender	At 15:30 Hrs on 19/07/2025
Opening of Part II (PS) of tender	Date and Time of opening of Price –Bid will be informed to the bidders who are qualified in the Technical Bid.
Tender Documents	Tender documents can be obtained from Indian Bank, Zonal office, Sitapur at Civil Lines from 03.07.2025 to 18.07.2025 on all working days during office hours. (OR) The Tender Documents can be downloaded from the Bank's website www.indianbank.in FREE OF COST (NO COST FOR TENDER)
Payment	One Interim Payment allowed for the Minimum Bill Value of Rs.15,00,000.00 (Rupees Fifteen Lacs Only).
Defect Liability Period	12 months from the date of handing over of project as certified by Engineer in Charge.

Taxes	TDS for work contract tax etc. shall be deducted as applicable from all bills / payments made in connection with this work.
GST	Percentage of GST is to be mentioned in the Financial Bid.

Note:

1. Tenderers are required to submit the bid in 2 parts namely Technical bid and financial bid. The Technical bid is to be submitted in sealed cover along with, Necessary documents prescribed in the Bids, Forms and EMD. The Financial bid shall be submitted in a separate sealed cover. The Technical and Financial bids are to be put in a master envelope (3rd Cover) and sealed and super-scribed 'Tender for Construction of ROAD Works at Indian Bank Campus, at Sitapur and addressed to the Assistant General Manager, Indian Bank, Zonal Office, Sitapur , (UP)
2. Conditional tenders, late tenders, tenders without EMD or EMD not enclosed with Technical Bids, will be summarily rejected. Any tender received open, late or not meeting all the tender conditions / Bids not filled up in Pen are liable to be rejected.
3. Earnest money will not carry any interest.
4. Applications for issuance of tender without complete information and certified photocopies of documents in support of fulfilling the Pre-qualification criteria will not be entertained.
5. If any information furnished by the applicant is found incorrect at a later stage, he shall be liable to be debarred from tendering/taking up the work in Indian Bank.
6. The Bank reserves the right to verify the particulars furnished by the applicant independently.
7. Short-listing of contractors will be finalized after inspection of works and obtaining confidential reports (if required) from previous employers for only those firms who fulfill the aforesaid Pre-qualification criteria and that specified in Technical bid.
8. The bank reserves the right to reject any tender/bid without assigning any reason and to restrict the list of qualified contractors for opening of the financial bid to any number deemed suitable by it, from out of the bids received.
9. Bank is not bound to accept the Lowest (L1) tender and reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.
10. Submission of a tender by a tenderer implies that he/she has read this notice and other contract / tender documents and has made himself aware of the scope, specifications, conditions, liabilities and duties bearing on the execution of the contract.
11. Return of EMD of remaining tenderers who were unsuccessful in the tender process will be done within a reasonable time say not exceeding 21 days from the date of acceptance of tender/tenders by the L1 bidder.
12. Each and every page of the tender documents and correspondences accompanying the tender shall have to be duly signed and stamped by the Bidder / Authorised Signatory before submission.
13. The rates quoted by the tenderer shall be based only on the specifications and conditions of the tender documents.
14. Bank is not liable to make any payment to tenderers for preparation to submit the tender/bid.
15. Clarifications, if any, pertaining to this bids may be referred to Indian Bank Zonal office ,Sitapur (UP)
16. The Bank will not be bound to accept the lowest tender and reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.

ASSISTANT GENERAL MANAGER

Signature & Seal of the Tenderer

ELIGIBILITY CRITERIA OF THE TENDER

The following are the eligibility criteria for the contractors to participate in the tender process:

1. The bidder should have established firm and should have experience in execution of similar works in the line of industry for the last 07 years working in the construction industry

2. The bidder should have successfully and directly executed one work of similar nature in any central / state / PSU / PSB / Local body / Corporate body.

3. The similar works should be executed directly with the client as mentioned Clause no:2. No subcontract work will be considered as eligible.

4. They should not have incurred loss more than two years in the last 5 years (please attach 5 years (2020-21 ,2021-22,2022-23, 2023-24,2024-25) Profit & Loss statement duly authorized by Chartered Accountant). In case 2024-25 is not available, 2019-20 is to be submitted

A. The bidder should have experience of having successfully completed similar works of value as indicated below during the last 5 years ending 31.05.2025:

- **One similar works of value not less than Rs.17.60 Lakhs each**
  (OR)
- **Two similar works of value not less than Rs.11.00 Lakhs each**
  OR)
- **Three similar works of value not less than Rs.8.80 Lakhs each.**

B. Similar work means construction of RCC Road works along with Canal, Strom water drainage works, bridges, building etc to the satisfaction of Clients.

In that, As the similar work of value works, Minimum of 80% of the cost of works shall be executed for RCC Road construction only,. For Example, in case the bidder has executed Rs. 20.00 Lakhs value of work which included all Civil works, a minimum Rs.14.08 Lakhs (i.e 80% of 17.60 Lakhs) Bill value (excluding taxes) of RCC Road Construction should have done in one Similar works category. The similar manner applies remaining categories of two similar works and three similar work.

C. The contractor\firms should submit completion certificate from the employer clearly indicating the nature, magnitude, date of starting and date of completion, indicating whether the works are completed within the stipulated time in respect of qualifying works.

5. CA certified Balance sheets of last three years need to be submitted.

6. **Sufficient proof and TDS certificate has to be attached duly sealed and signed by the applicant. Attested copies of performance certificate issued by the clients of the Tenderer should be enclosed, in support of their experience**

PREQUALIFICATION DOCUMENTS

1.0 Criteria for Eligibility and documents to be submitted along with Technical Bid (PART1)

1) List of Clients for similar nature of work along with documentary evidences about award / completion of works with value, completion period, type of Buildings, name and address / contact No.

2) List of works of similar nature in hand with value, schedule date of completion.

3) List of Banker along with address, contact number of Branch.

4) Turn-over of the company for the last 3 financial years, supported by documents.

5) Organizational chart of the company.

6) Organizational chart for the personnel proposed to be deployed at Indian Bank project (Engineer, Supervisor, skilled & non-skilled workers and administrative staff)

7) List of plant and machinery available with the firm & to be deployed on the project.

2.0 Documents – details to be enclosed with the Technical Bid (PART1):

- Copy of TDS Certificate issued by the employer in support of eligibility criteria.
- Form A – Financial Information
- Form B- Details of all works of similar class/ nature completed during the last five years ending 28.02.2025.
- Form B-1- Additional Information for completed works
- Form C- Project under execution or awarded as on 28.02.2025
- Form D- Performance report for works referred to in Forms B & C
- Form E – Structure and Organization
- Form E-1- Details of Key Technical and Administrative Personnel employed by the firm/company
- Form F - Proforma on ISO certification (Optional)

FORM 'A'

FINANCIAL INFORMATION

I Financial Analysis – Details to be furnished duly supported by figures in Balance Sheet/Profit and Loss Account for the last Five years duly certified by the Chartered Accountant, as submitted by the applicant to the Income-Tax Department (Copies to be attached).

	YEARS				
2019-20	2020-21	2021-22	2022-23	2023-24	2024-25

(i) Gross Annual turn-over in Interior Works:

(ii) Profit/Loss

(iii) Financial position:

(a) Cash

(b) Current Assets

(c) Current Liabilities

(d) Working capital (b-c)

(e) Current Ratio:
Current Assets/Current Liabilities (b/c)

(f) Acid Test Ratio:
Quick Assets/Current Liabilities (a/c)

II. Income Tax clearance Certificate

III. Solvency certificate from Bankers (Schedule Bank) of Applicant.

IV. Financial arrangements for carrying out the proposed work

SIGNATURE OF APPLICANT(S)

Signature of Charted Accountant with seal

FORM'B
'

DETAILS OF ALL WORKS OF SIMILAR CLASS COMPLETED DURING THE LAST SEVEN YEARS ENDING 31st May 2025.

Name of work/project & location	Owner or sponsoring organizations	Agreement No	Scope of work	Cost of work in Crores	Date of commencement as per contract	Stipulated Date of completion	Actual date of completion	Litigation/ Arbitration pending / In progress with details **	Name and address/ Tel No of Officer to whom reference may be made	Remarks
2	3	4	5	6	7	8	9	10	11	12

** **Indicate gross amount claimed and amount awarded by the Arbitrator**

Signature of Applicant(s)

FORM- B1

ADDITIONAL INFORMATION FOR COMPLETED WORKS

1. Name of work :

2. Location :

3. Client's name and address :

4. Consultants name and address :

5. Scope of work :

a. Total Number of Units :

b. Number of floors :

c. Height of the building :

6. Specialized equipment deployed for the project :

7. Project Management organization structure :

8. Number of shifts and its duration adopted in execution :

9. Systems adopted for timely completion of the project :

SIGNATURE OF APPLICANT(S

FORM C

PROJECTS UNDER EXECUTION OR AWARDED AS 31st May 2025

S L N O	Name of work/project & location	Owner or sponsoring organizations	Agreement No	Cost of work	Date of commencement as per contract	Stipulated Date of completion	Upto date percentage progress of work	Slow progress, if any, and reasons thereof	Name and address/ Tel No of Officer to whom reference may be made	Remarks(Indicate whether any show cause notice issued or Arbitration initiated during the progress of work)
1	2	3	4	5	6	7	8	9	10	11

Signature of Applicant(s)

FORM 'D'

PERFORMANCE REPORT FOR WORKS REFERRED TO IN FORM 'B'&'C'

1. Name of the work/ Project & Location.

2. Scope of work.

   a. Total Number of Units.

   b. Number of floors.

3. Agreement No.

4. Estimated Cost

5. Tendered Cost

6. Value of work done

7. Date of Start

8. Date of completion

   a. Stipulated date of completion.

   b. Actual date of completion.

9. Amount of compensation levied for delayed Completion, if any.

10. Performance report based on Quality of Work, Time Management, and Resourcefulness : Very Good/ Good /Fair/ Not satisfactory

DATE

SUPERINTENDINGENGINEER/
CHIEF PROJECT MANAGER
OR EQUIVALENT.

FORM 'E'

STRUCTURE AND ORGANISATION

(i) Name and address of the applicant

(ii) Telephone No./Fax No/E-Mail address.

(iii) Legal Status (attach copies of original document defining the legal status)

(a) An Individual

(b) A proprietary Firm

(c) A Firm in partnership

(d) A Limited Company or Corporation.

(iv) Particulars of registration with various Government bodies (Attach attested photo-copy)

a) Registration Number.

b) Organization / Place of registration

(v) Names and Titles of Directors and officers with designation to be concerned with this work with Designation of individuals authorized to act for the organization.

(vi) Was the applicant ever required to suspend work for a period of more than six months continuously after you commenced the construction? If so, give the name of the project and give reasons thereof.

(vii) Has the applicant or any constituent partner in case of partnership firm/company, ever abandoned the awarded work before its completion? If so, give the name of the project and give reasons thereof.

(viii) Has the applicant or any constituent partner in case of partnership firm/Company, ever been debarred/black listed for tendering in any organization at any time? If so, give details:

(ix) Has the applicant or any constituent partner in case of partnership firm, or any directors in case of a Company ever been convicted by a court of law? Or any criminal proceedings presently pending? If so, give details.

(x) Any other information considered necessary but not included above.

SIGNATURE OF APPLICANT(S)

FORM E-1

DETAILS OF KEY TECHNICAL AND ADMINISTRATIVE PERSONNEL EMPLOYED BY THE FIRM / COMPANY

SL. NO	Designation	Total Number	Names	Qualification	Professional Experience	Length of continuous service with employer
1	2	3	4	5	6	7

Note : additional information about Technical personnel , if any , may be submitted on separate sheet

Signature of Applicant(s)

FORM F

PROFORMA ON ISO CERTIFICATION (Optional)

1. Year of Certification

2. Name and Address of Certifying Agency

3. Name of Management Representative

4. Validity of Certificate

Note : Attested copy of certificate (attested by Government Officer or Notary Public) to be enclosed.

SIGNATURE OF APPLICANT(S)

Letter for submission of Tender

To,
The Assistant General Manager
Indian Bank, Zonal Office
Civil Lines
Sitapur, U.P.

Dear Sir,

SUB: **Civil, Works for Proposed Construction of RCC road at Sitapur Zonal office**

I / We hereby submit our tender for the captioned work having inspected the site, read & Examined the following documents related to the work.

a. Notice Inviting Tender.
b. General rules and instructions for the guidance of the Tenderers.
c. Articles of agreement.
d. General conditions of contract including contract labour regulations model rules for labour welfare and safety code appended to these conditions.
e. Special conditions of contract.
f. Particulars, specifications and special clauses forming part of schedule of quantities.
g. List of approved materials for Civil Works
h. Drawings as per the list of drawings.
i. Modifications / Amendments to the tender documents, if any.

I/We hereby tender for execution of the works referred to in the aforesaid document upon the terms and conditions contained or referred to therein and in accordance in all respects with the specifications, designs, drawings and other relevant details at the rates quoted in Part –II and within the period of completion as stipulated in schedule.

In consideration of I/We being invited to tender, I/We agree to keep the tender open for acceptance for 120 (one hundred and twenty) days from the date of opening of part-I of tenders and not to make any modifications in its terms and conditions which are not acceptable to Indian Bank. A sum of Rs.22 ,000/-(Rupees Twenty two Thousand only)) is hereby tendered in the form of demand draft/Banker's Cheque No._____ dated. _____issued by _____ bank as earnest money in favour of INDIAN BANK payable **at** _____ which amount will not bear any interest. If I/We fail to keep the tender open as aforesaid or make any modifications in the terms and conditions of the tender which are not acceptable to INDIAN BANK, I/We agree that INDIAN BANK shall without prejudice to any other right or remedy be at liberty to forfeit the said earnest money absolutely. Should this tender be accepted, I/We hereby agree to abide by and fulfill all the terms and conditions and provisions of the aforesaid document. If after the tender is accepted, I/We fail to commence the execution of the works as provided for in the terms and conditions of contract, I/We agree that INDIAN BANK shall without prejudice to any of their rights or remedy be at liberty to forfeit the said earnest money absolutely.

Date _____Signature in the capacity of _____
Duly authorized to sign the tender on behalf of _____

GENERAL RULES AND INSTRUCTION FOR THE GUIDANCE OF TENDERERS

1 Definition of terms / interpretation:

i. *Employer/Owner/Bank /Indian Bank/ Accepting Authority shall mean Indian Bank with their FGM Office, Lucknow, 1st Floor, New Building, Hazaratganj, Lucknow-226001 and any of its employees representative authorized on their behalf.*

ii. *Throughout these bidding documents, the terms "bid" and "tender" and their derivatives ("bidder"/"tenderer"), "bidered /tendered", "bidding"/"tendering", etc. are Synonymous.*

iii. *Day means calendar day. Singular also means plural*

iv. *"Contractor" means the person whose Tender has been accepted by the Employer and the legal successors in title to such person, but not (except with the consent of the Employer) any assignee of such perso*

v. *Tenderer: The term 'Tenderer/Bidder' shall mean the individual or firm or company whether incorporated or not, undertaking the work and shall include legal representative(s) of such individuals or persons composing such firm or company or successors of such firm or company as the case may be and permitted assigns of such individual or firm or company*

2 **Earnest money amounting to Rs.22,000/- (Rupees Twenty Two Thousand only)** in the form of Demand Draft drawn in favour of "Indian Bank", payable at Sitapur must accompany each tender. EMD amount will not carry interest. Tender without earnest money will be summarily rejected.

3 **SUBMISSION OF TENDER**:

I. The Tender must be submitted in original and as per details given hereunder. The rates shall be filled in the Schedule given in **Part II**, of the tender document.

II. Tender shall be submitted in two parts in separately sealed envelopes as described below:

a. **Part I** : Technical bid ,PQ Documents ,EMD

b. **Part II**: Priced Schedule of Quantities in Original

III. The envelopes containing Volume I and Volume II of offers shall be duly superscribed with the above titles.

IV. Part II of offer shall contain only the "Schedule of Quantities" and no conditions whatsoever. Any conditions/stipulated by the tenderer in Part II will not be taken into consideration for evaluation of the tenders.

V. Tenderers are requested to quote strictly as per the terms and conditions, specifications, drawings and tender documents and not to stipulate any deviations.

VI. Addendum/ Corrigendum to this tender document, if issued, must be signed and submitted along with the tender document.

VII. All pages to be initialed:

All pages of tender documents including any corrections, additions or deletions shall be initialed wherever required in the tender papers by the Tenderer or by a person holding power of attorney authorizing him to sign on behalf of the Tenderer before submission of tender.

VIII. Rates to be in figures and words:

The Tenderer should quote in English both in figures as well as in words the rates and amounts tendered by him in the Schedule of Rates for each item and in such a way that interpolation is not possible. The amount for each item should be worked out and entered and requisite totals given of all items, both in figures and in words. The tendered amount for the work shall be entered in the tender and duly signed & seal by the Tenderer.

In case of discrepancy between the rates given by the contractor in words and figures or in the amount worked out the following procedure shall be followed.

When there is a difference between the rates in figures and in words, the rates which correspond to the amounts worked out by the contractor, shall be taken as correct.

When the amount of an item is not worked out by the contractor or it does not correspond with the rates quoted by the contractor in figures as well as in words, the rate quoted in words shall be taken as correct.

IX. When the rate quoted by the contractor in figures and in words tallies but the amount is not worked out correctly, the rate quoted by the contractor shall be taken as correct and not the amount.

X. In case there is a difference in rate indicated in the original and duplicate copies of the tender submitted by the tenderer, the rate indicated in the original copy will be applicable.

XI. Corrections and Erasures

Corrections and alterations in the entries of tender papers shall be signed in full by the Tenderer. Corrections with white fluid and overwriting are not permitted.

XII. The tender shall contain the names, residence and place of business of person or persons making the tender and shall be signed by the Tenderer with his usual signature. Partnership firms shall furnish the full names of all Partners in the tender. It should be signed in the partnership name by all the partners or by duly authorized representative followed by the name and designation of the person signing. Tender by Corporation shall be signed by an authorized representative, and a Power of Attorney on their behalf shall accompany the tender. A copy of the partnership deed of the firm with names of all partners shall be furnished.

XIII. When a Tenderer signs a tender in a language other than English, the total amount tendered should, in addition, be written in the same language. The signatures should be attested by at least one witness.

4 The Indian Bank does not bind itself to accept the lowest or any tender and reserves to itself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

5 The rate quoted by the Tenderer shall be net (excluding GST), up to the stage of incorporation and handing over site. All taxes including (excluding GST) or any other tax on material or on finished works like Turn-over Tax, including taxes that may be newly introduced subsequent to the tender etc. in respect of this contract shall be payable by the Tenderer and the Indian Bank will not entertain any claim whatsoever in this respect.

The rate quoted should be excluding GST.

The vendor who wishes to quote for the tender should have GST registration and should mention the registration number.

6 The Tenderer shall give a list of his relatives working with the Indian Bank along with their designations and addresses.

7 No employee of the Indian Bank is allowed to work as a contractor for a period of two years of his retirement from Indian Bank service, without the previous permission of the Indian Bank. The contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of the Indian Bank as aforesaid before submission of the tender or engagement in the Tenderers service.

8 The tender for works shall remain open for acceptance for a period of 120 days from the date of opening of Tender. If any tenderer who withdraws his tender before the said period, then the Indian Bank shall be at liberty to forfeit Earnest Money paid along with the tender.

9 The tender for the work shall not be witnessed by a Tenderer or Tenderers who himself/themselves has/have tendered or who may and had/have tendered for the same work. Failure to observe this condition would render tenders of the Tenderers tendering as well as witnessing the tender liable to summary rejection.

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

11 Transfer of tender documents purchased by one intending Tenderer to another is not permitted.

12 The Tenderer must pay the amount of Earnest Money as mentioned in the Notice of Tender Invitation by Bank Guarantee / Bank Demand Draft payable to Indian Bank. No interest on Earnest Money deposited by the Tenderer shall be allowed. The Tenderer should attach the Bank Guarantee / Bank Draft along with the tender failing which the tender will not be considered. No other mode of payment shall be accepted.

13 The Bank Guarantee for **Earnest Money shall remain valid for 3 months** from the date of submission of tender. The Earnest Money Deposit of unsuccessful tenderers shall be refunded within three weeks of award of contract to the successful tenderer or within one week of actual commencement of work whichever is earlier and in any case not later than four months.

14 The Earnest Money Deposit of the successful tenderer shall be refunded on the acceptance by the Employer of the Contractor's Bank Guarantee/ Demand Draft towards Security Deposit.

15 The EMD & ISD of the Tenderer, whose tender is accepted, shall be forfeited in full in case he does not start the work by stipulated date mentioned in the award letter.

16 **The retention amount at 8%** on the value of the bill paid will be held by the Indian Bank apart from ISD. **50% of the retention amount & 50% ISD (i.e. 50% of TSD) will be paid after 15 days of completion of the project** and balance 50% will be released at the end of Defects liability period(12 Months), subject to satisfactory rectification of defects noticed, if any. EMD & retention amount held in our Indian Bank's books will not carry any interest.

17 The acceptance of a tender will rest with the Indian Bank and the Indian Bank reserves to itself the authority to reject any or all of the tenders received without the assignment of a reason. Tenders in which any of the prescribed conditions are not fulfilled (or) are incomplete in any respect are liable to be rejected. The Indian Bank reserves the right to accept the tender in full or in part and the tenderer shall have no claim for revision of rates or other conditions if his tender is accepted in parts.

18 Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the Tenderers who resort to canvassing will be liable to rejection.

19 All rates shall be quoted on the proper form of the tender alone. **All the entries to be made legibly in ink only.** Rates written in pencil or any other mode shall not be considered for evaluation and will be rejected.

20 An item rate tender containing percentage below / above will be summarily rejected. However, where a tenderer voluntarily offers a rebate for payment along with sealed tender, the same may be considered.

21 On acceptance of the tender the name of the accredited representative(s) of the Tenderer who would be responsible for taking instructions from the Indian Bank shall be communicated to the Indian Bank.

22 The Contractor shall within 7 days of receiving the WORK ORDER submit **initial** security **deposit of 2%** of the contract value in the form of a Demand Draft ~~or Bank Guarantee in an approved format~~. On acceptance of the Demand Draft or ~~Bank Guarantee by the Employer,~~ the Earnest Money Deposit shall be refunded to the Contractor.

23 The Contractor shall comply with and give all notices required under any law, rules, regulations, or bye-law of Parliament, State Legislature or Local Authority relating to works. If needed, the Contractor has to obtain required permission/ approval from the building secretary/ association. The Contractor shall before commencing the execution of work issue a certificate to the Employer that he has obtained all the permissions Registrations and give all the notices as are required to be obtained or given under law particularly blasting permission, Police permission etc.

24 The Contractor shall be required to maintain the site and the building areas in a neat and clean condition at all times to the satisfaction of the Employer. The Contractor shall especially take care to keep areas free from getting water logged, from concrete/mortar dippings, bricks, steel, shuttering materials or any other material / rubbish.

25 Debris and items removed from the building have to be neatly stacked at site and then periodically removed (maximum of one week), carried away by the Contractor and disposed off as per the rules and regulations of the Local Authorities concerned. No debris shall be thrown loose from upper floors. No floor, roof or other part of the building shall be over-loaded with debris or materials as to render it unsafe.

26 Employer reserves the right to insist on selection of material, workmanship, detailing and finishes, which they consider, is appropriate, and suitable for the intended use. The contractor is not eligible to claim extra on this account.

27 Employer will require the contractor to produce, samples of all the materials, accessories/ finishes prior to procurement/ manufacture. The samples of the materials for the work shall be got approved from the Employer. Failure to comply with these instructions can result in rejection of the work/ materials.

28 The Tenderer should note that he should execute his part of work without causing any damage to any component of the building and also without disturbing the occupants. Any damage so caused shall be made good at the cost & risk of the tenderer.

29 The successful tenderers shall include, in the quoted price, all allied civil works such as chasing in wall, drilling holes etc to support the frames, partitions, make the surface good after grouting, scaffolding required if any to load/ unload the materials etc in connection to the air-conditioning works .

30 The successful contractor shall also be responsible for the safety and security of all their materials and also for ensuring fire prevention steps at all times in the working premises including their part of the work. The successful contractor has to place full time representative at site, the representative should have thorough subject knowledge.

31 The work shall be carried out without disturbing the existing occupants of other offices. Necessary barricading of the area, if required from the rest of the area shall have to be arranged by the successful contractor at no extra cost. The work is to be organized and executed so as to have least disturbance to the occupants of other offices.

32 No advance payment will be made. However, **one interim payment /adhoc payment is permitted as per payment terms (if applicable).** The bills in proper forms must be duly accompanied by detailed measurements/Quantity in support of the quantities of work done/supplied and must show deductions for all previous payments, retention money(if any) etc. The Employer after detailed scrutiny of the interim bill shall certify full payment within **10 days** of the date of receipt of interim bill from the Contractor subject to submission of documentation as required.

33 **The contractor should ensure payment of minimum wages + VDA to all laborers / workmen staff employed by him in line with central/ state labour wage act whichever higher.**

The Contractor shall at all times indemnify and keep indemnified the Employer against all losses, claims, damages or compensation including under the provisions of the payment of the Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938,Workman's Compensation Act 1923,the Maternity Benefit Act 1961,the Bombay Shops and Establishments Act 1947, Industrial Disputes Act 1947, and Contract Labour (Regulation and Abolition)Act 1970 and Employees State Insurance Act 1948, Motor Vehicles Act 1988 or any modifications thereof or under any other law relating thereto and rules made thereunder from time to time or as a consequence of any accident or injury to any workman or other person in or about the work whether in the employment of the Employer or Contractor or not, and also against all costs, charges and expenses of any suit, action or proceedings whatsoever out of such accident or injury or combination of any such claims.

34 From commencement to completion of works, the Contractor shall take full responsibility for the care of the work and for taking precautions to prevent loss or damage to the work to the maximum extent possible and shall be liable for any damage or loss that may arise to the works or any part thereof from any cause whatsoever including causes of fire, lightning, explosion, earthquake, storm, hurricane, floods, inundation, subsidence, landslides, rock slides, riots (excluding civil war, rebellion, revolution and insurrection) or any latent defect or damage and shall at his own cost repair and make good the same so that at all times the work shall be in good order and condition and in conformity in every respect with the requirements of the Contract.

For the purpose of this condition this expression "from commencement to completion of works" shall mean the period starting with the date of issue of Work Order or date of handing over of site whichever is later and ending with issue of Virtual Completion Certificate.

Without limiting the obligations and responsibilities under this condition, the Contractor shall insure and keep insured the works from commencement to completion, as aforesaid, for the full contract value including Price Variation Adjustment if any against the risk of loss or damage from any cause whatsoever including the causes enumerated in the foregoing paragraphs. In the event of there being a variation in the nature and extent of the works, the Contractor shall from time to time increase or decrease the value of the insurance correspondingly. All the premia for the insurance shall be borne and paid by the Contractor.

Before commencing the work, the Contractor shall without limiting his obligations and responsibilities under this condition, insure against any loss of life or injury to any personnel in the employment of Contractor / Sub-Contractor/nominated Sub-Contractor. For this purpose, an insurance shall be taken by the Contractor /Sub-Contractor. Such an insurance shall be taken to include both employees/workmen covered by the Workman's Compensation Act 1923, as well those employees/workmen not covered by the said Act. Separate insurance policies may be taken for employees/ workmen covered by Workman's Compensation Act 1923, and employees / workmen not covered by the said Act. All the premia shall be paid by the Contractor. Policy/Policies taken under this para for the personnel in employment with the Contractor / Sub-Contractor may be in their Employer's names of the Contractor / Sub-Contractor / nominated Sub-Contractors. In the event of any loss or injury to personnel in employment with the Contractor / Sub-Contractor / nominated Sub-Contractors, the Employer and Contractor shall recover directly from the Insurance Company and ensure that payment of the same is made to the affected parties including the Employer. The policy in original shall be deposited with the Employer.

The Contractor shall at all times indemnify and keep indemnified the Employer against all losses and claims for injuries or damage to any person or any property whatsoever which may arise out of or in consequence of the construction and maintenance of the work and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto. Before commencing the execution of the works, the Contractor shall without in any way limiting his obligations and liabilities under this condition, insure at his cost and expense against any damage or loss or injury which may be caused to any person or property including the employees and directors of the Employer and their property by or in the course of the execution of the works. Such insurance to be known as the Third Party Insurance shall be in a sum of **Rs. 1.0 lakh**. The Insurance policy to be so obtained by the Contractor shall be deposited by the Contractor with the Employer within Seven days of its issue by the Insurer.

35 The Contractor shall take all precautionary measures to ensure the safety of the workmen employed by it. The contractor shall be fully responsible for the any injury or damage caused to the workmen deployed by him at site for carrying out the work and Bank has nothing to do with such happenings and in no way shall be held responsible for the same.

36 The contractor shall maintain all registers as required by the Regional Labour Commissioner and should furnish the same to the Bank or its representative as and when required.

37 If the work is not started within **7 days** from the date of issue of work order then Employer may terminate the work order without assigning any reason. If during the execution of the work,.the progress of work is not considered to be satisfactory and is not consistence to be in contingent with the period of the completion of the work then the Bank may terminate the work order by giving a 5 days' notice to the contractor. In such case the contractor shall be liable to pay the employer any extra cost involved for the completion of the said work and will not obstruct any way in completing the work through other agency. After completion of entire work the contractor shall be paid for the actual work executed by him at the quoted rates after deducting any claims, damages.

38 The time allowed for completing the works is **45 days** to be reckoned from **7 Days** from the date of Work Order / date of handing over site whichever is later. Tenderers shall submit a programme (time schedule) for executing the entire project and shall furnish the details of their scheme indicating the proposed deployment of their machinery and resources.

39 If the Contractor fails to complete any or all the works by the date/s named in **Clause 38** (Date of Completion) or within any extended time (permitted by Bank) then the Contractor shall pay or allow the Employer the sum to be worked out at **2.0%** of contract value per week to be recovered as Liquidated Damages (and not by way of penalty) for the delay, beyond the said date or extended time, as the case may be, during which the works shall remain unfinished and such damages may be deducted from any moneys due or which may become due to the Contractor. The maximum amount of Liquidated damages shall be **10%** of contract value. The contractor shall be bound to extend validity of Insurance Cover till such period of completion as may be considered necessary at their cost.

40 The successful tenderer shall be required to execute an Agreement in the proforma attached with this tender document within **7 days** from the date of receipt of the notice of acceptance of tender. In the event of failure on the part of the successful tenderer to sign the agreement within the above stipulated period, the earnest money will be forfeited and the acceptance of the tender shall be considered as cancelled.

41 The final bill will be released on satisfactory completion of the entire work and on completion of all the terms and conditions / obligations spelt out and on proper submission of the bill together with the measurements. Final Bill settlement is within 45 days from the date of proper submission of bill & measurements.

42.At any stage i.e. during the execution of work, any kind of change required, whether it is in design or specification, the same has to be incorporated by the contractor and It shall be treated as a variation.

43. Single Power point & Water for work will be provide by bank at free of cost

44.The contractor shall not directly or indirectly sublet the work to other party without written permission of the bank.

45.The Bank reserves the right to distribute the work for which quotations have been called, among more than one parties, if found necessary. No claim in this respect shall be considered and the contractor agrees to cooperate with other agencies appointed by the Bank.

46. Bank shall not be responsible for any lose or damage to the contractor/labour due to any natural calamity during the course of construction. Contractor is liable to make good all the damages if any, till the work is completed and handed over to the Bank authorities

47 No advance payment shall be made to the contractor on supply of any material supplied at site for execution; payment shall only be made on execution and completion of any concerned/particulars item.

48 Contractor agencies are advised (before quoting the rates) to inspect the site of the proposed work. They must go through specifications and documents. Any clarification, if required, may be taken from the bank before submitting the quote.

49 The quantities mentioned in schedule are provisional and likely to increase /decrease to any extent or may be omitted thus altering the aggregate value of the contract. No claim for loss of profit/business shall be entertained on this account.

50 The contractor /vendor failed to carry out the works as per schedule/Quality, the same shall be carryout with different agencies and the actual amount will be deducted from the contractor bills.

51 Payment to the contractor shall be made as per actual work done of site.

52 The contractor agency shall keep particular vigil on his workers to maintain very good workmanship of all items, failing which no payment shall be made and no claim of material/labour used shall be made to him in any case, and the same work shall be executed by him again without charging any extra cost.

53 The Bank reserves the right to accept/reject any quotes without assigning any reasons.

54 Any work got executed in poor workmanship as pointed out by the Bank' Official will have to be dismantled and redone by the Contractor on his own cost

55 Any addition, alteration or correction in the quote shall be signed and stamped properly by the contractor

56 The Bank reserves the right to distribute the work for which quotations have been called, among more than one parties, if found necessary. No claim in this respect shall be considered and the contractor agrees to cooperate with other agencies appointed by the Bank.

57. Shop drawings shall be prepared by the contractor for approval of Bank before the commencement of the fabrication

~~58 Comprehensive Warranty: Workmanship and material warrantee for a period of 10 (Ten) years against manufacturer defect and colour variation to be provided.~~

ASSISTANT GENERAL MANAGER ,

Zonal Office, Sitapur,

Signature & Seal of the Tenderer

ARTICLES OF AGREEMENT

THIS AGREEMENT is made on this …… day of ……month of …….. between Indian Bank and having its Zonal Office, **Sitapur**(UP) (hereinafter referred to as the "Employer") which expression shall include its successor, legal heirs and assignees of the one part.

AND M/s. …….. having its office at ……
……...
(hereinafter referred to as the "Contractor") which expression shall include its successor, legal heirs and assignees of the second part.

WHEREAS the Employer has caused drawings and tender documents for ' Construction RCC Road Construction along with allied works at Zonal office **Sitapur**(UP)
AND whereas the Employer has called for tender vide ref. no. ……..……..…… dated……...… .

AND whereas the contractor has submitted the tender ref. no. ……. dated …… to the Employer on …… .

AND whereas the Employer has issued the work order ref ……. dated…….. to the contractor to do the work.

AND whereas the Contractor has agreed to execute the work as per drawings, specifications, conditions of contract and Work Order.

AND whereas the Employer has accepted the Contractor's tender as aforesaid and whereas the tender submitted by the contractor has been accepted for such sum as may be ascertained to be payable in terms of the Bill of Quantities and which sum is estimated to be Rs. …….. (Rupees ……..……..) hereinafter referred to as the said "Contract Agreement".

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:-

1) In consideration of the said Contract Sum to be paid at the times and in the manner set forth in the said Conditions the Contractor shall carry out and complete the Modular Works Stations in terms and conditions herein contained and according to the general conditions of the contract, notice inviting tender, special conditions of contract, general scope of work, technical specifications, schedule of rates and instructions to be given by and the supervision of and to the entire satisfaction of the Employer.

2) **Contract Price, Taxes and Payment Terms :**

Total contract price is Rs. ……. which is inclusive of cost of materials, equipment, installation charges and tools and tackles required for execution of the job. Above price is inclusive of all taxes & duties including excise duty, sales tax, works contract tax, income tax, octroi etc. in

respect of this contract. No claim in this respect will be entertained. Sales tax on works contract & Income tax on payments will be deducted and deposited by Employer in accordance with the sales tax law of the state and the provisions of tax deductions at source under income tax act 1961.

However, interim payment will be made as per the site measurements on Item Rate basis.

3) **Completion Period**:

Time is the essence of the Contract. The work is to be completed in all respects within45 **days** reckoned from **7th day** from the date of issue of the Work Order or handing over of site whichever is later. If the Contractor fails to complete the job within the agreed time period the Contractor will have to bear liquidated damages as per the relevant clause mentioned in the Tender Documents.

4) **Earnest Money**:

The Contractor has deposited an amount of **Rs. 22,000/- (Rupees Twenty Two Thousand only)** as earnest money by way of DD in favour of "Indian Bank " Payable at Lucknow..

5) **Inspection of Site**:

The Contractor has inspected the site before submitting his tender and has satisfied himself as to the nature of the work to be executed on the site. Any difficulties which the Contractor may come across in the course of the work shall in no way relieve the contractor to claim or receive extra payment unless the Employer is of the opinion that such difficulties could not have been foreseen and the Employer consents in writing.

6) **Supply of Material and Labour**:

The Contractor shall arrange all labour, materials, equipments, tools, tackles and everything necessary for the completion of the work. The Contractor will assume all responsibility for the safety, protection and accounting of all material and equipment and the work during construction. All materials used by the Contractor shall be of the best quality conforming to the required specification mentioned in the tender document and will be subject to the approval of the Employer. All such materials not approved by the Employer shall be removed at once by the Contractor at his own expense. The Contractor shall also at his own expense arrange for carrying out any test of materials which the Employer may from time to time require or if so desired by the employer.

7) **Defective Work / Materials**:

If any part of the work done by the Contractor is found defective in workmanship or if bad or inferior materials have been used the Contractor shall at his own risk and cost demolish all such defective work and rebuild the same and / or replace the bad or inferior materials used within a time frame mentioned to the satisfaction of the Employer. The decision of the Employer in this regard shall be final and binding on the Contractor. In case of default of the contractor to remove the defective work and rebuild the same or replace bad or inferior materials as directed by the Employer,
the Employer shall be entitled to employ anyone else to carry out the same at risk and cost of the Contractor and recover all expenses incurred in this regard from the contractor.

8) **Inspection of Work**:

During progress of the work the Employer shall be entitled at all times to have access to and inspect the work.

9) **Supervision**:

The Contractor shall provide one or more competent and technical qualified engineers duly and fully authorized to act on his behalf in all matters relating to the works to be carried out under or any other matter concerning this agreement and who shall at all times be present at the works while any work is in progress as per directions, explanations & instructions of Employer.

10) **Compliance with Statutory Regulations & Work Rules**:

The Contractor shall be responsible for complying with the applicable laws / bye laws / Regulations in force from time to time and shall have to bear all statuary liabilities to the workers / personnel engaged for the job. Nothing will be paid extra in this regard. If any amount is paid by the Employer with this regard the same amount shall be deducted from the Contractor's dues. The Contractor shall have to arrange insurance cover for the workers / personnel engaged by him for the job and materials & works supplied/carried out at site/work place. Also to be adhered as per Tender Clause No.33,34,35&36 of **General Rules And Instruction For The Guidance of Tenderers**

11) **Termination of Contract**:

In the event of Contractor failing to keep / adhere to agreed schedule of work, or in the event of the Contractor failing to comply with the provisions of this contract by default and / or negligence and / or suspension of work or in the event of Contractor failing to complete the work within the stipulated period, the Employer may terminate this Agreement forthwith and employ, at the Contractor's risk and cost, another contractor or sufficient number of workmen to complete the work.

12) **Force Majeure**:

This clause will be operative only if the work is delayed by

a) Acts of God
b) Earthquake or floods or similar natural calamities.
c) Serious loss or damage by fire or lightning.

In case any Force Majeure condition herein mentioned occurs and continues for a period exceeding 15 days the parties hereto undertake to sit together and devise ways for expeditious and proper performance of the obligations of the parties under this order.

13) **Arbitration**:

" In the event of any dispute or difference relating to interpretation and application of provisions of the contract and all disputes/ claims whatsoever which shall either during the continuance of the contract or afterwards either between the parties to the contract or the respective representatives touching the construction/ application of any provision/ clause mentioned in the contract or any account or liability between the parties to the contract or as to any act or deed or omission of any party to the contract, in any way relating to these presents, shall be first at the discretion of the Bank attempted to be resolved in good faith by mutual discussion within 30 days of the dispute or question being raised failing which the same shall be settled by arbitration in accordance with provisions of Indian arbitration and Conciliation act 1996.

The Parties concerned shall designate an arbitrator on mutual consent/ consensus. The venue of the arbitration shall be exclusively at Lucknow and any award passed by arbitrator shall be final, conclusive and binding upon the parties and shall be deemed to have been made between parties themselves. The parties to the dispute shall share equally the cost of arbitration as intimated by the arbitrator".

Submitting to arbitration may be considered as an additional remedy and it does not preclude the right of the bank to seek other redressal/ Other Recourse.

14) The Bank and the Contractor agree that this agreement is entered in to on Principal to Principal basis. Nothing contained in this agreement shall be construed to create any association, Joint venture or Partnership or Relationship of Principal and Agent or Master and Servant or Employer and Employee between the Bank and the contractor. The parties to the agreement shall be deemed to be independent entity and employees of wither of the parties shall not deemed to the employees of the other. Neither party shall have authority to bind other except to the extant authorized herein.

IN WITNESS whereof the said contracting parties have set their hands and seals on the day and year first hereinabove witness.

Witness Address Employer

Witness Address Contractor

GENERAL TECHNICAL SPECIFICATIONS FOR CIVIL, SANITARY, ETC. WORK (AS APPLICABLE to SPECIFIED WORKS)

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SECTION – A : MATERIALS AND LIST OF APPROVED MATERIALS BRAND *AND/OR* MANUFACTURE.

SECTION – B : EARTHWORK

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SECTION – D : BRICK MASONRY

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SECTION - A : MATERIALS

1. Materials shall be of approved quality. A list of materials of approved brand and manufacture is indicated in the list of materials of Approved Brand manufacture. The list is given to ensure the standard of quality and performance.

2. Contractors shall obtain approval of representative of Employer/Consultant on sample of all materials before placing order and the approved sample shall be carefully preserved in an appropriate manner at the site office for verification by the representative of Employer/Consultant.

3. For standard bought out items, the sizes manufactured by the firms listed shall prevail in case of discrepancy with the sizes mentioned in the schedule without any financial adjustment.

4. Materials shall be tested at site/any approved Testing Laboratory. The Laboratory Test Certificate in original shall be submitted to the representative of Employer/Consultant. Test results are also to be recorded at site registers appropriately.

5. Wherever work as per manufacturer's specification is indicated, it will be obligatory on the part of the contractor to submit manufacturers specification to Consultant/Employer. The Quoted rates shall be deemed to include for the complete work specified by the manufacturer even though not specifically mentioned in *the* schedule of items. Moreover, the quoted rates shall be deemed to include for the complete work specified by the manufacturer even though not specifically mentioned in the schedule of items.

6. It shall be obligatory for the contractor to furnish certificates, if demanded by the representative of Employer/Consultant, from manufacturer or the material supplier, stating that the work has been carried out by using their material.

7. All materials supplied by the representative of Employer/Consultant/any other specialist firm shall he properly stored and the Contractor shall be responsible for its safe custody until they are required on the works and till the completion of work.

8. All equipment and facilities for carrying out field tests on materials shall be provided by the Contractor without any extra cost.

9. Unless otherwise shown on the Drawings or mentioned in *the* "Schedule of Quantities" or anywhere in the contract, the quality of materials, workmanship, dimensions etc shall be as specified hereunder.

9.1 Material for filling

Shall be selected material as specified for filling and shall be free from building rubbish or organic decomposed material. They shall be obtained either from excavation or brought from outside, as specified, in the schedule of items.

9.2 Cement

Cement unless otherwise specified of grade 43, conforming to IS. *455/IS* and grade 53

conforming to IS: 12269 shall be used. The use of cement other than ordinary Portland cement/Blast furnace slag cement will not be allowed unless specifically advised by representative of Employer/Consultant. Cement shall be stored in dry weatherproof go-down/shed built by the contractor at his own cost in order to prevent deterioration by dampness or intrusion of foreign matter. Not more than 10 bags should be kept in one stack and it shall be stored in such a manner as to permit easy access for proper inspection. It shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt i. e., first received being first used. Cement deteriorated and/or clodded shall not be used on work but shall be removed at once from the site at Contractors cost.

Daily record of cement received and consumed shall be maintained by the Contractor in the cement register at site and submitted to representative of Employer/Consultant if called for. Theoretical consumption of cement for different materials brought at site by the Contractor shall also be submitted with proper documents with every bill for verification The consumption of cement for different items of work shall be as given in the tender and in its absence as per C. P. W. D. schedule. Consumption of cement in the corresponding items of work under the contract shall be computed on the basis of the quantities shown in the table subject to a variation of plus/minus three percent. The weight of 1 cum. of cement shall be taken as 1440 kg. Cement stored for more than three months shall be got tested before using it in work.

9.3 **Lime**

Lime shall be made from approved Lime Stone or Kankar and properly burnt and shall be of appropriate class for specific work given in IS: 712-1984. It shall be free from excess of unburnt kankar or lime stone ashes or other extraneous materials and shall be stored to prevent damage by rain, moisture or air slaking. Lime Shall be used within 14 days from the date of stacking and damaged lime shall not be used but shall be removed from *the* site of work forthwith at contractors cost.

9.4 **Fine Aggregate**

Shall be from natural source, chemically inert, clean, sharp, hard, durable and well graded and free from deleterious materials not exceeding the permissible limit as per IS : 383-1970. The Silt Content shall be within 8%. If it is in excess, washing shall be done in an approved manner to bring it within allowable limit. The fine aggregate for concrete shall be graded and the Fineness Modulus shall be between 2.60 to 3.20. The Fineness Modulus of fine aggregate shall be between1.80 to 2.60 for plaster & masonry work.

The fine aggregate shall be stacked carefully on a clean and dry surface so that it will mixed up with deleterious foreign materials. If such a Surface is not available, thick floor or a thin layer of lean concrete shall be prepared. The percentage of Materials shall be within the permissible limits as specified in IS 383-1970.

9.5 COURSE AGGREGATE

It shall consist of crushed or broken stone 95% which shall be retained on 4.75
Mm IS test Sieve. It shall be obtained from crushing Granite, Trap, Basalt or
Similar approved stones. Coarse aggregate shall be chemically inert when
Mixed with cement and shall be roughly cubical in shape and free from soft friable, thin, laminated or Flaky pieces. Maximum percentage of deleterious materials shall not exceed those specified

in IS 383-1970. The coarse aggregate used in the w*ork* shall conform to the grading as limits specified in IS: 383-1970. It shall be washed if so desired by the Employer *I A*rchitects. Aggregates shall be Stored on platforms or otherwise so as to avoid inclusion of foreign materials. It shall be thoroughly wetted before *being* charged into tile hopper of the concrete mixer.

9.6 Reinforcement

High Strength Deformed Bars

Unless specified otherwise, high strength deformed bars shall conform to IS:1786-1985 of grade Fe 415 and obtained from approved manufacturer.

Where mild steel bars are *specified* they shall conform to IS - 432 Part-I and shall be obtained from approved manufacturer.
Contractor shall get steel reinforcement tested at his cost as and when required and directed by the Employer/Architects/Consultants.

9.7 Bricks

The bricks shall be locally available kiln burnt bricks of generally regular and uniform size, shape and colour, uniformly well burnt throughout but not over burnt. They shall be free from cracks or other flaws.

They shall show a fine grained, uniform, homogeneous and dense texture on fracture and be free from lumps of lime, laminations, cracks, air-holes, soluble salts causing efflorescence or other defects which *may* in *any* way impair their strength, durability, appearance, usefulness for the purpose intended.
The size of brick shall be nominally 250 mm x 125 mm x 75 mm or 230 mm x 115 mm x 65 mm with a tolerance on dimension of ± 8%.

After Immersion in water, absorption by weight shall not exceed 20 percent of the dry weight of the brick when tested according to I. S. 1077-1970. The bricks shall have minimum average compressive strengths as specified nomenclature of the items. The compressive strength of any individual bricks on testing shall not fall below the average compressive strength by more than 20 (twenty percent). The rating of efflorescence of bricks shall not be more than 'Moderate'.

The Bricks to be used for the work shall be approved by the representative of Employer/ Consultant beforehand.

9.8 Water

Water for mixing Cement/Lime mortar of concrete shall not be salty or brackish and shall be clean, reasonably clear and free from injurious quantities of deleterious materials. It shall not contain any sugar or excess of oils, acid and injurious alkali, salts, organic matter which will either weaken the mortar or concrete or cause efflorescence or attack the steel in reinforced cement concrete. Water shall be obtained from source approved by the representative of Employer/Consultant. Potable water is generally considered satisfactory for mixing and curing concrete, mortar, masonry etc. Water shall be tested once before undertaking the construction work in an approved testing laboratory to establish *its suitability.* All charges connected therewith shall be borne by the Contractor. The pH value of water shall generally be not less than 6.

The permissible values of NaOH, H2 $S0_4$ and other organic and inorganic solids should be as per IS:456 and tile tests should be in accordance with IS : 3025.

9.9 Timber

Timber for carpentry/joinery works of all description shall be as specified as in schedule and seasoned, naturally or artificially as indicated therein. These shall be free from knot, shakes, fissures, flaws, sub-cracks and other defects to a reasonable extent. Representative of Employer/Consultant's decisions in this regard is final and binding. The moisture content for timber normally should not exceed the following limits :-

I) Timber for frames 14%

II) Timber for planking/ shutters etc. 12%

Tolerance up to maximum 5% on above is permissible.

In measuring cross-sectional dimensions of timber for the frames/shutters styles, rails or panel members, tolerance up to 1.5 mm shall be allowed for each planed surface.

9.10 Steel Windows, Doors & Ventilators

Steel windows and doors shall be fabricated out of approved steel sections. They shall be obtained from approved manufacturers. Unless otherwise stated the Indian Standard Specifications applicable for steel doors, Windows and ventilations shall be IS:1038. Wherever rolled steel sections are used the section should however conform to I.S. 226 and I.S. 1977 latest addition, and steel should be of weldable quality.

9.11 Ceramic Tiles

White or colored ceramic glazed/unglazed tiles shall be obtained from approved manufacturer and shall be flat and true to shape. They shall be free from cracks. *crazing,* spots, chipped edges *and* corners. The glazing and colour *shall* be of *uniform* shade. Tolerance in dimension shall be ± 1.0 mm in sizes and ± 0..5 mm in thickness The rear face shall be grooved and recessed in parts to provide the necessary key for mortar. They shall *generally* conform to I.S. 777.

9.12 Kota/Cudappah Stone

Sabs shall be of selected quality, hard, sound, dense and homogenous in texture, free from cracks, decay, weathering and flaws. They shall be hand/machine cut to the specified thickness and of approved quality and size shall be uniform in colour with straight edges. The tolerance in thickness shall be ± 2 mm. Before starting the work, the contractor shall get the samples approved from Employer/Consultant.

9.13 Marble Slabs

Marble shall conform to the following characteristics :-

Moisture absorption after 24 hours immersion
: Max. 0.4% by weight tested as per I.S.1124.

Hardness : Min. 3 on Mhos scaler

Specific Gravity : Min. 2.5 tested as per I.S. 1122.

The thickness shall be as specified with a tolerance +/- 2 mm.

9 .14 Glazing

Glass used for glazing shall be sheet glass/float glass as specified, clear or obscured as directed by the Employer/Consultant of approved quality free from flaws, specks *bubbles.*

9.15 C. I. Rain Water Pipes

All C. I. pipes and fittings shall be of approved manufacturer free from cracks, chipped edges *or corners* and other damages. The pipes shall be IS stamped and shall conform I.S. 3989.

9.16 Collapsible Gates

These shall be of approved manufacturer and fabricated from MS sections consisting of vertical double channels each 18 x 9 x 3 mm at 100 mm *c/s* braced with flat iron diagonals 18 x 5 mm and top and bottom rails of either T's or E's with minimum web of 40 x 12 mm and flange *40* x 6 mm. The roller wheels shall be of grey iron castings and rivets shall be snap headed and not less than 6 mm dia.

The gates shall be provided with necessary bolts and nuts, loading arrangements, stoppers, handles etc. even if not specified.

9. 17 Rolling *Shutter*

Rolling shutter shall be of approved manufacturer as described in the schedule of quantities and fabricated from M.S. laths in single pieces, machine rolled and straightened with an effective bridge depth and shall be interlocked together throughout their entire length and joined at the end with end locks. These shall be mounted on specially designed pipe shaft. *The* springs shall be preferably coiled type manufactured from high tensile spring steel wire or strip of adequate strength to balance shutter at all positions. The spring pipe shaft shall be supported on MS brackets and covered with MS sections as that of lath. The guide channels shall be of MS deep channel pressed/rolled sections. The gap between legs should be just sufficient to allow free movement of shutter without making any rattling sound. The guide channels shall be provided with minimum three fixing cleats or supports with as pacing not exceeding 750 mm for *fixing* to *walls/columns* etc. with bolts/screws.

9.18 Marble Mosaic Tiles

Tiles shall conform to IS:1237-1959. They shall be of sizes as specified with tolerances of *(+/-)* 1 mm in length and breadth. The tolerance on thickness shall be 0, +3 mm & + 5 mm for 20 mm, 25 mm & 30 mm. tiles respectively. The tiles shall be manufactured with hydraulic pressure of not less than 140 kg/sq.cm.

9.19 Paints

Dry distemper, oil bound distemper, cement primer, oil paint, enamel paint, flat oil paint, plastic emulsion paint, anti-corrosive primer, red lead, yellow zinc chromate, water-proof cement paint shall be from an approved manufacturer as listed. Ready mixed paints received from the manufacturer without any admixture shall be used, except for addition of thinner, if recommended by the manufacturer.

9.20 Cement Admixtures

Cement admixtures are to be obtained from approved manufacturer with the explicit approval of the representative of Employer/Consultant. The use of admixture containing Calcium Chloride, Fluorides, Nitrates and Sulphates is prohibited The representative of Employer/Consultant's decision as regards use of admixtures is final and binding.

9.21 Hardware Fittings

The Hardware Fittings, Ferrous or Non-ferrous shall be obtained from approved manufacturer and IS stamped if available. The MS / Iron fitting are to be oxidized and Aluminum fittings anodized in natural colour mat satin finish, even though not specified in the schedule of quantities. The sample for fittings shall be submitted to the Employer/Architects for their approval.

9.22 Mortars

Cement mortar shall be of proportions specified for each type of work in the schedule. It shall be composed *at* cement *and sand. The* ingredients shall be accurately gauged by measure and shall be well and evenly mixed together, care being taken not to add more water than is required. No mortar that has begun to set shall be used.

If hand mixing is done in lieu of mechanical mixture, then it shall be done on pucca water-proof platform. The gauged materials shall be put on the platform and mixed dry. *Water* will then be added and the whole mixed again until it is homogeneous and of uniform colour. The contractor shall use 10% extra cement for hand mixing for which no extra payment will be made.

9.23 Aluminum doors & windows

Shall be obtained from approved manufacturer. All sections used shall be 'INDAL'. Thickness of anodic coating to aluminum members shall not be less than 15 micron.

9.24 Polysulphide Sealant

Polysulphide sealant if specified in the schedule of quantities should be obtained from approved manufacturers.

10,0 Codes

Wherever reference to codes is made, they shall mean the latest version of the particular IS Code under reference.

LIST OF MATERIALS 0F APPROVED BRAND AND / OR MANUFACTURE

CEMENT	*Grade* 43 & 53 OP or Slag cement of ACC Ultratech/CENTURY/LAFARGE/AMBUJA/BIRLA.
WHITE CEMENT	JK & BIRLA.
STEEL	TISCO, SAIL, RINL or any ISI approved manufacturer
CERAMIC TILES	
I) UNGLAZED	KAJARIA Jhonson, NITCO, Regency, Somani.
1I) GLAZED	First Quality of . i) H & R Johnson II) Somani iii) Cera iv) Decora

WATERPROOFING COMPOUND : ROFFE, PIDILITE, SIKA QUALCRETE, CICO OF approved grade

RED OXIDE ZINC CHROMATE : Shalimar, Asian Paints, Jenson and Nicholson.

WATERPROOF CIMENT PAINT : SNOECEM PLUS OR SIMILAR APPROVATE BRAND.

GLAZING : Modifloat and Ashifloat.

SHEET GLASS : Indo Ashal, Tribeni & Shreevallabh

SYNTHETIC ENAMEL PAINT : DULUX (ICI), LUXOL (BERGER)

ACRYLIC Emulsion : ICI, BERGER, JOHNSON &NICHOLKSON, ASIAN

FLUSH DOOR : GREEN PLY, CENT URI, Greenlam, kitply

HARDWERE FITTINGS

I) FERROUS : MOWJEE AND EARL BIHARI

ii) NON-FERROUS : EARL BIHARI, METACO & ARGENT ISI Marked

COLLAPSIBLE GA TE : & ROLLING SHUTTER ANY ISI APPROVED MANUFACTURER.

ALUMINIUM Work : ANY ISI APPROVED MANUFACTURER

WATERPROOFING TREATMENT : SIKA / PEDILITE / CHOKSHI , Dr.Fixit

TILE FIXING ADHESIVE : ROFFE & PIDILITE, Dr.Fixit

HDPE PIPES : EVEREST GIPS OR EQUIVALENT

MS CONDUITS : NIC, BEC OR EQUIVALENT ISI MARKED

RIGID PVC CONDUIT : BEC, PLAZA AKG KALINGA

SECTION - B

EARTHWORK

1.0 GENERAL

The excavation will generally refer to open excavation of foundation area wet or dry in all sorts of soils at any depth, unless otherwise specified except hard rocks for which separate provisions are made.

2.0 EXAMINE THE SITE

The contractor shall visit and ascertain the nature of the ground to be excavated and the work to be done and shall accept all responsibility for the cost of the work involved.

3.0 SETTING OUT

The contractor shall clear the entire site by cutting/uprooting jungles, bushes, grass, vegetation growth and trees and generally level the site and set out the centre line of the Building or other involved works and get the same approved frorn representative of Employer/Consultant. It shall be the responsibility of the contractor to install substantial reference marks; bench marks etc. and maintain them as long as required by the representative of *Employer/Consultant.* The contractor shall assume full responsibility for proper setting out, alignment, elevation and dimension of each and all part of the works.

4. 0 GROUND LEVEL AND SITE LEVEL

Before starting the excavation the existing ground level of the entire plot shall be taken by the contractor in consultation with the representative of Employer/Consultant and a proper record of these levels kept, which shall be jointly signed *by* the contractor and the representative of Employer/Consultant.

5.0 EXCAVATION AND PREPARATION OF FOUNDATION FOR CONCRETE OTHER THAN HARD ROCK

Excavation shall include removal of all material of whatever nature including moored, soft rock, boulders, old foundations, concrete, asphalt or paved surfaces etc. at all depths and whether wet or dry necessary for the construction of foundation and sub-structure including mass excavation for underground reservoir, chess pits, septic tanks etc. where applicable, exactly in accordance with lines, levels, grades and curves shown in the drawings or as directed by the representative of Employer/Consultant. The bottoms of excavation shall be leveled both longitudinally and transversely or as directed by the representative of Employer/Consultant. Should *the* contractors excavate to a greater depth or width than shown on the drawings or as directed by the representative of Employer/Consultant, he shall at his own expenses fill the extra depth or *width* in cement concrete in proportion as directed by the representative of Employer/Consultant but in no case with concrete of thin linear than 1:5:10 cement concrete.

The contractor shall report to the representative of Employer/Consultant when they are ready to receive concrete. No concrete shall be placed in foundations until the contractor has obtained representative of Employer/Consultant approval. In case excavation is done through different strata of soil and if the same is payable as per provision in the Schedule of Quantities the contractor shall set the dimensions or the strata decided by the representative of Employer/Consultant for payment. If no specific provisions is made in the schedule of quantities, it will be presumed that excavation shall be in all types of strata except hard rock and the contractor's rate shall cover for the same, which are treated as a single entity.

After the excavation is passed by the representative of Employment/consultant and before having

the concrete, the contractor shall get the depth and dimensions of excavations, levels, nature of strata as applicable as per schedule of quantities and measurements recorded from the representative of Employer and Consultant.

5.1 Shoring

The sides of the excavations, if required, should be protected by shoring in such a *way* as is necessary to secure them from falling in, and the shoring shall be maintained in position as long as necessary. The Contractor shall be responsible for the proper design of the shoring to hold the sides of the excavation in position and ensure safety of persons and properties etc. The shoring shall be removed as directed after the items for which it is required are completed. No extra payment will be made for shoring.

5.2 Protection

If instructed by the representative of Employer/Consultant all foundation pits, and similar excavations shall be strongly fenced and marked with red lights at night to avoid accidents. Adequate protective *measures* shall be taken to see that the excavation does not affect or damage adjoining structures. All measures required for the safety of the excavations, the people working in and near the foundation trenches and people in vicinity shall be taken by the contractor at his own cost.
The contractor will be entirely responsible for any injury or damage to property caused by his negligence of accident due to his constructional operations.

5.3 Stacking of Excavated Materials

All materials excavated will remain the property of the employer. The excavated materials at the first instance shall be sorted as directed by representative of Employer/Consultant and stacked appropriately by the sides of trenches as directed by the representative of Employer/Consultant before they are disposed off and leveled within the site at locations directed by the representative of Employer/Consultant. Materials suitable and useful for back filling, plinth filling or leveling of the plot or other use shall be stacked in convenient places in such a way so as not to obstruct free movement of men, animals and vehicles or encroach on the area required for constructional purposes. The cost on account of sorting out useful materials/disposal within the site and removal or spoils etc outside in conformity with Local Municipal Rules will not be additionally paid for.

5.4 Back Filling / Plinth Filling

All shoring and form work shall be removed after their necessity ceases and trash of any sorts shall be cleaned out from the excavation. All space between foundation masonry or *concrete* and the sides of excavation shall be refilled to *the original* surface with approved excavated materials in layers 15 cm in thickness watered and rammed with iron and wooden rammers weighing 7-8 kg. with a base of 20 cm square or 20 cm diameter. The filling shall be done after concrete or masonry is fully set and done in such a way as not to cause undue thrust on any part of the structure. Where suitable excavated materials are to be used for refilling, it shall be brought from the space where it is temporarily stacked and used in refilling. When sand filling is done, it shall be consolidated by flooding with water. No excavation of foundations shall be filled in or covered up until all measurements at excavations, masonry concrete and other works below ground level jointly recorded. Black cotton soil shall not be used for back filling or in plinth filling.

5.5) Dewatering

Rate for excavation shall include bailing or pumping out water which may accumulate in the excavation during the progress of work either from seepage, springs, rain or any other cause and *diverting* surface flow if any by bends or other means. Pumping out water shall be done in such approved manner as to preclude the possibility of any damage to the foundation trench, concrete or masonry or any adjacent structure. When water is set in foundation trenches or in tank excavations, pumping out water shall be from auxiliary pit of adequate size dug slightly outside the excavation. The depth of auxiliary pit shall be more than the working foundation trench levels. The auxiliary pit shall be refilled with approved excavated materials after the dewatering is over.

The excavation shall be kept from water:
During inspection and measurement.
When concrete and/or masonry wall are in progress and till they come above the natural water level, and Till the representative of' Employer/Consultant consider that the concrete mortar is sufficiently set.

5.6) Surplus Excavation Materials

All materials and spoils certified as surplus and not useful, shall be removed by the Contractor from the site in an approved manner at locations to be arranged by him in conformity with local regulations. The quantity to be disposed of shall be got pre-approved by Employer / Consultant.

The item of removal of surplus excavated materials shall only be undertaken by the Contractor only when specific instruction in this regard has been obtained from the representative of Employer/Consultant. The rate or the item will be mutually decided when such removal is advised.

6.0 Method of Measurement

6.1 Excavation

Excavation shall be measured in cum. As per drawing, the length and width being governed by the maximum dimensions of soling/bed concrete/structure concrete as in drawing and depth considered as the difference between average foundation level in a pit and average of pre-construction level there at. No extra measurements will be allowed for excavation for formwork, shoring, and working spaces or cut stability. No extra will be entertained for cost of dewatering and keeping trenches dry, protective shoring, if any needed. No Increase in bulk after cutting will be entertained. No deduction will be made for volume of pile heads, tree trunks or other masonry structures nor any extra on account of above is payable.

6.2 Filling

Plinth filling shall be measured as net consolidated volume in cum as per drawing.

SECTION - C

1.0 PLAIN AND REINFORCED CEMENT CONCRETE

All concrete work shall be carried out by the contractor under the supervision of a concrete foreman sufficiently experienced in this type of work.

Ingredients to be used in concrete and Reinforced concrete work :

Ingredients to be used in concrete should conform to the specifications as indicated under

"Technical Specifications for Materials" given earlier.
As regards admixture, this shall be used with prior approval of representative of Employer/Consultant.

1.1 **Mix Proportion.**

The mix proportions shall be selected to ensure that the workability of the fresh concrete is suitable for the conditions of handling and placing so that after compaction it surrounds all reinforcements *and* completely fills the form work.

The determinations of the proportions of cement, aggregates and water to attain the required strength & workability shall be made as follows :

a) By designing the concrete mix such concrete shall be called "Design Mix Concrete" and *will* be permitted for use when complete quality control is ensured through use of weigh-batches, equipped field laboratory, approved transportation method and skilled technician.

b) By adopting nominal concrete mix, such concrete shall called "Nominal Mix Concrete". *The minimum cement content for nominal mix concrete shall be as under :*

Grade of Concrete	C**ement/cum. of concrete (in kg)**
M 20	400
M 15	317
1:3:6	235
1:4:8	180

1. 2 **Design Mix Concrete:**

The mix shall be designed to produce the grade of concrete having the required workability and a characteristic strength not less than values given in table Ä". The procedure given in Indian standard should be preferred for the design but other Standard methods may also be followed. As long as quality of material does not change a mix design done earlier may be considered adequate for later work.
When mix is designed, the records shall be maintained in the format annexed.

TABLE A-GRADES OF CONCRETE

GRADE OF CONCRETE	SPECIFIED CHARACTERISTIC COMPRESSIVE STRENGTH	
	AT 7 DAYS N/SQ.MM	AT 28 DAYS N/SQ.MM
M10	7.0	10
M15	10.0	15
M20	13.5	20
M25	17.0	25
M30	20.0	30
M35	23.5	35
M40	27.0	40

1.3 Nominal Mix CONCRETE

Nominal mix concrete may be used for concrete of grades M5, M7. 5, M10, M15 and M20. The proportion of materials for nominal mix concrete shall be in accordance with Table “B”. However strength requirement is to be pre- established before resorting to mass work The proportions of fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregate becomes finer and the maximum size of coarse aggregate becomes larger. Graded coarse aggregates shall be used.

The cement content In the mix specified 'B' for any nominal mix to be proportionately increased if the quantity of water in a mix has to be increased to overcome *the* difficulties of placement and compaction, so that the *water* cement ratio is specified is not changed. In the case of vibrated concrete, the limit specified may be suitably reduced to avoid segregation.

The quantity of water used in reinforced concrete work should be the quantity of water used in reinforced concrete work should be sufficient but not more than sufficient to produce dense concrete of adequate workability for its purpose which property grip all the reinforcement. Workability of concrete should be controlled by maintaining a water content that is found to give a concrete which is sufficiently wet to be placed and compacted without difficulty with the means available.

TABLE B - PROPORTIONS FOR NOMINAL MIX CONCRETE

GRADE OF CONCRETE	TOTAL QUANTITY OF DRY AGGREGATE BY MASS PER 50 KGS OF CEMENT TO BE TAKEN AS THE SUM OF THE INDIVIDUAL MASSES OF FINE AND COURSES AGGREGATE (MAXIMUM)	PROPORTION OF FINE AGGREGATE TO COURSE AGGREGATE	QUANTITY OF WATER PER 50 KGS OF CEMENT (MAXIMUM)
	KG	BY MASS	LITRE
M5 M7.5 M10 M15 M25	800 625 480 350 250	GENERALLY 1:2 BUT SUBJECTED TO AN UPPER LIMIT OF 1:1 ½ AND A LOWER LIMIT OF 1:2 ½	60 45 34 32 30

2.0 PRODUCTION AND CONTROL OF CONCERTE

In proportioning Concrete the quantity of both Cement, Coarse/Fine Aggregate and water should be determined by weight in case of design mix or volume in case on nominal mix. Where weight of cement is determined on the basis of mass of cement per bag, a reasonable number *of bags* should be weighed periodically to check the net mass. Where the cement is weighed on the site and not in bags it should be weighed separately from the aggregates. Water should be either measured by volume in calibrated tanks or weighed. Any solid admixture that may be added may be measured by mass, liquid and paste admixture may be measured by volume or by mass. Batching plant when used should conform to IS: 4925. All measuring equipments should be maintained in a clean serviceable condition and their accuracy periodically checked.

Except where it can be shown to the satisfaction of the representative of Employer/Consultant

that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in night proportions, as required, the different sizes being stacked in separate Stock-piles. The grading of coarse *and* fine aggregate should be checked as frequently as possible to ensure that the specified grading is being maintained. No change In proportions of substitutions In materials shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

2.1 Mixing

Concrete shall be mixed in a standard mechanical mixer. The mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. If there is segregation after unloading from the mixer the concrete should be remixed. The mixing time may be *1-1/2* to 2 minutes generally. In exceptional circumstances such as mechanical breakdown of mixer, work in remote areas or when the quantity of concrete work *is* very small, hand mixing may be permitted subject to adding 10% extra cement for which no extra payment will be made to the contractor. When hand mixing is permitted it shall be carried out on a water tight platform and concrete is uniform in colour and consistency.

Workability of concrete should be controlled by direct measurement of water content and it should be checked at frequent intervals. For Nominal Mix workability measured by slump test may have values given in table “C”.

TABLE 'C'

Sl. No. Type of work	When vibrated	When not vibrated
1. Mass concrete in RCC foundation footings, retaining walls and pavement	2.5 cm (1”)	5 cm (2”)
2. Beams, slabs, columns	2.5 cms to 5 cms	5 cms to 10 cms
With sample reinforcement	(1” to 2”)	(2” to 4”)
3.Thin sections with congested reinforcement	5 cms to 10 cms (2”to 4”)	10 cms to 15 cms (4”to 6”)

Note: Should conditions governing slump and workability change pointing to advisability of an increased slump, this shall only be done by decreasing the amount of aggregate and not by increasing the amount of water.

2.2 Transportation

The method of transportation shall be got pre-approved from Consultant/Employer. Concrete shall be transported from the mixer to the formwork as rapidly as possible by methods, which will prevent the segregation or loss of any of the ingredients and maintaining the required workability. In no case, more than 30 minutes shall elapse between mixing and consolidation in its position.

During hot and cold weather, concrete shaft be transported by deep containers. Other suitable methods to reduce the loss of water by evaporation in hot weather and heat loss in cold weather may also be adopted.

For buildings with height more than 18.0 Meter, transportation of concrete by suitable and pre-approved mechanical devices is essential.

2.3 Placing

The concrete shall be deposited as neatly as practicable in its final position to avoid rehandling. The concrete shall be placed and compacted before setting commences and should not be subsequently disturbed. Methods of placing should be such as to preclude segregation. Care should be taken to avoid displacement of reinforcement or movement of form work. Concrete shall not be dropped into position from a height greater than 2.0 m

2.4 Compaction

Concrete should be thoroughly compacted and fully worked around the reinforcement, embedded fixtures and into corners of the formwork. Mechanical vibrators should generally be used. Over-vibration or vibration of very wet mixes is harmful and should be avoided. Under-vibration is also harmful.

Whenever vibration is to be applied externally the design of form work and the disposition of vibrators should receive special consideration to ensure efficient compaction and to avoid surface blemishes.

Beams and columns shall be vibrated using immersion vibrators. Thin sections like walls of water tanks, chajjas, and aprons etc. should be vibrated preferably using surface vibrators. It is better to vibrate in smaller intervals for short period of time, rather than at wider intervals for longer periods of time. The vibrator shall be used only to aid compaction and not to push concrete laterally in the forms.

3.0 CONSTRUCTION JOINTS

Concreting shall be carried out continuously up to construction joints, the position and arrangement of which should be indicated by the designer.

The locations of construction *joints* shall *preferably* be kept parallel *to* the principal reinforcements. Where it is unavoidable, and is at right angles to the principal reinforcement, it shall be kept at approx. 1/3rd to 1/4th of the span. All joints shall be *vertically* formed with proper wooden stop boards.

When work is to be resumed on a surface, which has hardened, such surface shall be roughened. It shall then be swept clean and thoroughly wetted. For vertical joints neat cement slurry shall be applied on the surface before it is dry. For horizontal joints the surface shall be c*overed 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 concrete mix. This layer of cement slurry or mortar shall be freshly mixed and applied immediately before placing of concrete.

Where concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to *avoid* dislodgement of particles of aggregate. The surface shall be thoroughly wetted and all free water removed. The surface

shall then be coated with neat cement slurry. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be well rammed against old work, particular attention being paid to close pots. Work therefore shall proceed in the normal way.

2.

4.0 CURING

Unless otherwise specified all exposed surfaces of concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer or sacking canvas or similar materials and kept constantly well at least 7 days from the date of placing of concrete. Mere sprinkling of water on vertical surfaces shall not be allowed. The rate of RCC/plain concrete work shall include cost of curing.

Approved curing compounds may be used at no additional cost to the owner in lieu of moist curing with the permission of the representative of Employer/Consultant. Such compounds shall be applied to *all* exposed surfaces of the concrete as soon as possible after the concrete has set.

5.0 FACIUTIES FOR PREPARATION AND TESTING OF CONCRETE AT SITE

In order to exercise the required degree of constant control over the concrete materials and its preparation the contractor is expected to set up and maintain at his own expense a Testing Laboratory at Site equipped with at least *the* following equipments :-

i) *Compression* Testing machine of capacity 80t/100t;
ii) A set of standard sieves;
iii) Measuring cylinders, adequate number of cube and *cylinder* moulds and slumps cones:
iv) Weighing balance,
v) Vicat apparatus;
vi) Curing tanks for Cubes.

5.1 Sampling, Testing and Acceptance of Concrete

Samples from fresh concrete shall be taken and cubes shall be made, cured and tested at 28 days in accordance with IS 516.

Tests shall be conducted for compressive strength on 15 cm x 15 cm x 15 cm Cubes of Concrete. Companion Specimens shall be cast from a single batch of concrete and shall be of the same age at the time of testing. In order to get a relatively quicker idea of the quality of concrete, additional tests of compressive strength tests at 7 days shall be carried out in addition to 28 days compressive strength tests. In all cases, 28 days compressive strength specified in Table 'A' shall alone be the criterion for acceptance or rejection of the concrete.

5.2 Frequency of Sampling

The frequency of sampling shall be as indicated in the list of mandatory tests.
Works test cubes shall represent quality of concrete incorporated in the work and taken out in sets of 6 cubes. The concrete for preparation of one set of 6 cubes shall be taken from one batch of mixed concrete discharged from mixer. The cubes shall be moulded in accordance with IS Code of practice. Out of 6 cubes, 3 cubes shall be tested at an age of 7 days. In case of testing in an approved laboratory the contractor shall arrange to transport the cubes from site to the

laboratory and forward the test results to the representative of Employer/Consultant. The contractor shall bear all expenses in connection with the preparation of test cubes, cost of concrete, labour and transportation charges to the approved laboratory etc. including laboratory testing charges and his rate for concrete item shall be quoted accordingly.

The Specimens shall be tested as per IS : 516. The samples may be tested at site laboratory generally but should be tested in any other Government Test House or approved laboratory whenever asked for by the representative of Employer/Consultant for which no additional payment shall be made.

The work's concrete cubes shall be deemed to comply with the strength requirements if, the individual variation is not more than +/- 15% of the average test strength of three specimens. For mix design, however, acceptance criterion will be decided based on "Standard Deviation" as per IS : 456.

5.3 Concreting under special condition

The specifications and references given in IS: 456 for concrete in extreme weather condition should be adhered to.

6. 0 DEFECTIVE OR POOR CONCRETE : PROCEOURE FOR DEALING WITH

Concrete, which does not meet the strength requirement, shall be dealt with as under at the discretion of the representative of Employer/Consultant:

I) The structural adequacy *of* the parts affected shall be investigated and any consequential action as needed shall be taken. Costs of any such consequential action or any tests to be advised by the representative of Employer/Consultant are to be borne by the Contractor.

ii) If it is advised by the representative of Employer/ Engineer to retain the concrete having strength less than that specified payment shall be made at a reduced rate pro-rata to the strength obtained if not covered by CI. (iii) below.

iii) If the deficiency In the opinion of the representative of Employer/Consultant is such as to necessitate removal of the concrete from the structure, then on being so directed by the representative of Employer/Consultant the Contractor at his own expense shall remove the portion of the concrete certified as deficient, and replace by concrete of specified strength at no additional cost.

A register shall be maintained at site by the Contractor with the following details entered and initialed by the Contractor and the representative of Employer/Consultant.

2.

i) Reference to specific structural members receiving the batch of concrete from which the cubes were cast.

Ii) Identification mark on cubes;

iii) Mix of concrete:

iv) Date and Time of casting,

i) Crushing strength as obtained at the end of 28 days and days for each set.

vi) Laboratory in which tested and certificates reference.

Concrete of each grade shall be assessed separately and shall be assessed daily for compliance. Concrete is liable to be rejected if it is porous or honey-combed, its placing has been interrupted

without providing a proper construction joint, the reinforcement has been displaced beyond acceptable standard or construction tolerances have not been met. However the hardened concrete may be accepted after caring out suitable remedial measures to the satisfaction of the representative of Employer/Consultant.

7.0 FORM WORK

The form work shall conform to the shape, lines and dimensions as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete and shall be sufficiently water light to prevent loss of cement slurry from the concrete.

The allowable tolerances to formwork shall be as under:

I)	Deviation from specified dimensions of cross-section of columns & beams	+/- 3 mm
iI)	Plumb	1 in 1000 of height
Iii)	Levels	± 3 mm before any deflection has taken place.
iv)	General setting	+/- 3 mm up to 4 meters and ± 5 mm beyond 4 meters.

Craft paper or polythene sheets shall be used by the Contractor to ensure water tightness without additional costs to the Employer. Form work or centering shall be constructed of steel or timber or shuttering ply and adequately designed to support the impact load of full load of weight concrete and labourers without detection and retain its form during laying *and* setting *of concrete.* Timber used shall be properly seasoned so as to prevent wrapping when wetted. A camber in all directions of 6 mm for every 5 meter span in all slab and beam centering shall be provided to allow for unavoidable sagging due to compression or other causes.

All props either timber *or* steal, shall be straight and of full height and no joints shall be allowed. Where timber props like bullies are used, they shall have a minimum diameter of 100 mm and shall be straight and adequately strong. Props shall be braced with wooden battens and where *additional* staging *is* necessary extra care *shall* be taken to use bigger diameter props with bracing at 4 or 5 levels at no extra cost. All prop shall be supported on sole plates and double wedges. At the time of removing props, wedges shall be gently eased off and not knocked out.

All rubbish, chippings, shavings and saw dust shall be removed from the interior of the forms and shall be cleaned and thoroughly wetted or treated, if considered necessary, with any approved material before concrete is poured at contractor's own cost. Care shall be taken that for such approved material is kept out of contact with the requirement.

Form work shall be removed when the concrete has reached a strength of at least twice the stress to *which* the concrete may be subjected at the *time* of removal of formwork.

This shall be stripped without shock or vibration and shall be eased off carefully in order to allow the structure to take up its load gradually. Forms shall not be disturbed until concrete has adequately hardened to take up the superimposed load.

In normal circumstances (generally where temperatures are above 20 degree Centigrade and where ordinary Portland cement is used) forms shall be struck after expiry of the following periods unless otherwise directed at site by the representative of Employer/Consultant:

Location	**Striking time in days**
a) Vertical sides of walls, stabs, beams and columns	2
b) Bottoms of slabs upto 4 .5 m span	7
c) Bottom of slabs above 4.5 m span & bottom of beams upto 6 m span	14
d) Bottom of beams over 6 m span	21

8.0 REINFORCEMENT CLEANING, BENDING, PLACING ETC.

8.1 Cleaning of Reinforcement

Before steel reinforcement is placed In position, the surface of the reinforcement shall be cleaned of rust, dust, grease and any other objectionable substances.

8.2 Bar Bending schedule of reinforcement

On receipt of structural drawing, contractor shall prepare bar bending schedule of reinforcement and shall get it approved by the representative of Employer/Consultant.

8.3 Cutting in Reinforcement

Before steel reinforcement bars are cut, the contractor shall study the length of bars required as per drawings and shall carry out to suit the sizes required as per drawings.

8.4 Placing and Security

Reinforcement bars shall be accurately placed and secured in position and firmly supported or wedged by precast concrete blocks of suitable thickness, at sufficiently close intervals so that they will not sag between the supports or get displaced during the placing of concrete or any other operation of the works. It is most important to maintain reinforcement in its correct position without displacement and to maintain the correct specified cover. The contractor shall be responsible for all costs for rectification required in case the bars are displaced out of their correct positions.

8.5 Binding Wire

The reinforcements shall be accurately tied wherever they cross each other or whenever required for with 20 gauge black soft annealed steel wire. The cost of materials and labour required for binding the reinforcement shall be included in the contractors quoted rate for reinforcement.

8.6 WELDING

Welding in lieu of splices may be carried out only after authorization in writing by the representative of Employer/Consultant. Welding shall be carried out as per relevant IS Code of Practice. However, no extra payment shall be allowed for the same.

8.7 Bend etc.

Bends, cranks, etc. in steel reinforcement shall be carefully formed, care being taken to keep bends out of winding. Otherwise all rods shall be truly straight. For any bend minimum radius of eight times diameter of the bar shall be used unless otherwise specified In the drawing. However, in respect of standard hooks the radius of bends shall be two times the diameter of bar. Heating of reinforcement bars to facilitate bending *will not* be permitted. The bars shall be always be bent cold. In case of mild steel reinforcement bars of larger sizes where cold bending is not possible they may be bend by heating with written permission of the representative of Employer/Consultant. Bars when bent shall not be heated beyond cherry *red color and* after bending, shall be allowed to cool slowly without quenching. The bars damaged or weakened in any way in bending shall not be used on the work. High strength deformed bars shall in no case be heated to facilitate bending.

8.8 Inspection of Reinforcement

No concreting shall be commenced until the representative of Employer/Consultant have inspected the reinforcement in position and until their approval have been obtained. The contractor for inspection of reinforcement shall give a notice of at least 72 hours to the representative of Employer/Consultant. If in the opinion of the representative of Employer/Consultant any material is not in accordance with the specification or the reinforcement is incorrectly spaced, bent or otherwise defective, the contractor shall immediately remove such materials from the site and replace with new and rectify any other defects in accordance with the instruction of the representative of Employer/Consultant to their entire satisfaction at his own cost.

8.9 Cover for Reinforcement

Cover shall be measured from the outer surface of main reinforcement. Cover shall be as follows :

a) At each end of a reinforcing bar, 25 mm or twice the diameter of such rod or bar, whichever is greater,

b) For longitudinal reinforcing bar in beam 25 mm or the diameter of such rod or bar, whichever is greater,

c: For tensile, compressive, shear or in other reinforcement in slab 15 mm or the diameter of such reinforcement whichever is greater,

d) For reinforcement in any other member such as a lintel, chajja, canopy or pardi, 15 mm or the diameters of such reinforcements, whichever is greater,

e) For main reinforcement in isolated footing (side and bottom) clear cover shall be 50mm,

f) For column bars clear cover shall be 40 mm, unless otherwise specified in drawings,

g) For bars In slabs of strip footings and mat foundations clear cover shall be 50 mm. Slab bars shall be placed *over* beam bars, in the case of beam and slab type foundations.

h) For any other types covers is specified in I.S. 456 shall be provided.

8 .1 0 High Strength deformed Bars/Steel

High strength deformed bars manufactured by approved manufacturer conform to Fe 415 Gr. IS 1786-1985 shall be used in *work.*

9. 0 PRE-CAST CONCRETE

All thin pre-cast RCC members shall be cast using ply board base and timbered side shuttering s. Casting on floor over sand bed is not permitted.
a)

Reinforcement cage to proper size as per design or instruction shall be placed after pouring concrete for the cover portion , duly leveled.

The top surfaces shall be finished smooth with additional cement in simultaneous operation.

Deshuttering shall be done carefully and rendering with cement mortar shall be immediately carried out.

Pre-cast members shall be fixed in position only after 15 days curing.

10.0 METHOD OF MEASUREMENTS

10.1 Concrete

a) Actual net volume of work as actually executed and accepted based on the drawing and authorized variation if any shall be measured in Cum unless stated otherwise. No deduction for reinforcements shall be made.

b) Precast concrete work shall be measured in the same way as specified in the foregoing paragraph

10.2 Form Work and Centering

a) Actual net area of form work in contact with concrete shall be measured in Sq m unless stated otherwise, small piece or fillet (Each not exceeding 10 sq cm. in cross section) and voids not exceeding 200 sq cm each on the exposed surface shall be ignored as if those are non-existent.

b) No separate payment shall be made for form work In case of precast units.

c) The work and payment thereof includes striping off after completion of the work.

10.3 Reinforcement

a) Actually net measurements by weight of reinforcement as actually used in the *permanent* works and accepted shall be paid *for.* Authorized extra for laps, hooks, steel chairs, spacer bars for keeping reinforcements in position shall be measured and paid for. The weight of binding wire or any fixture, shall be excluded from the measurement. The weight of bars shall be as per IS Code taken up to three decimal places. No extra for wastage, unnecessary overlaps or rolling margin shall be paid for.

b) Bar neither shown in drawings nor Instructed by the representative of Employer/Consultant but required *or* constructional facilities shall not be measured.

11.0 TYPICAL FORMAT FOR RECORDING MIX DESIGN RESULTS

Concrete mix of design for M __ . _____(Grade of MIX) proposed to be used in (Designations and levels of structural member)

Weight in kgms. of

Cement	Coarse Aggregate	Fine Aggregate	*Aggregate /Cement Ratio*	*Water/Cement ratio*
1	2	3	4	5

Compacting factor	Result of preliminary tests cube Strength at 7 days/ 28 days	Gradation of Coarse Aggregate (C.A.)	Gradation of Fine Agree gate (F.A.)	fineness Coarse Aggre gate (C.A)	fineness Fine aggre gate (F.A.)
6	7	8	9	10	11

Specific gravity of Coarse Aggregate	Specific gravity of Fine Aggregate	current	Absolute Volume	Density of cube by water displacement Method
12	13	14	15	16

Signature of the Testing Laboratory

Signature of the Contactor

SECTION -D

BRICK MASONRY

1.0 BRICK WORK

1.1 General

All brick work shall be carried out as shown on the drawings with setbacks, projections, curvatures, cuttings, footings etc. No additional cost for use of cut backs shall be allowed. Wherever the *proportion* of cement mortar has not been specifically mentioned, cement mortar in the proportion of 1:6 shall be used. Flat brick arches shall be provided wherever required without any extra cost. Brick work shall be kept wet while in progress, till mortar has properly set. Minimum curing period for work shall be 10 (ten) days. On holidays or when work is stopped, top of all unfinished masonry shall be kept wet. Should the mortar become dry, white or powdery, for want of curing, work shall be pulled down and rebuilt at the contractor's expense. All external brick work shall be done from outside by erecting rigid external scaffolds only.

2.0 BRICK MASONRY

2.1 Soaking

All bricks shall be immersed in water for twenty-four hours before being put into work so that they will be saturated and will not absorb water from the mortar.

2.2 Bats

No bats or cut bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different course and for closures, in which case, full bricks shall be laid at corners, the bats being placed on the middle of the courses .

2.3 Laying

Unless otherwise specified, the brick work shall be laid In English bond. The brick shall be *laid in* cement mortar to line, level and thoroughly bedded in mortar and all joints shall be properly

flushed and packed with mortar and no hollows left anywhere. Brick shall be handled carefully so as not to damage their edges. They should not also be thrown from any height to the ground *but* should be put down gently. *All courses shall* be laid truly horizontal and all vertical joints made truly vertical. Vertical joints on the course and the next below should not come over one another and shall not normally be nearer than quarter of a brick length. Fixtures, lugs, frames etc, if any, shall be built in at places shown in the plans while laying the course only and not later by removal of bricks already laid unless instructed by the representative of Employer/Consultant.

Care shall kill be taken during construction to see that edges of bricks are not damaged.
The vertically of the walls and horizontally if the courses shall be checked very often with plumb bob and spirit level respectively.

2.4 Joints

Joints shall preferably not exceed 1 0 mm (about 3/8") in thickness,

2,5 Uniform raising

Brick work shall be carried up regularly. In all cases where the nature of work will admit, not leaving any part 60 cm lower than another. But where building at different levels necessary, the bricks shall be stopped so as to give later a uniform level and effective bond. Horizontal courses should be to line and level, and face plumb as shown on the plan. The rate of laying masonry may be up to a height of 80 cm (about 32 inch) per day if cement mortar is used, and 45 cm (about 18 inch) if lime mortar is used.

2.6 Scaffolding

The scaffolding must be strong and rigid stiffened with necessary cross bearers and always decked and beard on the sills with close boarding's/ceilings to prevent injury to persons or damage of materials. The contractor shall have to allow other tradesmen engaged by the employer to make use of the scaffoldings at no addition cost. Rates for brickwork is include all necessary costs and removal on *completion* of suitable scaffolding *needed for the work.* The contractor has to erect scaffolding arrangement for the same including licensing licensing fees etc. shall be borne by the contractor and the employer is kept free from any liability on this account.

3:0 HALF BRICK WORK AND 75/65 MM THICK BRICK WORK

The mortar mix for half-brick and *75/65* mm brick work shall be as specified in the schedule of quantities. Half brick thick and brick on edges *walls* shall be provided wire netting reinforcements. For half brick thick wall and brick on edge wall wire netting shall be provided at every third course and at alternate course respectively with wire netting 40 mm mesh made of 20 SWG soft G. I. iron wire, turned around the specified courses for continuity.

4.0 BRICK FLAT SOLING

For soling the bricks shall be picked slightly over burnt of approved brand, sound, hard, durable, dense, clean, *free* from soft spots, cracks, decay and other defects. Brick Bats shall not be used. All the fillings shall be watered and compacted to at maximum consolidation.

All necessary timings or flitting for laying of the soling In line and required grade shall be done. The sub-grade shall be marked by stacks and strings tor required depth for laying of soling. The cushioning as well as filling at joints shall be done with local sand.

The bricks shall be laid on flat (unless otherwise specified) touching each other. Brick shall be laid in parallel rows breaking bond or in herring bond pattern as directed by the representative of Employer/Consultant and firmly embedded true to line and filled with local sand.

5.0 MEASUREMENTS

The measurements shall be made Nett as per drawing or actual, whichever Is less. No deduction shall be made for ends of dissimilar materials up to 500 sq.crn in section.

SECTION-E

Plastering

1.0 SCAFFOLDING

Scaffolding for carrying out plastering work shall preferably be double scaffolding having two sets of vertical supports so that the scaffolding is independent of the walls.

1.1 Preparation of surface

All putlog holes in brickwork and junction between concrete and brickwork shall be properly filled in advance. Joints in brickwork shall be raked about 5 mm deep and concrete surface hacked to provide the grip to the plaster. Projecting burns of mortar formed due to gaps at joints in shuttering shall be removed.

The surface shall be scrubbed clean with wire brush/coir brush to remove dirt, dust etc. and the surface thoroughly washed with clean water to remove efflorescence, grease and oil etc. and shall be kept thoroughly wet prior to application of plaster.

1.2 Ordinary Cement Plaster

The preparation of surface shall be as stated above. The thickness and proportion of plaster shall be as specified *In* the schedule of Items.

The mortar shall be applied evenly with force on the surface to be plastered. The mortar surface shall be finished at once by being rubbed over with a trowel till the cement appears on the surface. All corners, angles and junctions shall be truly vertical and horizontal as the case may be and neatly finished. Rounding of corners and junctions where required shall be done without extra charges. Plastering in narrow grooves or making designed grooves on plastered surfaces are not separately payable. The *mortar* shall adhere to the surface intimately *when* set and there should be no hollow sound when struck

The completed plastered surface shall be cured for a minimum period of 10 days.

***2.0* NEERU FINISH**

'Neeru' shall be made of pure fat lime conforming to appropriate class
mentioned in IS: 712.
The lime shall be slaked with fresh water and thereafter shifted and reduced to a thick paste by grinding in a mill.
'Neeru' thus prepared shall be kept moist until use and shall be utilized within 15 days after preparation.
A thin layer of 'Neeru' shall then be applied on the plastered surface while it is still green. 'Neeru' shall be rubbed into the surface by trowelling until an even and smooth finish is obtained. Any

leveling work etc shall be carried out at the plastering stage itself and not while putting 'Neeru' finish.
The surface shall be kept moist for seven days following which a coat of white wash may be applied, if specified.

3.0 PLASTER OF PARIS

Surface of walls/ceiling where specified shall be treated with plaster of Paris calcium sulphate Hemihydrates materials. It shall have a fineness such that residue after sieving of dry materials for 5 minutes through IS. Sieve designation 3.75 mm. will not exceed 1% by weight & initial setting time shall not be less than 13 minutes. The particular brand of this special plaster and its composition must be previously approved by the Consultant/Employer.

The paste of material made with water shall be applied by means of English Trowel.

The entire surface must be very smooth on completion and unevenness must be removed. Special trained and skilled artisans with previous experience of this *work* will have to be employed for the purpose of achieving high grade finish. Before application of plaster of paris, the surface to be treated shall be thoroughly cleaned, brushed and patching must be scraped properly and all holes, cracks and patches shall made good with approved materials.

3.0 METHOD OF MEASURMENT

Measurement shall be in sq. mt as per drawing or actual whichever is less. Half the area of opening shall be deducted *tor* each face of wall plaster and jambs and soffits will not be separately paid for. Deduction for ends of dissimilar materials if less than 0:5 sq. mt. will not be made.

SECT!ON - F

FLOOR FINISHING

1.0 TERRAZZO (MARBLE CHIPS) FLOORING LAID IN SITU

1.1 General

The thickness of the under layer shall be measured with a permissible tolerance of +/- 3 mm. The thickness of the top layer after polishing shall be measured with a tolerance of +/- 1.5 mm.

1 .2 Under Layer:

Cement concrete of specified mix shall be used. The panels shall be of sizes as directed by representative of Employer/Consultant and generally not exceeding 2 sq. mt. in *area* and 2 Mt in length for inside situations. In exposed situations the length of any side of the panel shall preferably be not more than 1.25 Meters or as directed. Cement slurry @ 2.00 kg. per sq. mt. shall be applied before laying of under layer over the cement concrete / R C. C. surface which will not be separately paid for.

1 3 Strip Fixing

Glass strips or aluminum strips as given in the schedule shall be fixed with their top at proper level.

1.4 Top laver

Mortar: The mix for terrazzo topping shall consist of cement with or without pigment, marble powder, marble aggregate (marble chips) and water. The cement and marble powder shall be mixed in the proportion of 3 parts of cement to one part marble powder by weight. For every part of cement marble powder mix, the proportion of aggregate by volume shall be as follows

Size of Aggregate	Proportions of Aggregates to binder mix
For predominantly grade 00,0 and 1	1.50 parts
For predominantly grade 2 and 2	1.25 parts
For predominantly grade 4 and 5	1.25 parts

Grade No.	Size of Aggregate in (MM)	Minimum thickness of top layer in(MM)
00	1-2	6
0	2-4	9
1	4-7	9
2	7-10	12

Where aggregate of size larger than 10 mm are used the minimum thickness of topping shall not be less than 1.5 times the maximum size of the chips. Where large size chips such as 20 mm or 25 mm are used they shall be used only with a flat shape and bedded on the flat face so as to keep the maximum thickness of wearing layer. Before starting the work, the Contractor shall get the sample of marble chips approved by the representative of Employer/Consultant. The cement to be used shall be ordinary grey cement, white cement, colored cement or cement with admixture of coloring matter of approved quality in the ratio specified in the description of the Item or in the ratio to get the required shade as ordered by the representative of Employer/Consultant. Coloring matter where specified, shall be mixed dry thoroughly with the cement and marble powder and then chips added and mixed as specified above. The full quantity of dry mixture of mortar required for a room shall be prepared in a lot in order to ensure a uniform colour. This mixture shall be stored in a dry place and well covered and protected from moisture. The dry mortar shall be mixed with water in the usual way as and when required. The mixed mortar shall be homogeneous and stiff and contain just sufficient water to make it workable.

The terrazzo topping shall be laid while the under layer is still plastic but has hardened sufficiently to prevent cement from rising to the surface. This is normally achieved between 18 to 24 hours after the under *layer* has been *laid. A* cement slurry preferably of the same color as the topping shall be brushed on the surface immediately before laying is commenced. It shall be laid to a uniform thickness slightly more than that specified in order to get *the* specified finished thickness after rubbing. The surface of the top layer shall be toweled over, pressed and brought true to required level by a straight edge and steel floats in such a manner that the maximum amount or marble chips come up and *are* spread uniformly over the surface.

1.5 Polishing, Curing and Finishing

Polishing shall be done by machine. About 36 hours after laying the top layer, the surface shall be watered and ground evenly with machine fitted with special rapid cutting grit blocks (carborundum stone) of coarse grade (No 60) till the marble chips are evenly exposed and the floor is smooth. After the first grinding, the surface shall be thoroughly washed to remove all grinding mud and covered with o grout of cement or/and coloring matter in same mix and proportion as the topping in order to fill any pin holes that appear. The surface shall be allowed to cure for 5 to 7 days and then ground with machine fitted with fine grit blocks (No.120). The surface is cleaned and repaired as before and allowed to cure again tor 3 to 50 days. Finally the third grinding shall be done with machine fitted with fines grade grit blocks (No.320) to get even and smooth surface without pin holes. The finished surface should show the marble chips evenly exposed.

Where use of machine for polishing is not feasible or possible, rubbing and polishing shall be

done by hand, in the same manner as specified for machine polishing except that carborundum stone of coarse grade (No 60) shall be used for the 1st rubbing, stone of medium grade (No. 80) for second rubbing and stone of fine grade (No 120) for final rubbing and polishing.

After the final polish either by machine or by hand, oxalic acid shall be dusted over the surface @ 33 gm per square meter sprinkled with water and rubbed hard with a namdah block (Pad of woolen rags). The following day, the floor shall be wiped with a moist rag and dried with a soft cloth and finished clean.

Curing shall be done by suitable means such as laying moist, sawdust or ponding water. The finished floor shall not sound hollow when lapped with a wooden mallet.

1.6 Precautions :

Flooring in lavatories and bathrooms shall be laid after fixing of squatting pans and floor traps. Traps shall be plugged, while laying *the floors* and opened after the floors are cured and cleaned. Any damage done to W.C.'s squatting pans and floor traps during the execution of work shall be made good by the Contractor.

During cold weather, concreting shall not be done when the temperature falls below 4 degree centigrade. The concrete placed shall be protected against frost by suitable coverings. Concrete damaged by frost shall be removed and work redone. During hot weather, precautions shall be taken to see that the temperature of wet concrete does not exceed 38 degree centigrade. No concreting shall be laid within half an hour of the closing time of the day unless permitted by the representative of Employer/Consultant.

The floor shall be protected from any damage during the execution of work.

2.0 TERRAZZO (MARBLE CHIPS) SKIRTING-IN-SITU

2.1 Thickness:

The thickness of the bottom and top coats shall be as specified. The total thickness of skirting specified is of the total thickness of plaster as measured from the unplastered face of the masonry. Average thickness of the under coat shall not be less than 6 mm and minimum thickness *over* any portion of the surface shall not be less than 4 mm. A tolerance of 1.5 mm is applicable over the finished specified lop coat.

3.0 GLAZED / UNGLAZED CERAMIC TILE FLOORING:

3.1 Preparation of Surface and Laying

Sub-grade concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding *tor* the tile shall be either with cement mortar 1:3 (1 cement: 3 coarse sand) or approved cement based ready to use mortar on cement plastered (1:3) surface as specified. The average trickiness of the bedding for cement mortar shall be 10 mm while the thickness under portion of the tiles shall not be less than 5 mm.

Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it.

Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread @ 3.3 Kg of cement per square meter over such an area as would accommodate about twenty tiles. Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tiles gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.

The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long so as to obtain a true surface with the required slope.

Where full sizes tiles cannot be fixed these shall be cut to the required sizes and their edged rubbed smooth to ensure straight and true joints.

Tiles, which are fixed in the floor adjoining the wall, shall enter not less than 10 mm under plaster, skirting or dado.

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

3.2 Pointing and Finishing :

The grey cement grouts in joins shall be cleaned of with wire brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the colour of tiles. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden.

4.0 CERAMIC TILES IN SKIRTING AND DADO

4.1 Laying

Tiles shall be laid either on 12 mm thick plaster of cement mortar 1:3 (1 cement : 3 coarse sand) or *mix* as specified shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonally closed intervals. The plaster thickness shall be reduced, as directed only for a leveling course, when ready to use approved cement based mortar is used.

The tiles should be soaked in water, washed clean and a coat of cement slurry or ready to use cement based mortar as the case may be applied liberally at the back of tiles and set in the bedding mortar. Approved epoxy adhesives, if specified in the bill of quantities shall be used in lieu of cement blurry as per manufacturer. 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. Top of skirting of dado shall be truly horizontally except where otherwise Indicated. Full size tiles cannot be fixed, these shall be cut (sawn) to the required size and their edges rubbed smooth.

4.2 Curing and Finishing:

The joints shall be cleaned off the grey cement grout with wire brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white

cement added with pigments if required to match the color of tiles. The surface shall then be kept wet for 7 days.

After curing, the surface shall be washed and finished clean. The finished work shall not sound hollow when tapped with a wooden matter.

5.0 KOTA / CUDOAPAH STONE FLOORING

5.1 Dressing:

Every slab shall be cut to the required size and shape and fine chisel dressed on the sides to the full depth so that a straight edge laid along the side of the stone shall be full contact with it. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the tiles shall be true, square and free *from* chippings and the surface shall be true and plane.

5.2 Preparation of Surface and Laving :

The sub-grade concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding for the slabs shall be with cement mortar 1:4 (1 cement : 4 coarse sand) or with lime mortar (1 lime putty: 1 surkhi : 1 coarse sand) as given in the description of the item except that the edges of the slabs to be jointed shall be buttered with grey cement, with admixture of pigment to match the shade of the slab.

5 3 Polishing and Finishing:

The day after the slabs are laid all joints shall be cleaned of the grey cement grout with a wire brush or trowel to a depth of 5 mm and all dust and loose mortar removed and cleaned. Joints shall then be grouted with grey or white cement mixed with or without pigment to match the shade of the stone slabs. The flooring, thus laid, shall be ground evenly with machine as spooned In Para 3.2, except that (a) first polishing with coarse grade carborundum stone shall not be done, (b) cement slurry with or without pigment shall not be applied on the surface before polishing.

6.0 KOTA / CUDDAPAH STONE IN SKIRTING, DADO, RISERS, STEPS ETC.

6.1 Preparation of Surface:

Shall be as specified In case of Glazed tiles and Dado.

6.2 Laying:

The stone slab for risers of steps and skirting/dado shall be set in grey or white cement admixed with or without pigment to match the shade of the stone as specified in the description of the item, with the line of *the* slab at such a distance from *the* wall so that the average width of the gap shall be 20 mm and at no place the width shall be less than 15 mm. If necessary, fixed in the wall at suitable intervals. The skirting/dado or riser face shall be checked for plane and plumb and corrected. The joints shall thus be left to harden then the rear of the skirting or risers slab shall be paced with cement mortar 1:3 (1 cement: 3 coarse sand) or other mix as specified in the description of the item. The fixing hooks shall be removed after the mortar filling the gap has

acquired sufficient strength.

6.3 Curing, Polishing and Finishing:

It shall be as specified in Para 5.3 as applicable, except that cement slurry with or without pigment shall not be applied on the surface and polishing shall be done only with hand. The face and top skirting shall be polished.

7.0 ARTIFICIAL STONE FLOORING

Selection of materials, method of mixing placing and compacting shall generally conform to the specifications under plain and reinforced cement concrete described earlier. A stiff mix consistent with workability shall be used.

7.1 Preparation of surface:

Before the operation for laying topping is started the surface of base concrete shall be thoroughly cleaned of all dirt, loose particles, caked mortar, droppings and laitance, if any by scrubbing with coir or steel wire brush. Where the concrete has hardened so much that roughening of surface by wire brush is not possible, the surface shall he roughened by chipping or hacking at close intervals. The surface shall then be cleaned with water and kept for 12 hours and surplus water shall be removed by moping before the topping is laid.

7.2 STRIP FIXING

Where mentioned glass strips or Aluminum stripe as given in the schedule shall be fixed with their top at proper level.

7.3 LAYING

The screed strips shall be fixed over the base concrete dividing it into panels. The panels shall be uniform size and no dimension of a panel shall exceed 2 mt and the area of a panel shall not be more than 2 sq. cm. Before placing the concrete for topping, neat cement slurry shall be thoroughly brushed into the prepared surface of the base concrete just ahead of the finish. Concrete of specified proportion and thickness shall be laid in alternate panels to required level and shape and thoroughly tamped.

7.4 Finishing the surface

After the concrete has been fully compacted it shall be finished by toweling or floating with mixed cement rendering. Finishing operations shall start shortly after the *compaction* of concrete and the surface shall be toweled three times at intervals so as to produce a uniform and hard surface. The satisfactory resistance of floor to wear depends largely upon the care with which trowelling is carried out. The time interval allowed between successive troweling is very important. *Immediately* after placing cement rendering, only just sufficient trowelling shall be done to give a level surface. Excessive trowelling in the earlier stages shall be avoided as this tends to bring a layer rich in cement to the surface. Some time, after the first trowellinq the duration depending upon the temperature, atmospheric condition and the rate of set of cement used, the surface shall be re-trowelled to close any pores in the surface and to bring the surface and to scrap off the excess water in concrete. No dry cement shall be used directly on the surface to absorb moisture or to stiffen the mix. The final trowelling shall be done well before the concrete has become too

hard but at such a time that considerable pressure is required to make any impression on the surface. If directed by the representative of Employer/Consultant, approved mineral pigment shall be added to the rendering to give desired color and shape, to the flooring at no extra cost. The finished floor shall not sound hollow when tamped with a wooden mallet.

8.0 CHEQUERED TILES:

The tiles of approved color shall be of normal size as 20 x 20 cm, 25 x 25 cm and 30 x 30 cm or of standards sizes with equal sides. The size of tiles to be used shall be as shown in drawings or as required by the representative of Employer/Consultant. The centre to centre distance of chequers shall not be less than 2.5 cm and not more than 5 cm.

The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm.

The chequered tiles shall be cement tiles, or terrazzo tiles as specified in the description of the item. The thickness of the upper layer measured from the top of the chequers shall not be less than 6 mm.

The tiles shall be given the first grinding with machine before delivery to site.

The tiles shall be manufactured under hydraulic pressure of not less than 140 kg per square centimeter and shall be given the first grinding with machine before delivery to site.

All exposed joints shall be pointed using mortars/water proof adhesives, as specified with admixture of pigment, duly approved by representative of Employer/Consultant to match the shade of marble.

Green work shall be protected from rains/adverse weather conditions by suitably *covering* the same. The work shall be kept constantly moist for a period of 7 days.

The entire work shall be cleaned by acid polishing on completion of work.

The proportion at cement to aggregate in the backing of the tiles shall not be leaner than 1:3 by weight. Similarly, the proportion of cement to marble chips aggregate in the wearing layer of the tiles and the proportion of pigment to be used therein shall not exceed 10 per cent of weight of cement used in mix.

8.1 Laying and Curing

Laying and curing shall be as specified for terrazzo tiles.

9.0 CRAZY MARBLE FLOORING

Crazy marble flooring shall be laid on cement concrete sub-grade. The surface of the sub-grade shall be hacked roughened with steel wire brushes, washed clean & scared with a floating coat of cement slurry @ 2 Kg/Sq Cm to provide bond between sub-grade and flooring.

The under layer of specified thickness and mix shall then be laid over it.

After spreading cement slurry mix @ 2 Kg/Sq. Mt. over the under layer marble stone picks of approved size shape and color free from strains, crack decay etc. shall be laid piece by piece in the manner advised in such a way that the top surfaces of all stone pieces are true to the required level. After fixing of stone pieces, the gap is filled up with *the* mix of binder Marble chips (4:7) by volume, the binder being a mix of cement (with or without pigment) : marble dust (3:1) by weight. The filled surface shall be toweled, pressed so as to bring it to the level of stone pieces. Polishing, curing and finishing shall be done as done for in-situ terrazzo flooring and specified elsewhere.

10) METHOD OF MEASUREMENTS

Flooring work shall be measured net as per drawing or actual, whichever is less. Measurements for flooring shall be upto the wall (before plaster) and that for skirting shall be from above the floor finish.

Nett laid area shall be measured in square meters correct to two decimal places.

11.0 TERRAZO TILE/MOSAIC TILE FLOORING

11.1 TERRAZO TILES

Terrazzo tile shall be of best quality of approved manufacturer and generally conform to IS : 1237 latest publication.

The specific sizes of tiles to be used shall be as shown in the drawings or as approved.

11.1.2 TOLERANCE

Tolerance on length and breadth shall be plus or minus one millimeter; tolerance on thickness shall be plus 5 mm. The range of dimensions in any one delivery of tiles shall not exceed 1 mm on length and breadth and 3 mm on thickness.

11.1.3

The tiles shall be manufactured under hydraulic pressure of not less than 140 kg. per Square Centimeter and shall be given the first grinding with machine before delivery to site.

11 1.4

The proportion of cement to aggregate in the backing of the tiles shall not be leaner than 1:3 by weight. Similarly the proportion of cement to marble chips aggregate in the wearing *layer* of the tiles and the proportion of pigment to be used therein shall not exceed 10 per cent of weight of cement used in mix.

11.1.5

The finished thickness of the upper layers shall not be less than 5 mm for size of Marble chips from the smallest up to 6 mm *and* also, not less than 5 mm for size of Marble chips ranging from the smallest up to 12 mm and not less than 6 mm for sizes of marble chips varying from the smallest up to 20 mm.

11.1.6 LAYING

Sub grade concrete or the R.C.C slab on which the tiles are to be laid shall be cleaned, wetted and mopped.

The average thickness of the bedding mortar shall be 20 mm and the thickness at any place shall not be less than 10 mm.

11.1.7

The surface of the flooring during laying shall be frequently checked with a straight edge at least 2 meter long,

so as to obtain a true surface With the required slope.

11.1.8

Where full sizes tiles cannot be fixed, these shall be cut (sawn) to the required size and their edges rubbed smooth to ensure a straight and true joint.

11.1.9

Tiles which are fixed in the floor adjoining the wall shall enter not less than 12 mm under the plaster, skirting *or* dado. The junction between wall plaster and tile work shall be finished neatly and without waviness.

11.1.10

After the tiles have been laid, surplus cement grout that may have come out of the joint shall be cleaned off.

11 2 <u>Curing, Polishing and Finishing:</u>

11.2.1

The day after the tiles are laid all joints shall be cleaned of the grey cement grout with a wire brush or trowel to a depth of 5 mm and all dust and loose mortar removed and cleaned. Joints shall than be grouted with grey or white cement mixed with or without pigment to match the shade of the topping of the wearing layer of the tiles. The same cement slurry shall be applied to the entire surface of the tiles in a thin coat with a view to protect the surface from abrasive damage and fill the pinholes that may exists on the surface.

11.2.2

The floor shall than be kept wet for a minimum period of 7 days. The surface Shall thereafter be grounded evenly with machine fitted with coarse grade grit Blocks (No 60). Water shall be used profusely during grinding. After grinding the surface shall be thoroughly *washed* to remove all grinding mud, cleaned and mopped. It shall It than be covered with a thin coat of grey or white cement, fixed with or without pigment to match the color of the topping of the wearing surface in order to fill any pin hole that appear. The surface shall be again cured. The second grinding shall then be carried out with machine fitted with fine grade grit blocks (No. 120).

11 2:3

The final grinding with machine fitted with the finest grade grit blocks (No. 320) shall be carried out the day after the second grinding described in the preceding Para or before handing over the floor, as ordered.

For hand polishing the following carborundum stones, shall be used:

1st grinding--coarse grade stone (No. 60).

Second grinding--medium grade (No. 80).

Final grinding-fine grade (No 120).

In all other respects, the process shall be similar as for machine polishing.

11. 2.4

After the final polish, oxalic acid shall be dusted over the surface at the rate of 33 gm per square meter sprinkled with water and rubbed hard with a 'namdah' block (pad of woolen rags). The

following day the floor shall be wiped with a moist rag and dried with a soft cloth and finished clean.

11.2.5

If any tile is disturbed or damaged, it shall be refitted or replaced, properly jointed and polished. The finished floor shall not sound hollow when tapped with a wooden mallet.

11 .2.6 Measurements:

Terrazzo tile flooring shall be measured as laid in square meter correct to two places of decimal. For length and breadth dimensions correct to a cm before laying skirting, dado or wall plaster shall be taken. No deduction shall be made nor extra paid for any opening in the floor of area up to 0.1 square meter (10 cm2). Nothing extra shall be paid for use of cut tiles nor for laying the floor.

11.2.7. Terrazzo tile flooring laid in floor borders and similar band shall be measured under the Item of terrazzo tile flooring. No extra shall be paid in respect of similar bands formed of half sizes or multiples of half size standard tiles or other uncut tiles .

Skirting & dado paved with tiles shall be measured as follows:

The thickness of the skirting shall be as stated in the schedule of quantity. Length shall be measured along the finished face of riser, skirting or dado correct to a cm. Height shall be measured from the finished level of tread or floor to the top (the underside at tread in the case of steps). This shall be measured correct to 3 mm in case of riser skirting and dado. The area shall be calculated in square meter, correct to two places or decimal.

11.2.8. Rate

The rate shall include the cost of all materials and labor involved in all the operations described above.

12.0 MARBLE STONE FLOORING

12.1 Marble:

Marble shall be hard, sound dense and homogeneous in texture with crystalline texture. *It* shall be uniform in color and free from stains, crack, decay and weathering.

12.1.1. Dressing of Slabs:

Every stone shall be cut to the required size and shape, fine chisel dressed on all sides to the full depth so that a straight edge laid along the side of the stone shall be fully *in* contact with it. The top surface shall also be fine chisel dressed to remove all waviness. The sides and top surface of slabs shall be machined rubbed or table rubbed with coarse sand before paving. All angles and edges of the marble slabs shall be true, square and free from chippings and the surface shall be true and plain.

The thickness of the slabs shall be 20, 30 or 40 mm as specified in the description of the item. Tolerance of ± 2 mm shall be allowed for the thickness. In respect of length and breadth of slabs *a* tolerance of 5 mm shall be allowed.

12.1.2 Laying:

12.1.3 Sub-grade concrete or the RC.C. slab on which the slabs age to be laid shall be cleaned, wetted and mopped. The bedding of the slabs shall be with cement mortar 1:4 (1 cement : 4 coarse sand) or as given in the description of the Item.

12.1 .4 The average thickness of the bedding mortar under the slab shall be 20 mm and the thickness at any place *under* the slab not be less than 12 mm.

12.1.5 The slab shall be laid in the following manner :-

Mortar of the specified mix shall be spread under tile area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed tapped with wooden mallet and brought it to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same at the rate of 4.4 kg. of cement per sq. mt. The edges of the slab already paved shall be buttered with grey or white cement with or without admixture of pigment to match the shade of the marble slabs as given in the description of the item. The slab to be paved shall then be lowered gently back in position and tapped with wooden mallet till it is property bedded in level with and close to the adjoining slab with as fine a joint as possible. Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement on the surface of the slabs shall be cleaned off. The flooring shall be cured for a minimum period of seven days. The surface of the flooring as laid shall be true to levels and slopes as instructed.

12.1.6 The slabs shall be matched as shown in drawings or as instructed by the Consultant Employer.

12.1.7 Slabs which are fixed in the floor adjoining the wall shall enter not less than 12 mm under the plaster skirting or dado. The junction between wall plaster and floor shall be finished neatly and without waviness.

12.1.8 Polishing and Finishing ;

Slight unevenness at the meeting edges of slabs shall then be removed by the chiseling finished in the same manner as specified in 11.2 of Terrazo Mosaic flooring except that cement slurry with or without pigments shall not be applied on the surface before each polishing.

12.1.9 Measurements

Marble stone flooring with different kind of marble shall be measured separately and in square meter correct to two places of decimal. Length and breadth shall be measured between the finished faces of skirting, dado or wall plaster as the case may be, correct to a cm. No deduction shall be made nor extras paid for any opening in the floor of area up to 0.05 sq m (5 dm2). No

extra shall be paid for laying the floor at different levels. Steps and treads of stairs paved with marble stone slabs shall also be measured under the item of "Marble stone flooring". The width of treads in all cases shall be measured from the outer line to the finished face of riser.

12.1.10 Rate:
The rate shall include the cost of all materials and labor involved in all the operation described above.

12.2 Marbles stone in Risers of steps, Dado and Skirting

12.2.1 Marble stone slabs and dressing of slabs shall be as specified in 12.1.1 except that the thickness of slabs shall be as specified in the schedule quantities. A tolerance of +/- 2 mm shall be allowed unless otherwise specified in the description of the item.

12.2.2 Preparation of Surface :

The joints shall be racked out to a depth of at least 15 mm in masonry walls, while the masonry is being laid. In case of concrete walls, the surfaces shall be hauked and roughened with *wire* brushes. The surface *shall* be cleaned thoroughly, washed with water and kept wet before skirting risers of steps, dado and skirting is commenced. Where necessary, the wall surface shall be cut uniformity to the requisite depth so that the face shall have the projection from the finished *face of wall as shown in drawings or as required by the Employer/Consultant.*

12.2. 3. LAYING:
The risers of steps, dado and skirting shall be set in grey or white cement admixed with or without pigment to match the shade of the stone, *specified* in the description of the item with the line of the slab at such a distance from the wall that the average width of the gap shall be 12 mm and at no place the width shall be less than 10 mm. If necessary, the slabs shall be held in position by temporary M. S. hooks fixed Into the wall at suitable intervals. The skirting *or* riser face shall be checked for plane and plumb and connected. The Joints shall thus be left to harden then the rate of the skirting or riser face shall be packed with cement mortar 1 3 (1 cement: 3 coarse sand) *of* other *mix* as specified in the description of *the* item. *The* fixing hooks shall be removed after the mortar filling the gap has acquired sufficient strength.

The Joints shall be as fine as possible. The top line of skirting and risers shall be truly horizontal and Joints truly vertical, except where otherwise indicated.
The risers, dado and skirting slab shall be matched as shown in drawings or as instructed by the Consultant/Employer.

12.2. 4. Curing, Polishing And Finishing:

It shall be as specified in 11.2 of terrazzo mosaic flooring as far as applicable except that cement slurry with or without pigment shall not be applied on the surface and polishing shall be done only with hand. The face and top shall be polished.

12.2.5 Measurements

Lengths shall be measured along the finished face of riser or skirting, correct to a cm. Height shall be measured from *the* finished level of tread or floor, to the top (the underside of tread, in the case of steps) correct to 1 mm. The area shall be calculated in square meter correct to two places of decimal.

12.2..6 Rate:

The rate shall include the cost of all materials and labour involved in all the operations described above.

13.0 MARBLE / DHOLPUR STONE / GRANITE SLAB IN SURFACE ENEERING WORK IN WALL LINING

13 1 Marble work shall be paid by under veneer work.

13.1.1 Dressing:

Dressing shall be same as specified in 12.1.1 except that the back shall not be dressed, but left rough cut, in order to ensure a good grip with the hearting or backing. The dressed slabs shall be of the thickness as specified with a tolerance of ± 2 mm. The tolerance in wall lining when a straight edge of 3 mt length is placed should not exceed more than 2mm.

13.1.2. Laying And Fixing :

The slab shall be sufficiently wetted before laying to prevent absorption of water from mortar. Sub-grade concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding tor the stabs shall be as specified in the schedule of quantities. Care shall be taken to match the grains of veneer work as directed by the Consultant/Employer. For purpose of matching, the grains the marble slabs shall be selected judiciously having uniform pattern of veins/streaks. Preferably, the slabs shall be those got out of the same block from the quarry. The area to be veneered shall be reproduced on the ground and the marble slabs laid in position and arranged in the manner to give the desired matching of grains. Any adjustment needed for achieving the best results shall be then carried out by replacing or interchanging the particular slabs. Special care shall be taken to achieve the continuity of grains between the two slabs one above the other along the horizontal joints. This shall then be got approved from me Consultant/Employer and each marble slab numbered properly and the same number shall be marked on a separate drawing as well as on the surface to be actually veneered, so as to ensure the fixing of the particulars slab on the correct location.

In case of marble slabs, granite slabs, dholpur stone adjoining pieces shall be secured to each other by means of 75 mm long 6 mm dia brass pins. The slabs shall also be secured to the backing masonry or concrete surface by means of 25 mm x 6 mm size brass cramps of suitable length. Pins cramps shall be got approved before use. They shall be fixed using cement mortar.

For the facing of the columns also the same procedure as mentioned above shall be followed.

13.1,3 Joints:

All joints shall be full of mortar. Special case shall be taken to see that groundings for veneer work are full of mortar. If any hollow groundings are detected by tapping the face stones, these shall be taken out and re-laid. The thickness of the face joints shall be uniform, straight and as fine as possible not more than 1.5 mm and in the face Joint the top 6 mm depth shall be filled with mortar specified for the pointing.

13.1.4 Mortar;

The mortar used for jointing shall be as specified in the bill of quantities.

13.1.5 Curing: - The work shall be kept constantly moist on all faces for period of at least 7 days.

13.1.6 Finishing :- After the marble work is cured, it shall be rubbed with carborandum stone of different grades, No 60, 120 and 320 In succession, so as to give a plane true and highly smooth surface. It shall then be cleaned *with* a solution of oxalic acid washed and finished clean.

13.1.7: Protection :- Green work shall be protected from rain by suitable coverings. The work shall also be suitably protected from damage during construction.

13.1.8: Scaffolding :- Double scaffolding having two sets of vertical supports shall be provided, where necessary. The supports shall be sound and strong, tied together by horizontal pieces, over which the scaffolding planks shall be fixed.

13.1 9 Tolerances:

13.1.10 Slabs:

(a)Length ± 2 percent

(b) width

(c) Thickness ± 3 percent

13.1.11 Measurements:

The length and breadth shall be measured correct to a cm. The area shall be calculated in square meter nearest to two places of decimal.

13.1.12 Rate:

The rate includes the cost of material and labor required for all the operations described above, except for the cost of providing and fixing brass pins etc. which shall he paid for separately, as stipulated in the item of work.

14.0 CEMENT CONCRETE FLOORING WITH METALLIC HARDENER TOPPING

14.1 The thickness of cement concrete flooring and metallic hardener topping shall be as specified in schedule of quantities.

14.1.1 Metallic Hardening Compound:

The Meramec hardening compound shall be approved quality consisting of uniformly graded iron particles, free from non-ferrous metal particles, oil, grease, sand, soluble alkaline compounds.

14.1.2 Sub-Grade :

Shall be as specified in 7.0 Artificial stone flooring.

14.1.3 Under layer :

Cement concrete flooring of specified thickness and mix shall be laid as under layer. The top surface shall be roughened with brushes while the concrete is still green and the forms shall be kept projecting up 12 mm over the concrete surface, to receive the metal hardening compound topping.

14.1.4 Topping:

The topping shall consist of 12 mm thick layer mix of 1:2(1 cement and two stone aggregate 6 mm normal size) by volume specified with which Metallic hardener compound as mixed in the ratio of 1:4(1 metallic concrete hardener and 4 cement) used by weight. Concrete hardener shall be mixed thoroughly with cement on a clean dry pucca platform. The dry mixture shall be mixed with stone aggregate 6 mm nominal size or as otherwise specified in the ratio of 1:2(1 cement and 2 stone aggregate) by volume and well turned over. Just enough water shall then be added to this dry mix as required for floor concrete.

The mixture so obtained shall be laid in 12 mm thickness, on cement floor within 2 to 4 hours of its laying. The topping shall be laid true to provide an uniform and even surface. It shall be firmly pressed in to the bottom concrete so as to have good bond with it. After the initial set has started, the surface shall be finished smooth and true to slope with steel floats.

The men engaged on finishing operation shall be provided with raised wooden platform to sit on, so as to prevent damage to new work.

14.1.5 Curing :

The curing shall be done for a minimum period of 10 days. Curing shall not be commenced until the top layer has hardened. Covering with empty cement gunnies shall be avoided as the color is likely to be bleached with the remoments of cement matter from the bags.

14.1.6 Measurements:

Length and breadth shall be measured correct to 3 cm and its area as laid shall be calculated in sq. m correct to two places of decimal length and breadth shall be measured before laying skirting dado or wall plaster. No deduction shall be made nor extra paid for any opening in the floor of area up to 0.10 sq m.

The flooring done with strips (in one operation) and without strips (in alternate panels) shall be measured together.

14.1.7 Rate

The rate shall include the cost of all materials and labor involved in all operations described above including application of cement slurry on RCC slab or on sub- grade including roughening and cleaning the surface etc.

SECTION - G

EXTERNAL AND INTERNAL PAINTING WORKS

1.0 WHITE WASING WITH LIME

1.1 Scaffolding

Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No bullies, bamboos or planks shall rest on or touch the surface which is being white washed.

For all exposed brick work or tile work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces

over which scaffolding planks shall be fixed.

Note In case of special type of brick work, scaffolding shall be got approved from representative of Employer/Consultant in advance.

Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.

For while washing the ceiling, proper stage scaffolding shall be created.

1.2 Preparation of surface

Before new work is white washed the surface shall be thoroughly brushed free from mortar droppings and foreign matter.

In the case of old work, all loose pieces and scale shall be scrapped off and holes In plaster as well as patches of less than 50 sq.cm. area shall be filled up with mortar of the same mix where so specifically ordered by the representative of Employer /Consultant, the entire surface of old white wash shall be thoroughly removed by scrapping and this shall be paid for separately.

1 .3 Preparation of Lime Wash

The wash shall be prepared from good quality fresh stone white lime. The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm of gum dissolved in hot water, shall be added to each 10 cubic decimeter of the cream. The approximate quantity of water to be added in making the cream will be 5 liters of water to one kg of lime.

If not directed otherwise, Indigo (Neel) upto 3 gm per kg of lime dissolved in water shall be added and wash stirred well. Water shall than be added at the rate of about 5 liters per kg of lime to produce a milky solution. In case of lime wash on the surface finished with lime punning no indigo should be used unless otherwise directed by the representative of Employer/Consultant.

1.4 Application

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

Each coat shall be allowed to dry before the next one is applied. Further each coat shall be inspected and approved by the representative of Employer/Consultant before the subsequent coat is applied. No portion of the surface shall be left out initially to be patched up later on. For new work, three or more coats shall be applied till the surfaces presents a smooth and uniform finish through which the plaster does not show. The finished dry *surface* shall not show signs of cracking and reeling nor shall *it* come *off* readily on the band when rubbed.
For old work, after the surface has been prepared as described in Para 1.2, a coat of white wash shall be applied over the patches and repairs. Then a single coat or two or more coats of white wash as stipulated in the description of the item shall be applied over the entire surface. The white washed surface should present a uniform finish through which the plaster patches do not

appear. The washing on ceiling should be done prior to that on walls.

1.5 Protective Measures

Doors, Windows, floors, articles of furniture etc. and such other parts of the building not to be white washed shall be protected from being splashed upon. Splashing and droppings if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture or fittings and fixtures shall be recoverable from the contractor

2.0 CEMENT PAINT

2.1 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, dust, algae, oil etc by brushing and washing. Pitting in plaster shall be made good and a coat of water proof cement paint shall be applied over patches after wetting them thoroughly.

2.2 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 comprises 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 given preference over the above specification, in case of variation between the two exists.

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.

2.3 Application

The solution shall be applied on the clean and tested 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 alter 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.

a)

2.4 Precaution

Waterproof cement based paint shall not be applied on surfaces already treated with white wash, color wash, distemper dry or oil bound, varnishes, paints, etc. It shall not be applied on gypsum, wood and metal surfaces.
The specifications in respect of scaffolding, protective measures, measurements and rate shall not be as described under white washing with lime.

3.0 PAINTING

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 empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the representative of Employer/Consultant.

3.1 Commencing Work

Painting shall not be started until the representative of Employer/Consultant has inspected the items of work to be painted, satisfied themselves about then proper quality and given their approval to commence the painting work. Painting of external surface should not be done in adverse weather condition like hail, storm and dust storm. Painting, except the priming coat shall generally be taken in hand after practically finishing all other builders 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.

3.2 Preparation of Surface

The surface shall be thoroughly cleaned and dusted. All rust, dirt, scales, smoke and grease shall be thoroughly removed before painting is started. The prepared surface shall receive the approval of the representative of Employer/Consultant after inspection, before painting is commenced.

3.3 Application

Before pouring into smaller containers for use, the paint shall be stirred thoroughly in the containers. When applying also, the paint shall be continuously stirred in smaller containers so that its consistency is kept uniform.

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 the representative of Employer/Consultant shall be used.
The painting shall be laid on evenly and smoothly by means of crossing and laying off, the latter in the direction of the grain of wood. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat. Where so stipulated, the painting shall be done by spraying. Spray machine used may be (a) high pressure (small air aperture) type, or *(b)* a low pressure (large air gap) type, depending on the nature and location of work to be carried out. Skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner.
Spraying should be done only when dry condition prevails. Each coat shall be allowed to dry out

thoroughly and rubbed smooth before the next coat is applied. This should be facilitated by through ventilation. Each coat except the last coat shall be lightly rubbed down with sand paper or fine pumice stone and cleaned off before the next coat is laid

No left over paint shall be put back into the stock tins. When not in use, the containers shall be kept properly closed.

No hair marks from the brush or clogging of paint puddles in the corner of panels, angles of mouldings etc. shall be left on the work.

In painting doors and windows, the putty round the glass panes must also be painted; but care must be taken to see that no paint stains etc. are left on the glass. Top of shutters and surfaces in similar hidden locations shall not be left out in plaint.
In painting steel work, special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. The additional specifications for primer and other coats of paints shall be as according to the ,detailed specifications under the respective headings.

3.4 Brushes and containers

After work, the brushes shall be completely cleaned of paint by rinsing with linseed oil or with turpentine. A brush in which paint has dried up is ruined and shall on no account be used for painting work. The container, when not in use, shall be kept closed and free from air so that paint does not thicken and also shall be kept safe from dust. When the paint has been used, the containers shall be washed with turpentine and wiped dry with soft clean cloth, so that *they* are clean, and can be used again.

4.0 PRIMING COAT ON WOOD, IRON OR PLASTERED SURFACE

4.1 Preparation of Surface

i) Wooden Surface

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

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

The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentations on the surface shall be stopped with glazier's putty or wood putty. The primer shall be prepared on site or shall be of approved brand and manufacture as specified in the item. Paint shall be anti corrosive bitumastic paint, aluminum paint or other types of paint as specified in the description of the item. Stopping shall not be done before the priming coat *is* applied as the wood will absorb the oil in the stopping and the latter is therefore liable to crack.

ii) Iron & Steel Surface

All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought Iron during rolling which become loose by rusting, shall be removed.

All dust and dirt shall be thoroughly wiped away from the surface. If the surface is wet, it shall be dried before priming coat is undertaken.

iii) Plastered surface

The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall then be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of paris and rubbed smooth.

4.2 Application

The primer shall be applied with brushes, worked well into the surface and spread even and smooth. The painting shall be done by crossing and laying off as described in cement paint above.

5.0 PAINTING WITH READY MIXED PAINT / SYNTHETIC ENAMEL PAINT

5.1 Painting on new surface

The surface which has not been painted earlier, or the paint has been removed by paint remover, burning, caustic Soda etc. shall be considered to be new surface.

5.2 Preparation of Surface

i) Wood work

The surface shall be cleaned and all unevenness removed as specified in wooden surface. 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

ii) 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, AU dust and dirt shall be carefully and thoroughly wiped away.

iii) plastered surface

The priming coat shall have dried up completely before painting is started. All dust of dirt that has settled on the priming coat shall be thoroughly wiped away before painting is started

5.3 Application

The specifications described in Cement paint shall hold good as far as applicable. The number of coats to be applied will be as stipulated in the item. The powder surface shall present a *uniform* appeared Ice and glossy/mat finish as described in schedule of quantities free from streaks, blisters etc.

6.0 FRENCH SPIRIT POLISHIN

Pure shellac varying from pale orange to lemon color free from raisin or shall be dissolved in mentholated spirit at the rate of 140 gm of shellac to 1 lt of spirit. Suitable pigment shall be added to get the required dilution.

6 .1 Polishing new surface

Preparation of surface : The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots, if visible, shall be covered with a preparation of red lead and glue sized and used hot. Holes and indentations or: the surface shall be slopped with glazieries putty The surface shall be then given a Goat of wood filler made by mixing whiting (ground chalk in mentholated spirit at tile rate (If I 5 kg of *whiting* per liters of *spirit).* The surface shall *again* be rubbed down peddle smooth with glass paper and wired clean.

7.0 METHOD OF MEASUREMENT

Measurements for painting on plastered surfaces shall be the same as that for plaster. For doors, windows etc., *the* following multiplying factors will be considered .

Sl. No.	Description of work	How measured	multiplying coefficients
I.	**Woodwork - Doors, windows etc.**		
	Paneled or framed side)	Measured flat (not girthed) including chowkhat or frame edges chocks, cleats etc. shall be deemed to be included in the item	1.30 (for each braced L doors, windows etc.
	2. Flush doors etc.	Do··	1.20(-do-)
	3. Part paneled and part. glazed or Gauged doors. Windows	Do	1.00do
	4.Fully glazed or gauzed doors, windows etc	do	0.80 (do)
	5. Fully venetioned or louvered doors, windows etc	do	1.8 (do)
	6. Trellis (or Jaffri) work one *way or* two *way*	Measured flat, no deduction shall be made for open spaces , supporting members Shall not be measured separately	2 (for painting all over)
	7. plain sheeted steel Doors or windows	measured flat (not girthed) including frame edges etc. 0.50 (do)	1.10 (for each side)
	8. Fully glazed or gauzed	do	0.50(do)

doors and windows

9. Partly paneled and		do	0.80 (do)
10. Corrugated sheeted	steel doors or windows	do	1.25 (do)
11. Collapsible gates	measured flat		1.50(for painting all over)
12. Rolling shutters	Measured fiat (size' of . opening interlocked latch) all over: jambs, guides, bottom rails and locking arrangement etc. shall be included in the item 1.10 (for each (Top cover sha1.1 measured separately)		

SECTION – H
METAL DOORS/WINDOWS

1.0 STEEL DOORS, WINDOWS ETC

The windows shall be obtained from approved specialized manufacturers. The frames of doors, windows, ventilators etc. shall be formed by cutting section to required lengths and mitered. The corners shall be welded to form a solid framed welded joints. Sash bars of units shall be tanned and riveted into the frames and where they intersect the vertical tie shall be broached and the horizontal tie threaded through it, and the intersection closed by hydraulic pressure. For fixing steel hinges, slots shall be cut in the fixed frame and the hinges inserted inside and welded to the frame at the back. For fixing hinges to inside frame, the method described for fixing to outside frame may be adopted but weld shall be cleaned or holes made in the inside frame and hinge riveted. The hinge pin and washer shall be galvanized or, aluminum alloy 51 S-WP of suitable thickness.

The handle shall be mounted on handle plate which shall be welded to the opening frames. The handle shall have a two points nose which will engage with suitable tapered striking plate provided on the fixed frame
Top hung and bottom hung ventilators shall be provided with two plain hinges, with peg stays of sufficient length 3~ specified earlier
Centre hung ventilators shall be made with two outer frames, With mastic water-proof compound embedded between these two (Jute! frames Unless otherwise specials the ventilators shall be provided with spring catch whir-I) when pulled by a Cold, will allow II Ie shutter bolero half to open outside and the top half opening inside.

Steel windows and ventilators shall be fixed to brick or concrete surface as shown In drawing or with M. S. Jugs of *sizes* 100 x 16 x 3 mm and to concrete work by means of 125 mm long counter sunk screw, or raw rules or other approved fastener after drilling into concrete With a power drill as specified in the item The lug shall be grouted it I concrete (1:2:4) mix of dimension as directed.

The frames should not be fixed in position until the structural work has been completed and the free deflection has taken place. The doors, wiredraws, etc. shall be erected in true plumb, line and level.
All steel doors, windows, ventilators shall be given a coat of anti-corrosive primer at the shop before delivery to site for erection but in no case prior to the materials have been inspected by the representative of Employer/Consultant.
Final painting shall be done after obtaining approval from the representative of E employer /

Consultant

2.0 STEEL GRILL AND RAiLINGS

The grills and railings for windows, verandah and balcony etc. shall be of mild steel. The design of grills/railings and shape and sizes of various components shall be according to the drawings. Where ever grills integrated with windows are specified they shall be manufactured at windows manufacturers shop

The edge angles and corners shall be cleaned and true to shape. The joints, if possible, shall be mechanically interlocked and neatly spot welded in such a way that the grill is rigid. Grinding of the joints to achieve. a neat regular finish shall be done. The grills shall be fixed to true plumb, line and level as per drawing.

All grills, railings etc. after being fixed in position, shall be cleaned off dust, dirt, rust and loose scales before applying a coat of protective zinc chromate primer.

3.0 ROLLER SHU1TER

These shall be fixed in position as shown in drawing.
Brackets shall be fixed on the lintel or under the lintel as specified with rawl-pluges, and screw bolts etc. The shaft along with the spring shall then be fixed on the brackets.
The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound *with* it with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and the cover frame shall then be fixed to the walls through the plate welded to the guides. These plates and bracket shall be fixed by means of steel screw bolts, and raw plugs drilled in the wall .The plates and screw bolts shall be concealed in plaster to make their location invisible shall be done accurately in a workman like manner that the operation of the shutter is easy and smooth.
After being fixed in position, these shall be cleaned off dust, dirt, rust or scales before applying a protective coat of zinc chromate.

4.0 COLLAPSIBLE GATE

T-iron shall be fixed to the' floor and to the lintel at top by means of another bolts embedded in cement concrete of floor and lintel. The anchor bolts shall be placed approximately at 45 cm centers alliteratively in the two flanges of the T -iron The bottom runner (T-iron) shall be embedded in the floor and propel you've shall be formed along the runner for the purpose. The collapsible shutter shall be fixed at Sides by fixing the end double channels with T-iron rails and also by hold-fasts bolted to the end double channel and fixed in the masonry of the side walls a)

5.0 ALUMINIUM DOORS /WINDOWS/CURTAIN WALLS

All aluminum doors, windows etc shall be procured from an approved manufacturer. Aluminum section Shall be extruded hollow sections conforming to latest IS Specifications including IS, 1948 and 1.S. 733. All sections have been approved by Employer/Consultant before placing the order. All extruded sections shall have approved IS specification with thickness The aluminum section; shall be anodized color and with micron thickness as specified in the schedule of quantities or as per approved IS specification.

Open able windows shall be double weather-stripped. One weather strip shall be provided in the other frame and other weather strip in the shutter frame. The *weather* strip shall be extruded neoprene and of a size to make the windows completed .weather tight. The weather-strip shall be dovetailed in the window sections.

The hinges of operable windows shall be strong. Pin of the hinges shall be stainless steel with nylon/PVC washers. In case the windows are projected type, these shall be provided with brass pivots sliding on stainless steel guides. Concealed type friction stays shall be provided to keep the windows open in any desired position. The window shall be provided with the handle (or two-point locking or single point locking as required and directed. The glass used shall be 4mm thick or 5.0mm sheet glass of first quality and approved make, free from scratches, waviness, bubbles, etc. all as shown drawing or as specified and directed. Sliding windows wherever used should have tile

sliding tracks, rollers, pins and the locking clamps as directed by the Employer/Consultant. General fabrication shall be as earlier given for steel windows and doors.

6.0 Method of Measurements

61 Steel Windows

Shall be measured in sq. m. up to two decimal places, the height and width being measured correct to 0.5 cm between out-to- out of frame.

6.2 Rolling Shutter

Shall be measured net in sq.m. Up to two decimal places, the width being measured overall out-to-out of guide towards channels and height taken as clear opening height, all measurements correct to 0.5 cm

6.3 Collapsible gate

Shall be measured In sq m. up to two decimal places. the width being measured In fully stretched position and height taken as between out to out as top runner, all correct to 0 .5 cm.

6.4 Grills/railings etc:

Shall be measured Nett in kg up to three decimal places, the sectional weights being taken as per IS Codes up to three decimal places. No extra wilt be entertained for welding etc.

6.5 Aluminum windows/Doors

Shall be measured in sq. cm up to two decimal places, the height and width being measured correct to 0.5 cm. between out - to -out of frame.

SECTION -I

SPEIFICACTION FOR WATER PROOFING

1.0 DAMP PROOF COURSE (D P C)

DPC shall be of thickness as shown in drawing or in the schedule of quantities unless otherwise mentioned, proportion shall be 1 parts of cement 2 parts of sand and 4 parts of aggregate mixed with approved water proofing compound as per manufacturers specification. Before laying the concrete the top surfaces of the wall shall be thoroughly cleaned of all dirt and loose particles, mortar droppings at and laitance, if any, scrubbing with coir or steel wire brush or by hacking, if necessary. The surface is then thoroughly wetted and the concrete is placed. The concrete shall be laid in every case for the full width of the plinth or as shown in drawing. The top surface shall be kept rubbed or rough or double-chequered for adhesion of mortar for brick *work.* Proper curing shall be done before starting the brick work over 0 P ~.

2.0 BRICK COBA WATERPROOFING

The treatment shall be got executed by approved specialist firms and a guarantee of 10 years in the approved format is to be submitted along with a back-to-back separate guarantee by the main *contractor. Moreover,* in case of variations between specifications given below and the specification of the manufacturer, the tatter shall prevail

a: Terrace

The roof surface shall be thoroughly cleaned and prepared to receive water proofing treatment. Construction joints, if any, arc raked and cleaned Cement slurry with resinous admixtures of Specialist film is spread to penetrate into the:' structure and to till cracks and other porous areas.
15 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) with resinous admixtures of specialist is laid over *the* prepared surface.
A layer of brick bats (Coba) ;6 laid over the mortar layer giving the required gradient for adequate drainage (A slope 01 1 in 120 is considered adequate). The joints between 1 he brick bats shall! generally be kept between 15-25 mm wide' Those joints arc filled with cement mortar (1 4) with *resinous* admixtures of *specialist* firm Curing is done *for:* two days

The top is finished smooth with 20 mm thick cement mortar (1 :4) with resinous admixtures of Specialist firm and marked with 300 mm x 300 mm false squares. Curing is done for two weeks.
'

b: Sunk Slabs

any existing covering on slab is removed and surface is prepared. Construction joints if any, are raked and cleaned. Cement slurry with resinous admixtures of Specialist firm is spread which penetrates into the structure. This fills cracks and other porous areas.
20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) with resinous admixtures of Specialist firm is laid over the prepared surface.
A layer of brick bats (Coba) is laid over the mortar layer giving the required gradient for adequate drainage. The joints between the brick bats are generally kept between 15-25 mm wide. These joints are filled with cement mortar (1:4) with resinous admixtures of Specialist firm Curing is done for two days.
The top IS finished smooth with 20 min thick cement plaster (1:4) with resinous admixtures of Specialist firm. Curing is done for two days
Existing covering, if any, is removed and surface is prepared upto the required height (A height of 150 mm above upper floor level IS considered adequate). A cement slurry coating with resinous admixtures of Specialist firm is given.
The side wall is provided with cement plaster (1:4) 20 nun thick with resinous admixtures of

Specialist firm up to the height specified A vatta (Gala) 01 specified design is made in cement mortar (1 :4) With resinous admixtures at Specialist firm Curing is done for two weeks.

c. Method of Measurement

The measurement tor the complete work as per specification shall be taken clear between the walls. No separate measurements for "Golai" treatment to vertical surfaces shall be made.

SECTION-J

1.0 WOODWORK AND JOINERY

1.1 TIMBER

i) Unless otherwise specified all timbers for frames and shutters for doors windows, ventilators, cupboards, etc. shall be free from knots, snakes, fissures, flaws, sub-cracks and other defects The planed surface shall be smooth and free from blemishes and discolorations.

ii) All timber for carpentry and joinery in touch with masonry or concrete shall be creosoted before fixing.

iii) All full fabricated timber shall be air seasoned at site of work for a period of not less than one month to allow for any shrinkage that may take place The preparation of timber for joinery is to commence simultaneously with H 12 beginning of the project work generally and should proceed continuously until all the wood work is prepared and fixed/stacked on or near the site as the case may

iv) Paneled shutter may be obtained from factories approved by Consultants/ Employer provided the contractor can ensure proper quality control to the satisfaction of Consultant/Employer

v) Paneled shutters shall be manufactured after taking correct measurements of openings so as to ensure that the dimensions of rails styles are not reduced than that indicated in schedule/drawing.

1.2 Workmanship and Constructions

A) The workmanship shall be first class and to the approval of the Representative of Employer/Consultant. Scantlings and board shall be accurately sawn and shall be of required width and thickness All carpenters work shall be wrought except where otherwise described. The workmanship and Joinery shall be framed together and securely fixed set out in strict conformity according to the drawings and shall be framed together and securely fixed in approved manner and with properly made joints. All work is to be properly tenured shouldered, wedged, pinned, braced etc. and properly glued with approved quality glue to tile; satisfaction of the representative of Employer/Consultant

B) Screws: Unless otherwise specified all screws to be used in woodwork and joinery shall be of cadmium plated and of approved quality. The size (diameter and Length) should conform to those specified in hardware schedule.

C) Tolerance: 1.5 mm (1/16)will be allowed for each wrought face of sizes specified except where described as finished in which case they shall hold to the full dimensions

D) Protection: All edges of timber frames shall be protected from being damaged during construction by providing rough timber casino securely fixed and other adequate protective measures.

E) If it is decided by the representative of Employer/Consultant to provide ant termite treatment, the buildings contractor shall co-ordinate his work suitably as directed by the representative of Employer/Consultant.

F) Door/Window frames shall have cut rebate. Planted rebates shall not be permitted unless shown in drawings. .

G) wooden cover, moulds of sizes shown in drawings shall be provided all round painted or finished as in doors. This will be paid as a separate Item as described in Schedule of Quantities.

Holdfasts: Three holdfasts shall be fixed to each post of the door frame. The MS holdfasts shall be of

the size 37 cm x -10 mm x 3 mm or as mentioned in the Schedule of Quantities and shall be fixed to the frames by means of screws and not nails. The other end of the holdfasts shall be fixed into jambs with 1:2:4 P.C.C of dimensions as directed. Ends of holdfast will be fish trailed

Whenever the frames are abutting to concrete surface approved metal expansion as directed shall be provided for frame, hangers rough grounds

The rates quoted for woodwork and joinery shall exclude the cost for all types of holdfasts or Raw Plugs or other frames shall be out and shall not be used as holdfasts,

The items of holdfast, metal fasteners etc. shall be paid as a separate item as described In Schedule of Quantities The rate for holdfasts shall include for cement grouting and fixing to frame work with screws etc. The rate tor *metal* fasteners shall *include* for nuts etc. as required.

2.0 Door/window Frame

Specified timber swan in the direction of grain and truly straight and square shall be used. The scanting shall be planed smooth and accurate to the full dimension, rebates, rounding & mouduling as shown in the drawing before assembling. All joints shall be mortice and Tenon type, simple near strong the joint shall be glued framed put together and pinned with timber.

2.1 WOODEN FLUSH SHUTTER (SOLID CORE TYPE)

Wooden flush shutters shall be of solid core type: and obtained from approved manufacturer pressed and phenol formaldehyde synthetic resin shall also be provided with external lapping fixed to shutter with synthetic adhesives & head-less pins

2.2 Paneled Shutters:

Where specified in the Schedule of quantities Shutters shall be manufactured from Kiln Seasoned and chemically treated commercial hardwood of approved quality Thickness and sizes of styles rails and panels etc. shall be as specified in the Schedule of Quantities and/or drawings Panel shall be in a single width piece. Shutters shall be manufactured conforming to the relevant IS Specification and an approved· sample shall be kept in the site office of the representative of Employer/Consultant.

2.3 Teak wood glazed shutters :

The general specifications for glazed shutter shall be similar to that for paneled shutters described. Styles and rails in the glazed shutters shall be rebated *5/8"* x 1/2" (16 mm x 12 mm) to receive the glass unless otherwise specified.

Sash bars shall be of full thickness of the shutter and of width as shown in the drawings. These shall be molded and rebated miter on side to receive the glass as per drawing unless otherwise specified glass panels shall be fixed by means of molded teak beads and suitable G.I screws. Finished thickness of the shutter shall be as mentioned in the schedule of quantities. The rate shall be for *the* completed *work* fitted and fixed in position. An approved sample should be kept in the office of the representative of Employer/Consultant at the site for reference. The glass shall conform to specification as described under head galliard. The thickness of glass shall be

mentioned in the Sct1edule of Quantities

3.0 **Method of measurements**

Door shutters shall be measured in square meter upto two decimal places The height and width shall be clear height and width of shutter.

Frames shall be measured along the centre line, no extra being allowed for embedment in floors.

2.1 WODDEN FIUSH SHUTTER (SOLID TYPE)

Wooden flush shutters shall be of solid core type and obtained from approved manufacturers as listed, Shutters shall be hot pressed and phenol formaldehyde synthetic resin shall also be provided with external lapping fixed to shutter with synthetic adhesives & head-less pins.

2.2 Paneled Shutters:

Where specified in the Schedule of Quantities Shutter shall be manufactured from Kiln Seasoned and chemically treated commercial hardwood of approved quality, Thickness and sizes of styles rails and panels etc shall be as specified in the Schedule of Quantities and/or drawings Panel shall be in a single width piece. Shutters shall be manufactured conforming to the relevant I.S Specification and an approved sample shall be kept in the site office of j he representative of Employer/Consultant.

2.3 Teak Wood And Glazed Shutters:

The general specifications for glazed shutters shall be similar to that for paneled shutters described. Styles and rails in the glazed shutters shall be rebated 5/8" x ½ (16 mm x 12 mm) to receive the glass unless otherwise specified. Sash bars shall be of full thickness of the shutter and of width as shown in the drawing. These shall be molded and rebated mitre on side to receive the glass as per drawing unless otherwise specified glass panels shall be fixed by means of molded teak beads and suitable G.I. screws. Finished thickness of the shutter shall be as mentioned in the schedule of quantities. The rate shall be for the tile completed work fitted and fixed in position. An approved sample should be kept in the office of the representative of Employer/Consultant. The glass shall conform to specification as described under head glazing the thickness of glass shall be mentioned In the schedule of quantities.

3.0 METHOD OF MESUREMENTS

Door shutters shall be measured in square metre upto two decimal places. The height and width shall be clear height and width of shutter.

Frames shall be measured along the centre line, no extra being allowed for embedment in floors.

SECTION "K"

ANTI-TERMITE TREATMENT

1.0 **GENEREL**

The work should be executed through a specialized firm approved by the representative of Employer/Consultant. Approval of such firm shall be obtained from the representative of Employer/Consultant before commencement of work

2.0 SOIL TERATMENT SHALL CONFIRMS TO THE FOLLOWING

2.1 Chemicals: The treatment of the area shall be carried out by applying of chlorphyriphos chemical 20% EC at 1% or Endosulfan (30% EC) with 0.5% concentration. The chemicals shall

be obtained from approved manufacturer.

2.2 Records: A daily record shall be maintained by the contractor indicating the amount of work done and quantity of chemical consumed for the: work The~; record book shall be property of the representative of Employer/Consultant.

2.3 Tests : The contractor should perform test at his own cost of the chemical to be used in the work and the result of the test should be submitted to the representative of Employer/Consultant.

2.4: Method of Application: The following paragraphs specify the manner and sequence of operations, which must be followed. The rates of applications of chemical as indicated in the following pares for various operation should be followed. This specifications represent the minimum rates of application of each operation and the contractor shall actually apply chemicals at rates that they may consider necessary for effectiveness during the 10 years guarantee period. In other words responsibility of applying adequate amounts of chemical as required to sustain the 10 years guarantee shall be that of the contractor but in no case shall actual rates of application be less than specified in the technical specifications.

2.4. TREATMENT OF JUNCTION OF WALL AND THE FLOORS

Special care shall be taken to establish continuity of the chemical barrier on the inner wall surface from ground level. To achieve this a small channel of 30 mm x 30 mm shall be made at the junction of walls and columns with the floor and rod holes made in the channel up to ground level 150 mm apart and the iron rod moved backward to break up the earth and chemical emulsion poured along the channel at the rate of 7.5 litres per square metre of the vertical wall or column surface so as to soak the soil right to the bottom

2.4.2 TRATMENT OF TOP SURFACE OF PLINTH FILLING

The top surface! of the consolidated earth within plinth wells shell be treated with chemical emulsion at the rate or ~ liters per square metre of U1e surface before the sub-grade is laid. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, notes up to 50 to 70 mm deep at 150 mm centre 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.

2.4.3 Treatment of soil surrounding Pipes, Wastes and Conduits

When pipes, wastes and conduits enter the solid inside the area of the foundations, soils surrounding the point of entry shall be loosened around each of such pipe, waste 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 for a distance of over 300 mm unless they stand clear of the walls of the building by about 75 mm.

2.4.4 Treatment of soil along External Perimeter of Building:

After the building is completed the earth along the external perimeter of the building should be rotted at intervals of 150 mm and to a depth of 300 rnrn. lhe rod should be moved backward and forward parallel to the wall to back up the earth and chemical emulsion poured along the wall at the rate of 7.5 fit res per square meter of *vertical* surfaces After the treatment, the earth should be tamped back into place. Should the earth outside the building be graded on completion of the building, this treatment should be carried out on completion of such grading.

In the event of filling being more than 300 mm, the external perimeter treatment shall be extended to the full depth of tilling up to the ground level so as to ensure continuity of the chemical harrier.

2.5 Treatment Shall not be made if the soil or fill is excessively wet or immediately after heavy rains to avoid surface flow of toxicant from application site. Unless the treated areas are to be immediately covered, percolation shall be taken to prevent distribution of the treatment by human or animal contact with treated soil.

2. 6. Guarantee : 10 (ten) years guarantee should be submitted on non-judicial stamp paper as per the Performa attached. The guarantee shall be signed by the main contractor and the specialized who have execute the work. In the unlikely event of any treatment becoming necessary subsequently during the guarantee period, required inspection and treatment shall be carried out free of cost.

2.7 The work should be executed in stages according to the progress and in Co-ordination with the general building and other contractors. Idle labour, if any, for the same shall not be entertained.

2.8 **Stages of Payment·:** The work has to be carried out in stages according to the progress of works.

2.8.1 The contractor shall have to furnish a guarantee on non-judicial stamp paper for 10 years as per the Performa. In the unlikely event of any treatment becoming necessary subsequently during the guarantee period, required inspection and treatment shall be carried out free of cost by the contractor.

2.8.2 Payment will be made on the plinth/floor area measurement and the rates should include to cover treatment to parts of structure as detailed out subject to deduction 1 for retention money, payment will be made in stages as under

a) On completion of treatment al junction and Floor & Ceiling.
……. 75%

b) On completion of treatment of all parts of structure required *and* pi pipes, waste conduits etc. etc.
……100%

SECTION - X

TECHNICAL SPECIFICATION FOR SANITARY AND PLUMBING WORK

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SECTION II SOIL, WASTE PIPES AND FITTINGS

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LIST OF APPROVED BRAND AND MANUFACTURERS

SECTION - I

TECHNICAL SPECIFICATIONS FOR SANTARY FITTINCS

1.0 SANITARY AND ALLIED FITTINGS

All sanitary wares with their allied fittings must be first quality (best) of approved make and brand.

2.0 SQUATTING PATTERN W.C. PAN (INDIAN TYPE)

The W. C. Pan shall be of white vitreous China of specified size and pattern (Orissa or long pattern as specified) with an integral flushing rim. JI shall have the flushing horn in the hack unless it is not possible to accommodate cistern to *suit this* design. The pan shall be of approved quality. It shall have 100 mm C. I. Of porcelain trap 'P' or 'S' type with minimum effective seal of 50 mm and 50 vent ann.

2.1 Fixing of W.C. Pan

'The Squatting type W. C. Pan shall be sunk in floor sloped toward" the pan in a workmanship like manner, care being taken not to damage the pan in the process of fixing. If damaged it shall be replaced at Contractor's cost. It shall be fixed on a proper cement concrete base of 1 :3:6 proportion taking care that the cushion is uniform and even without having any hollows between the concrete base and pan and finished just below level of rim of pan to receive the specified thickness of the floor finishing. No extra for concrete bed shall be paid for.

'The joint between the pan and the trap shall be made with cement mortar 1: 1 and shall be leak proof.

3.0 PEDESTRAL WASHDOWN SYPHONIC (SINGLE OR DOUBLE TRAP)WATER CLOSET (EUROPEAN TYPE)

The W. C. pan shall be of white vitreous China unless otherwise specified of one piece construction of wash down type with integral P or S trap as required. It shall be of approved quality and pattern.

3.1 Installation

The weight of the fixture and user arc supported on the floor and not on The drainage pipe and this should be done in standard approved method.

3.2 seat and cover

The double solid scat with lid shall he of welt plastic seat as specified in the schedule with rubber buffers and shall be fixed in position by using Chromium plated brass hinges and screws. It shall be non-absorptive and free from crack and crevices in the materials, The plastic seat and cover,

where specified, shall conform to I.S. Specifications, and shall be of white colour unless otherwise specified.

3.3 Flushing

The flushing of the Squatting and pedestal w.c. Pan shall be done by 10w level' valueless symphonic flushing cistern of approved quality and capacity, as specified. In the former case, the connection between the flush pipe of the cistern and w.c. pan shall be made by using Rigid PVC pipe connection as specified. The. other specification will be as for Squatting pattern w.c. Pan.

The Hush pipe shall be fixed to wall by using holder bat clamps or embedded, as required.
As specified, low level Cisterns of specified capacity shall be with all internal fittings, brackets and C.P. brass flushing handle, and connected to the w.c. pan by means of 40 nun diameter Chromium Plated brass bend and rubber or any other, as specified.

4.1 BRACKETS

The cistern shall be fixed on Cast Iron Of rolled steel cantilever brackets Nylon braced of required strength which shall be firmly embedded in the wall or fixed by using wooden plug and screws, to t*he* satisfaction of the Consultant/Employer. Depending on (the characteristics of work any type of sanitary fixtures, the fixing of cistern should vary in quality of material and design also. Or it may be installed in other ways like placing on the top at the back of the w.c.

4.2 OVERFLOW

The Cistern shall be provided with 20 mm pipe with fittings which shall terminate into mosquito proof coupling secured in a manner that will permit it to be readily cleansed or renewed, when necessary.

4.3 . FLUSH PIPE:

Unless otherwise stated in the schedule of quantities, the outlet or flush pipe from the low level cistern shall be of 40mm rigid PVC/ brass chromium pipe minimum thickness of 2.6 mm as specified or PVC pipe as directed by the consultant/employer which shall be connected to the W.C pan by means of an approved type of joint adapts. The flush pipe shall be fixed to wall by using holder bat clamps or embedded as require.

4.4 PAINTING C.I. CISTERN

Inside Of cisterns and fittings shall be painted with approved biutumastic paint and outside of the cisterns, if required, brackets, overflow and ibis pipes, if required shall be painted, with 2 coals (If synthetic enamel paint of approved primer to give an even appearance. The cost of such painting shall be include in the rates quoted for concerned items.

5.0 STANDING URINALS

5.1 Bowl Urinal

The urinal shall be flat hack or angular pattern lipped front basin of required dimensions of white vitreous china and one piece construction with internal flushing' box rim of an approved make as specified. It shall be fixed in the position by using wooden plug embedded in the wall with screw of proper size, Each urinal shall be connected to a 40 mm dia, waste lead pipe unless otherwise specified, which shall discharge into a channel or a floor trap, or as specified.

5.2 Half Stall Urinals

The urinal stall and it" screen shall he of white vitreous China of approved quality and manufacturer, The stall shall be 114 cm high and 46 cm wide and 40 cm deep. The stall shall be provided with 84 cm x 36 cm division plates. In case of two or more urinals there shall he further division plates similar to end screens, the range shall have 15 cm deep tread plates of first class quality unless otherwise specified,

5.3 FLUSHING

Where not specified the stall shall be provided with white glazed vitreous China automatic flushing cistern of proper capacity with 6 mm minimum hotly thickness unless s otherwise specified. The cistern shall be complete with fittings and brackets which shall be fixed 10 the: wall the cistern shall be connected to the stall through standard size C.P. brass flush pipe with spreader arrangement and damp unless otherwise specified. Where cistern have not been specified it will be from distribution line through Brass C.P. connector and spreaders.

5.4 Outlet

Each of Half stall shall be provided with C.P. brass outlet grating of size 32mm for each half stall arid then through PVC pipe to urinal channel

6.0 SQUATTING URINALS

6.1 SQUATTING PLATES

The urinal plates shall be of white glazed vitreous China with integral flushing rim of size 600 mm X 350 mm or as specified. There shall be white vitreous channel with stop and outlet pieces in front. The plate and channel shall he of approved quality.
The joint between the urinal plate and the flush pipes shall he made with putty or white lead mixed with chopped hemp.

6.2 Outlet

The squatting plate or a range of squatting plates shall be provided with a 65 mm dia. standard urinal C.I trap with vent arm having 65 mm C.P. brass outlet grating or as specified,

6.3 Walling

The squatting plate shall have 1.22 M high wall in front and on either side, these shall be lined as specified.

7.0 CISTERN

7. I Material

if not specified a high level cistern is intended to operate with minimum height of 191 cm and a low level cistern with a height of 60 cm approx. from the floor finish and the underside of the cistern.
The body thickness of' an earthenware cistern 1.3 cm. The cistern with internal parts shall be free from manufacturing faults and other defects and operate smoothly and efficiently. The cistern shall be considered mosquito proof only if there is no clearance anywhere which would permit a l.6 mm wire to pass through coupling in the permanent position (i. e. flushing or filling) or the cistern. The outlet tilting of each cistern shall he securely concern to the cistern. In the

case die outlet shall he fix low *level* 40 mm dia.

Nominal bore). The outlet of flush pipe from the cistern shall be connected to the pan by means of putty or cement and for E.P.W.C. with rubber joint and putty. The Wish pipe shall he fixed 10 wall by using holder hat clamps.

The discharge rate of cistern shall be about 5 liters in 3 seconds when connected to an appropriate flush pipe and there shall be no appreciable change in the full discharge. The cistern shall have discharge capacity of 5,10, 12.5, and 13 liters with tolerance of +/- 0.5 ltr.

a)

7.2CAPACITY OF CISTERNS AND THE SIZE OF FLUSH PIPE FOR FLAT BACK (BOWL) URINAL

Capacity: The capacity of the flushing cistern and the SIze of the Hush pipe for the number of urinals in a range *will* be as follows

Number of urinals in range	Capacity of flushing cistern	size of pipe	
	Main	ditribution	
1	5 liters	20 mm	15 mm
2	10 liters	20 mm	15mm
3	10 liters	25 mm	15 mm
4	15 liters	25 mm	15 mm

The joint between the urinal basin flush and waste pipe shall be means of putty of white lead mixed with chopped hem, or as specified in case of PVC pipe.

7.3 For Squatting Plate Urinal

Capacity : The capacity of the Hushing cistern and the size of the flush pipe for the number of squalling place urinals in a range will he as follows

Number of urinals In range	capacity of flushing cistern	size of flushing pipe	
	Main	distribution	
1	5 liters	25 mm	20mm
2	10 liters	25mm	20mm
3	15 liters	32mm	20mm
4	15 liters	32mm	20mm

The cistern shall be fixed on R.S. C.I. cantilever brackets of requisite strength which shall he embedded or fixed to the wall by means of wooden plugs and screws,

8.0 WASHING BASINS

8.1 BASIN: The wash basins shall be of white or colored vitreous China as specified and of approved quality, make and pattern. It shall be one piece construction with an integral combined overflow. The size of the basin shall be as specified.

8.2 FITTINGS: Each wash basin shall be provided with 15 mm C.P. brass pillar taps as specified, 32 mm C.P. waste - chain and rubber plug, unions, joint') etc. complete in all respects of approved quality.

8.3 FIXING: The basin shall be supported on a pair of M.S. or C.I. Cantilever or Nylon type brackets of requisite strength embedded or fixed in position by means of wooden cleats and screws. These metal brackets shall be painted to the required shade including a coat of anti-corrosive paint. The wall plaster on the rear shall he cut to overhang the top ~ of the basin.

8.4 WASTE CONNECTION :

The waste shall discharge into a floor trap leading to a gully trap on ground floor and on upper floor may be connected to waste stack.

Where specified wash basins shall be provided with a 20 mm G.I. puff pipe terminating with a brass perforated cap screwed on to *it* on the outside of the wall or connected to antisyphon stack. When the waste pipe discharge freely into a channel or floor trap and is or short length without all bends, no puff will be necessary

9.0 KITCHEN SINKS

Unless otherwise mentioned, the kitchen sink with drain hoard shall be of stainless sled and (If approved quality, make and pattern . It shall be of one piece construction with an integral combined overflow the size of the sink and drain board shall he as specified,

9.1 Fittings

Each sink shall be provided with 15 mm brass C.P. long body bib cock, 40/32 mm waste, chain and rubber plug, unions, joints etc. complete in all respects as specified and of approved quality.

9.2 Fixing

The sink shall be supported on a pair of M.S or C.I cantilever brackets of requisite strength embedded or fixing in position by means of wooden cleats and screws. The brackets shall be painted to required shade including a coat of anticorrosive paint.

9.3 Waste Connection

The waste shall discharge into a floor trap leading to a gully trap, OJ) ground floor and on upper floor it may he connected to waste pipe stack with bottle trap P.v.c. waste pipe.

10.0 TOILET REQUISITES

10.1 Mirror

The mirror shall be of approved make glass with beveled edges. The size and shape of the mirror shall be as specified. It shall be mounted on an asbestos sheet hack and provided with fiberglass frame.

10.2 Shelf

The shelf shall be of glass of approved quality with edge rounded off or of vitreous China (colored or white) of approved make. The size of the shelf shall be as specified. The shelf shall have C.P, brass or aluminum guard rail with rubber washers on positions resting 011 class plate and C P. brass Of aluminum brackets which shall he fixed with c.p. brass or aluminum screws 10 wooden plug firmly embedded in the wall.

10.3 Towel Rail

The towel rail shall be of C. P. brass or aluminum with two C. P. brass or aluminum brackets. The size of the rail shall be as specified. The bracket shall be fixed by means of c.p. brass or aluminum screws to wooden cleats firmly embedded in the wall which win projected 75 mm from wall surface,

10.4 chromium plated stop cock, taps, bib cocks, shower set, gun metal peets valves

If not mentioned otherwise in schedule, cocks and taps arc to be of brass standard head chromium plated of approved make and pattern. They must be capable to withstand at least 10.5 kg per sq.cm. pressure applied for 5 minutes without leakage. The valve arc to be of peel type gunmetal valves. Other conditions remain same as cocks and laps.

10.5 Liquid Soap Holder

This shall be glass Of P.V.C. Of C.P. brass as specified. It shall be fixed in position by means of c.P. brass screw to wooden *cleats* embedded in the wall. The liquid soap holder shall be or approved make,

10.6 Toilet Paper Holder

The paper holder shall be of C.P brass or vitreous chaina as specified. The rolled wooden paper holder shall be made of well seasoned take wood. This should preferably recessed type.

Section-II

SOIL, WASTE, RAIN WATER PIPES & FITTINGS

UPVC SWR (soil, w:aste, rain water) drawings system provides a r:lllge of pipes and fittings for soil, waste, vent, sewer and rain water drainage application and are extremely like in weight.
SWR drainage system is design to carry discharge from toilets baths and basin its consist of a range of pipes and injection molded fittings which are required to correct the waste and vent from each fixture to the sewer drain.

All traps arc to be supplied with either inlet (sockctened) of 125 mm or 110 mm and outlet (spigot end) 01110 mm only. The traps with 125 mm inlet are commonly used to the Indian w.c. pan. All traps have smooth / glazed inside.

Clean the outside of the pipe's sought end and the inside of the scaling grove of the fitting. Apply the lubricant supplied by us uniformly to spigot and sealing ring and pass the spigot end into tile socket containing scaling ring only fully home. Make Rule position of the socket edge with the pencil of felt-tip pin on the pipe, then withdraw the pipe from the sockct by approx. 10 mm (towards (thermal expansion gap).

With horizontal runs, the pipe clips should be spaced at intervals of no more than ten times the outside diameter of the pipes. Vertical lines are spaced *at* interval of one meter to *a* maximum of two meters according to pipe diameter.

The wan / concrete slots should allow for a stress-free installation. Pipes and fitting to be inserted molded the slots without a cement base have to be applied fit with a thin coat of pvc solvent cement followed by sprinkling of dry sand(medium size). Allow it to dry. This process gives a sound base to cement fixation. This process is ,.repeated while jointing PVC material to CI/AC materials

The Supreme UPVC SWR drainage system can he put to use immediately after installation, as no waiting lime required for joints to be set and. direct. However for testing, seal hermetically all openings below the top of the section to be tested. The water level shall then be raised to a height of not less than three meters above highest point of the section being tested or as din the inspection. Officer may direct every 10cm shall be carefully examined tor leaks.

SECTION-III

TECHNICAL SPECIFICATIONS FOR WATER SUPPLY PIPES & FITTINGS

1.0 G.I. PIPES AND FITTINGS

1.1 General

All galvanized iron pipes arc to be of mild steel continuously welded, screwed & socketed tubes, medium quality of Miss TAT A, Jamshedpur make. The pipes and sockets shall be cleanly finished when galvanized in and out and free from cracks surface flaws, lamination, and any other defects. The threads shall be well cut and clean. 1 be details of pipes and sockets regarding nominal] bore, thickness, and weight in kg/m are given below. All G.I. fittings shall *be* of approved brand or make as specified. The pipes and fittings arc to be screwed conforming to British Standard gas thread. In jointing the pipes, threaded portion of both pipes and sockets shall he oiled and rubbed over with white Zinc and fine spun yam wrapped round the screwed end of the pipe which then shall be screwed home to the socket with a pipe wrench. Care must he taken that all pipes and fittings are kept at all times free from dust and dirt during fixing. Any thread remaining exposed after jointing shall be painted.

1.2 Laying of pipes

The layout of the mains and service pipes will be according 10 the drawings. The Contractor is to work out the exact position of flanges and (he exact run or all the pipes and must ascertain from the Consultant/Employer that these are approved, before commencing the work,

Where pipes are to be cut and rethreaded, ends shall be carefully filed so that no obstruction to the bore is offered.

All cutting holes, chases, trenches ere, at any place necessary in connection with the work as per items of this tender and subsequent mending damages are to be included in the rates and Hot to he paid extra unless otherwise specified.

1.3 External Line

Where the pipes run underground these must be fixed at least 45cm below ground level, The galvanized iron pipes and fittings shall be laid in trenches, the width and depth of the trenches for different dimensions of the pipes shall be as given below :

Dia. Of pipe	width of trench	depth of trench
1 5 mm to 50 mm	30 cm	60 cm
65 mm to 100 mm	45 cm	75 cm

At joints the trench width shall be widened where necessary.

The pipe shall be painted with two coats of anticorrosive bit mastic paint of approved quality. the pipes shall be laid on a layer of 7.5 mm sand and filled up to 15 mm above pipes and the remaining shall then be filled with excavated earth with proper ramming as described in Excavation and refilling. Pipes shall not be hid so as to pass through manhole, catch pit drain under any circumstances. Where it is unavoidable, the pipe shall be carried in sleeve MS/GI pipe as approved by the Consultant/Employer, cost of which should be included in the item rate. Where the service pipe will enter the budding below ground level a sleeve pipe is to be provided. The underground water service pipe should be kept at a sufficient distance apart from sewer line, at least 30 cm above where it will cross over the sewer pipe or In common trench. The rates for all above work should he included in item of pipes.

1.4 internal work

Where the pipes run along walls these are to be fixed at 25 mm away by clamps fixed at a distance not exceeding 1.80 cm apart and both sides of turning point. Where the pipe lines are chased in wall as shown in the drawing or specified in the bill of quantities the pipes are to be secured to wall by hook fixed at an interval of 1 M and hooks at all sides of the branches and turning point. Where the pipes cross RCC/masonry wall, column, beam or pillar, these must pass through the appropriate higher sizes of CI/GI sleeve pipe and arc to be included in the rates. No extra claim wills he entertained. In case the pipe is embedded in walls and floors, it should be painted with anticorrosive bit mastic paint of approved quality and the pipe shall be wrapped in burlap of hessian cloth impregnated with bitumen. The wrapping shall be made to fit tightly over the pipe and where wrapping with a new piece it shall overlap the old one and the joint shall be tied with M.S. wire or nylon thread.

It should not come in contact with lime mortar or. Lime concrete as it is corroded by lime. All pipes should be fixed truly horizontal and vertical,

Under the floor the pipes shall be laid ttl a layer of sand filling done under concrete floors.
For pipes 15 mm to 50 mm diameter the holes in the walls and Floors shall be made by drilling 'With chisel or jumper and not dismantling the brick work Of concrete. After fixing, the holes shall be made good with cement mortar 1:3 and properly Finished to match the adjacent surface. Union is to be provided in each of the vertical riser or drop on and from water tank one each near the peets valve. The long screw fittings arc to are to be fitted at an interval of 3 meters for long horizontal line and inside the lavatory/kitchen/laboratory etc after 2 meters,

1.5 Testing the Joints and Lines

After laying and jointing the pipes and Linings shall be inspected under working condition of pressure and flow. Any joint found leaking should be removed and replaced without extra cost The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 kg/sg.cm. (60 metre or double the design working pressure whichever is more) for internal work and for CI water main a pressure of 7 kg. per sq.cm. The pipes shall be carefully charged with water allowing all

air to escape and voiding all shock or water hammer. As water comes out of taps, slop cocks shall then be dosed and specified hydraulic pressure shall be applied gradually. Pressure gauge should be accurate and preferably should have been tested. The lest pressure should he maintained without loss for at least half an hour.

1.6 Painting (Exposed)

On completion of the test the exposed pipes and arc to be painted with two coats of synthetic enamel paint. or approved colour over coat of ;printing and the pipes running

underground shall be painted with two coats of anticorrosive bitumastic pain! with sand bed all round.

Measurement

The length shall he measured in running metre correct to 2. decimal places for the finished work, which shall include the GI pipes and fittings such as bends, tees, elbows etc. but excludes brass or gun metal fixtures like taps, cocks, valves, PVC connectors, etc. The length shall be taken along the centre line of the pipes and fittings as mentioned above. All pipes and fittings shall he classified according to their diameters, method of jointing and fixing substance, *quality and* finish. TIIC diameter shall be the nominal diameters of the internal bore.

or val

be stained or discolored. Before a fatling is plated, the washer plates shall he

SECTION – IV

TECHNICAL SPECIFICATIONS FOR SEWERS AND DRAINS

1.O STONEWARE PIPES

1.1 Materials

The S. W. Pipes with spigot & socket ends and fittings should be Grade 'A' and shall he obtain from approved manufacturer listed in the tender. The pipe shall conform to IS 651-1955.

These shall be sound and free from visible defects such as fire crack or hair crack and Haw or blister, The pipe shall give a sharp clear note when struck with a 11ght hammer and should be perfectly salt glazed. The approximate thickness of 60 cm, Long pipes shall be as given in the table below:

1.2 S.W pipes

Internal diameter of the pipe in mm.	Thickness of the barrel & socket in mm,	weight of each pipe per miter in kg
100	12	14
150	15	22
200	16	33

230	19	44
250	20	52
300	25	79

The length of pipes shall be 60 cm exclusive of the internal depth of socket

1.3 EXCAVATION OF TRENCHES

The gradient is to be set out by means of sight and bonning rods and the required depth be excavated at any point. The trench shall be excavated as directed the consultant/employer. The depth of the trench shall not be less than 1 miter measured from the top of the pipe to the surface of the ground under roads and less than 0.75 cm elsewhere. The width of the trench shall be nominal diameter of the pipe plus 40 cm but it shall not be less than 80 cm incase all kind of soil excluding rocks and not less than 55 cm. in case of work.

The bed of the trench, if in soil Of made up earth, shall be well watered and rammed before laying (he pipes and the depressions if any shall be properly tilled with earth ahead consolidated in 20 cm lavers. If rock is met with, it shall be removed to l5 cm below the level of the pipe and the trench will be refilled with excavated materials and consolidated . the excavated materials shall not be placed within 1 (one) mere or half of the depth of the trench whichever is greater from the edge of the trench, I . The materials excavated shall be separated and stacked so that in refilling they may be re-laid and compacted in the same order to the satisfaction of the Consultant/Employer.

After the excavation of the trench is completed, foundation of cement concrete (1 :3 :6) or lime cone. as specified of proper width and thickness to be laid with proper level all along under the length of the pipe with hunching as per drawing.

1.4 Laying, .Jointing, t launching of the pipe and fittings

The rain pipes shall he laid in straight lines and to even gradients as shown on the drawings. The socket end of the pipes shall face upstream. Adequate care shall be exercised in gelling out and determining the levels of the pipes and the contractor shall provide suitable instruments, templates sight rails, bending rod. s and equipment s necessary for the purpose tilt: joints arc to be kept wet until the cement joints are properly set with wet bag. The cement mortar joints shall he cured at least for seven days.

In case of S. W. Pipes joint" (socket and spigot), they should he caulked first with tarred jute (spun) soaked in cement slurry of requisite diameter, almost quarter depth of the socket, at ("T which cement mortar (I: I) is pushed in with wooden chisel and finished beveled at outside al 45 degree. Instead of jute or hemp rubber gasket of proper size may *also* be used.

in case of pipes less than 25 cm ,dia. joints should be made at ground level with 3 pipes at a time and for larger ones 2 pipes at. a time and after curing they should be rolled in foundation with the help of ropes ..

An pipes should be properly launched and/or provided with chair as per drawing. Details of the foundation and covering etc. are to be taken from the drawing provided. Where the pipes are crossing the building or road around concrete *1:4:8 is to be* done to 15 cm thick over the barrel of the pipe.

Any treasure-trove, coin or object or antiquity which may he found on the site shall be molded

over the Employer.

5.0 CHAMBERS/MANHOLES

5. I Size

At every change of alignment, gradient or diameter of a drain there shall he a manhole or inspection pit. The maximum distance between manhole chamber shall be 30 M for road, 15 M within compound.

5.2 Size

All manholes shall have internal dimensions as shown on drawings The depth of invert shall be according (0 the gradient.

5.3 foundation

The base concrete shall be 15 cm thick and with 1:4:8 cement concrete laid over the brick flat soling. The slab shall be finished 75 mm beyond the external the face of the brick work.

5.4 Brick Work

The brick work shall he in cement sand mortar in the proportion. 1:5 and 250 nun thick or as mentioned in the tender. The joints shall be raked out.

Plaster

Inside walls and bottom of pit shall be plastered as specified in the item and shall be finished with floating, coat of neat cement. In wet ground, 20 mm thick plaster shall be done on the exterior surface of the walls also and this plaster shall be waterproof with the addition of approved water proofing compound :15 per manufacturer's specification,

Pointing

In dry ground pointing shall be done in 1:2 cement mortar to the outside surface.

5.5 Hunching and construction

On the top or the base slab from half pipe channel longitudinally at the centre, the channel is to be hunched up with concrete slopping towards from the edge of channel to meet the side of the chamber at gradient of 1:6, The channel an the benching arc to he floated to smooth *hard* surface *with a* coat of cement mortar. Extra cement Sewers are unequal sectional area shall not be joined at the event in a manhole unless it IS unavoidable. The branch sewers should deliver sewage in the hole in the direction of main flow and the junction must be made with heel rest bend at the bottom of drop connection C. J. shall he provided with heel rest bend at the bottom and bend with access door at the top for cleaning purposes.

6.0 CUTTLNG HOLEs, chases, etc, repairing the same:

Holes and chases to be cut into walls, slabs, etc. must be of the minimum size and extent required to run the service and in no case superfluous cueing is 10 be resorted to. After the services are laid, the chases and holes must be made good in cement concrete with suitable Finish, These repairs must be done very carefully S() that the finished surface is uniform and harmonious with the rest of the adjoining surface. No extra claim will be entertained in his respect.

7.0 RCPC AND POLYELASTOMER STREET MANHOLE COVERS AND FRAMES:

7.1 Unless otherwise mentioned the covers and frames shall be at IS 2592

Unless otherwise mentioned the covers and frame shall be of IS 2592 Part I and Part 11 obtained from approved manufacturer and shall he of approved make and brand as listed.

Covers and frames shall be cleanly cast, they shall be free from air and sand holes, cold shut" and wrapping which are *likely* to impair the utility of the casting. All casing shall he free from voids

whether due to shrinkage, gas inclusion or other causes. 'I he covers shall be gas tight and water tight with proper seal arrangement, but can be easily opened and closed and it shall be fitted in the frame in workmanship like manner. The cover used for sewer line should bear sewer engraved on top of casting. Simibr1y for storm line it shall be marked 'storm'. Size and dimensions are given .below with weight. 2.5 variations in weight shall be permissible. Size of cover shall be the clear internal dimensions of frame. Covers shall have raised chequered design to provide an adequate non-slip grip. The covers and frames shall be coated with anticorrosive paint of bituminous composition. 'I1IC frame of manhole cover shall be firmly embedded to correct alignment and levels in R.C.C. slab or plain concrete 3S the case may Be .

8.0 GULLY PIT

To be of the standard size 1.06 m x 0.03 m and to be built in cement mortar (3:1) as specified in *strict* accordance with be drawings. The internal side and the floor are to be finished whit 12 mm cement plaster to be fitted with a 150 mm C.I. overflow pipe with hinged cover and handle 0.90 x 0.45 C.I. gully grid of the stander weight, 15 cm siphon. The gully grid and frame are to be of rcpc bearing capacity 20 M.T. size grating 700 x525 x 70 mm and frame 820 x 670 x165 mm.

S.W. GULLY TRAP

S. W. Gully trap of specified sizes and quality shall be fixed on 15 cm thick
cement concrete 1:3 :6 bedding and tile gully outlet of the branch drain shall be joined similar to joining of S. W. pips, A brick masonry chamber 30 cm x 30 cm internally shall be constructed half brick masonry with 1 :6 cement mortar and the space between the trap and the wall filled up with cement concretel:4:~ and the upper portion of the chamber finished internally with 1:3 cement mortar and finished with neat cement, the corners and the bottom of the chamber shall be rounded off so as to slope towards the grating. in addition the chamber shall have a C.I. grating with frame 30 cm x 30 cm (inside) with machined seating faces, fixed on the top of be brick with cement concrete 1:2:4 and rendered smooth. The weight off grating shall not be Jess than 4.53 kg. and that of frame 2.72 kgs.

SANITARY AND PLUMBING WORKS

LIST OF APPROVED BRAND AND MANUFACTURERS

1. SANITARY FIXTURE(FIRST QUALITY VITREOUS CHINA): M/S PARRY INDIA LTD,M/S HINDUSTANSANITARYWARES.M/S MADHUSUDAN CERAMICS)
2. FOR stainless steel sink: M/S EID PARRY INDIA LTD,M/S SAIL,M/S JYOTI INDUSTRIES(NIRALI) JAYNA BRAND
3. PVC FLUSHING CISTERNS – SLIMELINE/COMMANDO/DUROLITE Scaffolding
4. CHROMIUM PLATED BRASS FITI1NGS: ESSCO, Jaquar Kingston, MARE, ESSESS,

5. a) UPVC(SWR). SOIL, WASTE RAIN WATER PIPE AND FITfINGS -IS 13592 SUPREME, PRINCE, ORIPLAST .

b)HCI son, WASTE PIPE AND FITTING IS 1729 : ALC, BIC, AMC,

6)GALVANISED IRON PIPES –IS 1239 :TATA ,NEZONE JINDAL I

8.G.I. FITTINGS: IS:879 'R' Brand manufactured by M's R.M. Engineering Ltd., Ahmedabad, 'SUN' Brand, NMC, AA, I-IB, Nil

9.GUNIv1ETAL VALVE & COCK: IS:778-84

'Leader' Jallundhcr, *MIs* Bombay Metal & Alloy Mfg. Co.(J» ltd.,
Zoloto Industries, lallamlhar.

11. GLAZED STONWARE WERE PIPE & FITTING IS-651/1955 M/s I LIND CERARNICS LTD.

12. WHITE REGID PVC PIPES & FITTING IS 4985 SQER SUPRIM, PRINCE, ORIPLAST.

13.H.D.P.E. PIPE & FITTINGS IS 4984 ORIPLAST, EMCO BRAND.

NOTE

1	THE ARCHITECT / BANK RESERVES THE RIGHT TO CHOOSE ANY ONE OF THE MAKES OF MATERIALS IN THE APPROVED LIST.
2	THE CONTRACTOR SHALL FURNISH, AS AND WHEN DEMANDED BY THE EMPLOYER/ CONSULTANT, THE INVOICE/ BILLS OF PURCHASE FOR VERIFICATION OF QUALITY QUANTITY AND MAKE OF THE MATERIALS.

Signature of Contractor: Name of Contractor
Address of the Contractor Date and Seal:

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORK

SCOPE

The Scope of work under Internal Electrical Works shall cover the supply installation, testing and commissioning of the complete electrical power , lighting , fire alarm & access control system and communication system (if any) of the entire Premises including approval from statutory authorities.

It is not the intent to specify completely herein all aspects of design and constructional features of equipments and details of the work to be carried out, nevertheless, the equipment and work shall conform in all respects to high standards of Engineering, design and workmanship and shall be capable of performing in continuous operation in a main acceptable to the Client who will interpret the meaning of the specifications and drawings and shall have right to reject or accept any work or material which in assessment is not complete to meet the requirement of this specifications and or applicable code and standards mentioned else where in this specifications.

1.0 STANDARDS AND REGULATIONS

2.1 All materials and the equipments used in the work shall be ISI and TAC approved and installed with a high degree of workmanship.

2.2 The installation as a whole , shall confirm in all respects with I.E. rules , Indian Standard Specifications , Regulations of the Tariff Advisory Committee (General Insurance) and
the Electricity Supply Co.'s rules and regulations.

3.0 GENERAL

3.1 BROCHURE AND DATA

The contractor shall submit four copies of all brochures, manufacturer's description data and similar literature. One copy will be returned to the contractor after approval.

3.2 APPROVAL

The Engineer's approval of such drawings, schedule, brochures, etc. will be an approval of general details and arrangements only and shall not relieve the contractor from responsibility for deviation from drawings or specifications unless he has in writing called the Engineer's attention to such deviations at the time of submission nor shall it relieve the contractor from responsibility for errors or omissions of any kind in the shop drawings when approved.

3.3 STORAGE

All materials and equipment's shall be stored properly to the satisfaction of the Engineer so that physical handling and climatic conditions do not affect the equipment's.

3.4 CUTTING & PATCHING

Cutting, patching and redoing shall be kept to the minimum. Wherever such works are required to be carried out, necessary permission shall be obtained from Engineer before cutting and patching up. Those shall be subsequently furnished properly to the satisfaction of Engineer. Care shall be taken to prevent damage of finishing.

3.5 PROTECTION

All work, equipment and material shall be protected at all times to prevent obstructions, damage or breakage. All equipments shall be covered and protected against water, dust, sand as well as chemical and or mechanical damage. At the completion of the work, all equipment shall be thoroughly cleaned and delivered in a perfect unblemished and working conditions.

3.6 CONTRACT RATES

The rates and prices shall be deemed to have included all labour, materials used, plants and tools, temporary works, minor building works like cutting, chases, holes, making good, grouting, finishing etc., insurance, sales tax, local taxes and duties, establishment charges, profit, supervision, transport, storage, testing & commissioning and other charges and fees and every expenses required to be incurred for proper and due execution including approval from Electrical Inspector and/or from all other statutory authorities or may be required and amended by laws till commissioning of the project.

3.7 COMPETENCY OF ELECTRICAL STAFF

Accepted norms of good workmanship is required. The electrical works shall be done by qualified and trained staff having First Class Wireman's license and Supervisory Competency Certificate

having sufficient competency in electrical works and under the overall supervision of electrical contractors.

3.8 APPROVAL OF MATERIALS

All materials used on the works shall be new and of the best quality available, conforming to the relevant specifications and approved makes list. Prior approval should be obtained in writing from the Engineer for all materials proposed to be purchased of makes not included in 'Approved Makes list' and when necessary, approved sample duly identified and labeled shall be deposited with the Engineer.

3.9AS BUILT DRAWINGS

On completion of work, the contractor shall submit to the Engineer, a reproducible and five copies of as built drawings showing :-

a) Conduit layout, location of junction boxes and number of wires through each section of conduit.

b) Circuit distribution scheme for each main and sub-distribution board. This shall indicate various outlets controlled by each fuse/circuit breaker and phase wise distribution of load.

c) Location of distribution and sub-distribution boards.

d) Distribution layout of telephone system.

e) Distribution layout of computer network.

f) Earthing system

4.0 LIGHTING SYSTEM EQUIPMENT

4.1 SCOPE

This specification covers the design, manufacture, testing, inspection and delivery to site of lighting system equipment such as light control switches, lighting and power receptacle units, ceiling fans, lighting fixtures conduits and other similar items necessary for lighting system.

4.2 SUB-DISTRIBUTION BOARDS (NORMAL & EMERGENCY)

4.2.1 CONSTRUCTIONAL FEATURES

Boards shall be sheet steel enclosed and shall be fully dust and vermin proof, providing a degree of protection of IP:52. The sheet steel used shall be cold rolled and 2 mm thick for meter boards.

All boards and panels shall be provided with hinged doors for access to equipment. Doors shall be casketed all round with neoprene gaskets. For wall mounting, lighting panels when provided with MCBs, a hinged, latched front door shall be provided with key-locking facility and a slotted bakelite sheet shall be provided inside. Only the MCBs operating knobs shall project out of the bakelite sheet slots for safe operation and neat appearance.

All accessible live connections/metals shall be shrouded and it shall be possible to change individual MCBs from the front of the boards/panels without danger of contact with live metal.

Adequate interior cabling space and suitable removable cable entry plates shall be provided for top & bottom entry of cables through glands and or conduits. Necessary number of glands to suit the specified cable sizes shall be provided. Cable glands shall be screwed on type and made of brass.

Two earthing terminals shall be provided to suit the PURCHASER's earthing conductor.

All sheets steel parts shall undergo rust-proofing process which should include degeasing, de-scaling and a recognised phosphating process. The steel works shall then be painted with two coats of Zinc-chromate primer and two coats of final stove-enamelled finish paint of colour. For chemical/corrosive areas, epoxy paint shall be used.

4.3 BUSBARS

Busbars shall be of aluminium alloy of 91E grade as per IS 5082 for Main Panel and of electrolytic grade copper for sub-distribution boards (SDB/SLDB).

Busbars shall be provided with at least the minimum clearances in air as per applicable standards for a 500V, 3 phase system.

Busbar shall be totally sleeved with coloured (Red , Yellow , Blue and Black)heat shrunk PVC , High tensile bolts , nuts , washers spring washers shall be provided at all the Bus bar joints

Busbars shall be adequately sized for the continuous current rating such that the maximum temperature of the busbards, busbar risers/droppers and contacts does not exceed 85^0C under site reference temperature.

The busbars, busbar connections and busbar supports shall have sufficient strength to withstand thermal and electro-mechanical stresses of the fuse/MCB's let through/cut-off current associated with the specified short-circuit level of the system.

Busbar supports shall be made from FRP (Fibreglass Reinforced Polyester).Separate supports shall be provided for each phase of the busbars. If a common support is provided for all three phases, anti-tracking barriers shall be incorporated.

The neutral bus of the main 3 phase, 4 wire distribution board shall be rated not less than 50% of the phase busbars. The neutral bus of the 1 phase ways lighting panel shall be rated same as the phase busbars. The neutral bus should have sufficient terminals and detachable links for full number of single-phase outgoing lighting circuits.

4.4 PANELS/BOARDS' COMPONENT EQUIPMENT

4.4.1 Miniature Circuit Breakers (MCB)

MCBs shall be hand operated, air break, quick make, quick break type conforming to applicable standards.

MCB shall be provided with overload/sort-circuit protective device for protection under overload and short-circuit conditions. The minimum breaking capacity of MCBs shall be 10 kA r.m.s. at 415V.

4.4.2 Internal Wiring

Panel/boards shall be supplied completely wired, ready for the PURCHASER's external connections at the terminal blocks. Wiring shall be carried out with 1100/650V grade, PVC insulated, stranded copper, conductors. Conductors of adequate size shall be used to suit the rated circuit current.

Engraved identification ferrules, marked to correspond with the wiring diagram shall be fitted at both ends of each wire.

All wiring shall be terminated on terminal blocks. Terminal blocks shall be one piece moulded 650V, of reputed make, preferably stud type for higher current ratings such that wires are connected by cable-lugs and complete with nuts and washers. Terminals shall be adequately rated for the circuit current, the minimum rating shall be 20A.
Terminals for circuits with voltage exceeding 125V shall be shrouded.

Terminals shall be numbered and provided with identification strip for identification of the circuit.

4.4.3 Label & Diagram Plate

All door mounted equipment as well as equipment mounted inside the switchboards/panels shall be provided with individual labels with equipment designation/rating. Also the boards/panels shall be provided on the front with a label engraved with the designation of the board/panel as furnished by the PURCHASER.

Labels shall be made of non-rusting metals, 3-ply lamicoid or engraved PVC.

Inside the door of the 1 phase ways lighting panels a circuit diagram/description shall be fixed for reference and identification.

4.5 Light Control Switches

Light control switches of ratings and types, i.e. decorative shall be supplied as indicated in BOQ. The switches shall be grid plate type/Piano Key type suitable for use on 240V, 1 Phase, 50 Hz supply.

Switches shall be of flush type for mounting behind an insulated plate or incorporated with a switch plate for mounting flush with the surface of wall or switch box/suitable enclosure. The switch box/enclosure may be recessed into or mounted on a wall as per the requirements of project layouts.

The size of enclosure boxes shall be chosen to accommodate the number of switches to installed at the particular location. The enclosures shall be 16 SWG sheet steel stove enamelled/galvanized. The enclosure box shall be covered with perspex/insulating cover. An enclosure intended for surface mounting shall not have holes or gaps in its sides other than those expressly provided for cable entry.

4.6 Receptacle Units

Receptacle units shall consist of socket outlet with associated switch and plug.The socket outlet and switch or MCB shall be flush mounted within a stove enamelled 16 SWG steel enclosure with

Perspex/insulating cover. The box may be recessed into or mounted on a wall as per requirements of project layouts.

The receptacle units shall be suitable for 240V, 1 phase, 50 Hz/415V, 3 phase, 5Hz supply as indicated. Single phase receptacles shall be associated with a switch/MCB of same current rating and the receptacle shall become live only when the associated switch/MCB is in "ON" position.

The plugs shall be provided with cord grips to prevent strain and damage to conductors/wires at connection and entry points.
The types and current rating of receptacle units shall be as indicated in BOQ and they shall conform to the applicable standards.
Whenever required, receptacle units may be provided with MCBs instead of switch.

4.7 Lighting Wires
The wiring of lighting system shall be carried out through 650/1100V, PVC insulated, unarmored stranded copper conductors, unless otherwise specified. The wires shall conform to the applicable standards.

The minimum area of conductors shall be 1.5 sq.mm for point wiring of light fittings and 6A receptacles and 4.0 sq.mm for receptacles rated 16A and above as indicated in BOQ. The Circuit wiring for light fitting shall be with 2.5 sq.mm stranded copper conductors.

The wires shall be coated red, yellow, blue for R,Y,B phase and black for neutral and green for earthing. The approximate quantities of wires shall be indicated by the PURCHASER only when the same are not covered in the CONTRACTOR's "Point Wiring" work under lighting system installation work. Unless otherwise specified, lighting cables shall be of 650/1100V grade, 3, 3-1/2 and 4C, PVC insulated and armoured type for main distribution boards.

4.8 Conduits UPVC (Unplasticised PVC) conduits and their associated fittings as per sizes shall conform to applicable
standards. The minimum size of conduit shall be 20mm.

Supply of conduits shall include all associated fittings like couplers, bends and tees as required for lighting system installation work including suitable fish wire, if necessary.

4.9 Junction Boxes
Junction boxes with terminals shall be supplied for branching and terminating lighting cables when required for outdoor areas, 3 phase receptacles etc.

The junction boxes shall be dust and vermin proof and shall be fabricated from 14 gauge sheet steel and shall
be complete with removable cover plate with gaskets, two earthing terminals each with nut, bolt and washer.
Boxes shall be additionally weather-proof when specified.

The boxes shall have provision for wall, column, pole or structure mounting and shall be provided with cable/conduit entry knock outs, terminal blocks, HRC fuses, etc.

The terminal blocks, with specified number of terminals, shall be mounted securely on bracket welded to the back sheet of the box. The terminals shall be 600V grade,one piece construction complete with terminals,
insulation barriers, galvanized nuts, bolts and washers and provided with identification strips of UPVC. The
terminals shall be made of copper alloy and shall be of box clamp type.
The boxes shall be painted with one shop coat of Red Oxide Zinc chromate primer followed by a finishing coat of paint as specified.

5.0 LIGHTING SYSTEM INSTALLATION WORK

5.1 Scope

This specification indicates the requirements of lighting system installation work. The installation, testing and commissioning of complete lighting system and power receptacles shall be carried out in accordance with the Lighting Installation Notes, the PURCHASER's /ENGINEER's Drawings and as stipulated in this specification and Data Sheets. Separate Specifications when enclosed, cover the requirements of lighting equipment supply.

5.2 Installation Work Scope

The installation work shall include storing, unpacking, fixing of all equipment associated with lighting system, routing and laying conduits, wiring, termination with copper lugs wherever required, testing, commissioning and all other work items necessary for completing the job.

The supply of all mounting accessories, earthing wires and incidental hardware and consumables like fixing saddles, spacer plates, junction boxes and conduits required for the fitting fixing/suspension points, point boxes and connectors, jointing ferrules, all fixing brackets, screws and studs, shall be deemed to be included as part of installation work. Mounting accessories like saddles, spacer plates, joint boxes, junction boxes and
fixing hardware shall be of galvanized mild steel.

The CONTRACTOR shall work in co-ordination with the Civil and Air- conditioning Contractors and where holes or openings in walls and floors, cut-outs in false ceilings are required the CONTRACTOR shall inform the ENGINEER and other respective Contractors. Holes in walls made by the CONTRACTOR shall necessarily be patched by him in a good and approved manner, using the same kind of masonry as in the structure surfaces.

The CONTRACTOR shall be responsible if parts of panels, fittings, etc. are lost or damaged and all damage and thefts shall be made good by the CONTRACTOR till the installation is handed over to the PURCHASER.

The CONTRACTOR shall touch-up painting on lighting panels/boards if the same is damaged during installation handling.

5.3 Point Wiring

Whenever asked for, if installation is to be carried out on point wiring basis, the supply of following shall be deemed to be included as part of the installation work, in addition to the items mentioned in para 4.3.3.

a) 650/1100V lighting wires for conduit wiring, minimum size of 1.5 sq. mm PVC insulated copper conductor.

b) PVC conduits with all relevant accessories and junction/inspection boxes. Minimum size 20 mm for exposed/concealed conduits respectively.

c) Necessary 6A/16A light control switches of grid plate type on MS boxes.

d) Required switch and receptacles units in similar boxes as in item (d) above. Wiring of each lighting fitting/receptacle unit/ceiling fan/bell etc. shall be considered as one point. However, when two or more receptacles are to be wired at the same location/in the same box. Wiring of first receptacle shall be considered as one point and wiring of each of subsequent receptacle at that location shall be considered as half point each.

5.4 Concealed Wiring

For installations requiring concealed conduit wiring, the supply routing and laying of UPVC conduits of minimum size 20mm in walls/ceiling, from lighting panels upto fittings, receptacles, inspection/junction boxes etc. shall be in the CONTRACTOR's scope. The CONTRACTOR shall closely co-ordinate his work with that of the Civil Contractor. The CONTRACTOR shall prepare and furnish drawings showing the location of the embedded conduits/junction boxes/inspection boxes, based on the PURCHASER's lighting layout drawings.

5.5 Wiring

Unless otherwise stated wiring shall be carried out in UPVC conduits. All types of wiring, concealed or unconcealed shall be capable of easy inspection.

Unconcealed wiring when run along walls shall be as near the ceiling as possible. In all types of wiring, due consideration shall be given for neatness and good appearance.

Wherever specified, Emergency lighting shall be switched in through change-over Switch on AC mains failure, and manually switched in for testing, independently of normal lighting. Emergency lighting cables shall run in a separate conduit system. In large rooms, the lighting system shall be distributed among three phases. Wiring shall be colour coded so as to enable easy identification of phase and Neutral conductors. The neutral shall be of the same size as the phase conductor. There shall be a circuit breaker or a linked switch on each live conductor of supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in neutral wire in the form of switch or fuse unit.

Conductors not arranged for connection to the same system and circuit or supply different phases of the same supply, shall be kept a part throughout their entire run.

Receptacles and lighting fittings in general shall be fed from different circuits. Six amps receptacles for toilet or small change rooms can be fed from the lighting circuit with proper isolating arrangement.

Each final sub-circuit from a lighting panel shall be controlled by a single pole switch connected to the live conductor.

For long conduit wiring runs, inspection/pull boxes shall be provided at intervals not exceeding 5m. Such facilities shall also be provided at conduit bends.

5.6 General Practices

All receptacles and switches to be installed in offices and control rooms shall be flush mounted within the wall and those in other areas shall be wall or column mounted.

Ceiling roses shall not embody fuse terminals as an integral part of it. For voltages exceeding 250 volts, a ceiling rose or any similar attachment shall not be used.

A socket outlet shall not embody fuse terminals as an integral part of it. The switch controlling the socket outlet shall be on the live side of the line.

All exposed metal parts of the plug, when the plug is in complete engagement with the socket outlet,
shall be in effective electrical connection with the earthing pin.

5.7 Earthing

Conduits and fittings shall be earthed by 14 SWG Copper wires (unless otherwise stated, run along the length of the conduit and secured by means of suitable clamps efficiently fastened to conduit pipe. To achieve perfect electrical continuity, the conduits shall be bonded effectively on either end of a coupling and other joints. Earth bonding clips shall be provided.
Conduits shall be grounded at the ends adjacent to switch boards at which they originate or otherwise at the commencement of the circuit, by a earthing conductor connected at an earth clip, clamp or gland, in effective electrical contact with the conduit.

5.8 Testing and Commissioning

Before a completed installation, or an extension to an existing installation is put into service, installation tests stipulated in applicable Standards and Codes of Practices shall be carried out by the CONTRACTOR in the presence of the Client's representative.

6.0 LIGHTING FITTING AND ACCESSORIES

6.1 Scope

This specification covers the design, material specification, manufacture, testing, inspection and delivery to site and installation & commissioning of lighting fittings and their associated accessories.

6.2 Standards

The lighting fittings and their associated accessories such as lamps/tubes, reflectors, housings, ballasts, etc. shall comply with the latest applicable standards as specified. Where no standards are available, the supply items shall be backed by test results, shall be of good quality and workmanship & any supply items which are bought out by the VENDOR shall be procured from approved manufacturers acceptable to the PURCHASER/ENGINEER.

6.3 Lighting Fittings – General Requirements

Fittings shall be designed for continuous trouble free operation under atmospheric conditions as specified (in Sections B & C of project information) without reduction in lamp life or without deterioration of materials and internal wiring. Outdoor fittings shall be weather-proof and rain-proof type.

The fittings shall be designed so as to facilitate easy maintenance, including cleaning, replacement of lamps/starters etc.

Connections between different components shall be made in such a way that they will not work loose by small vibration.
For each type of lighting fitting the VENDOR shall supply the utilization factor to indicate the proportion of the light emitted by the bare lamps which falls on the working plane.

All fittings shall be supplied complete with lamps suitable for operation on a supply voltage and the variation in supply voltage.

The fittings and accessories shall be designed to have low temperature rise. The Temperature rise above the ambient temperature shall be as indicated in the relevant standards.

All mercury vapour and sodium vapour lamp fittings shall be complete with accessories like lamps, ballasts, power factor improvement capacitors, starters wherever applicable etc. These shall be mounted as far as possible in the fitting assembly only. If these cannot be accommodated inside, then a separate metal enclosed box shall be included to accommodate the accessories and in addition with a fuse and a terminal block suitable for loop-in, loop-out connections. Outdoor type fittings shall be provided with outdoor type weather-proof box.

All fluorescent lamp fittings shall be complete with all accessories like ballasts, power factor improvement capacitors, lamps, starters and capacitors for correction of stroboscopic effect.

Each fitting shall have a terminal block suitable for loop-in, loop-out and T-off connection by 650/1100V, 3 core, PVC insulated Cu conductor cable of 2.5 sq. mm. in size unless otherwise specified in Data Sheet A1. The internal wiring should be completed by the MANUFACTURER by means of stranded copper wire and terminated on the terminal block.

The mounting facility and conduit knock-outs for the fixtures shall be as specified.

All hardware used in the luminaire shall be suitably plated or anodized and passivated for use in chemical industrial and power plants.

6.4 Earthing

Each lighting fitting shall be provided with an earthing terminal suitable for connection to the earthing conductor.

All metal or metal enclosed parts of the housing shall be bounded and connected to the earthing terminal so as to ensure satisfactory earthing continuity throughout the fixture.

6.5 Painting / Finish

All surfaces of the fittings shall be thoroughly cleaned and degreased. The fittings shall be free from scale, rust sharp edges and burrs.

When enamel finish is specified, it shall have a minimum thickness of 2 mills for outside surface and 1.5 mills for inside surface. The finish shall be non-porous and free from blemishes, blisters and fading. The housing shall be stove-enamelled/epoxy stove-enamelle-vitreous enamelled or anodized as indicated on flame-proof fittings is prohibited.

The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 900 over ½" dia mandrel.

Te finish of the fittings shall be such that no bright spots are produced either by direct light source or by reflection.

7.0 EARTHING SYSTEM

7.1 General

The earthing system shall comply with all currently applicable standards, regulations and safety codes of the locality where the installation is to be carried out. Nothing in this specification shall be construed to relieve the CONTRACTOR of this responsibility.

The installation work shall conform to the latest applicable Electricity Rules, standards (IS : 3043) and codes of practice.

7.2 Scope of Supply

The earthing & electrodes shall be supplied by the CONTRACTOR when specifically indicated. Conductors shall be free from rust, scale and other electrical and mechanical

defects and all materials used shall conform to relevant standards or approved by the Engineer . The sizes, materials and quantity shall be as listed.

Steel earthing conductors above ground shall be hot-dip galvanized , unless otherwise stated, to prevent atmospheric corrosion.

7.3 Scope of Installation Work

The CONTRACTOR shall carry out the earthing of all equipment/panels / structures. Whether specifically shown in drawings or not, building columns, hand-rails, miscellaneous items such as junction/marshalling boxes, field switches, cable boxes etc., shall be earthed.

The CONTRACTOR shall install bare/insulated, copper/aluminium conductors, etc. required for system and individual equipment earthing. All work such as cutting, bending, supporting, painting/coating, drilling, brazing/soldering/ welding, clamping, bolting and connecting into structures, equipment frames, terminals, rails or other devices shall be in the CONTRACTOR's scope of work. All incidental hardware and consumable such as fixing cleats/clamps, anchor fasteners, lugs, bolts, nuts, washers, bitumastic compound, anti-corrosive paint as required for the complete work shall be deemed to be included by the CONTRACTOR as part of the installation work.

The quantities, sizes and material of earthing conductors and electrodes to be installed, and routes of the conductors and locations of electrodes shall be shown on the project drawings.

The alignments of conductors are approximately shown in the earthing drawings and these may be suitably shifted/finalized in consultation with the site ENGINEER / PURCHASER to avoid any interference. If earth connection to any device is not shown specifically in the relevant earthing drawings, it shall be field routed.

The scope of installation of electrodes shall include installation of these electrodes such as (a) directly in earth, (b) in constructed earth pits, and connecting to main buried earth grid, as per enclosed drawings/relevant standards. The scope of work shall include excavation, construction of the earth pits including all materials required for construction of the earth pits, placing the rod, providing and fixing test links on those rods in test pits and connecting to main earth grid conductors.

The location of the earth electrodes will be such that the soil has reasonable chances of remaining moist, as far as possible. Entrances, pavements and roadways are definitely avoided for locating the

earth electrodes.
The scope of installation of the test links shall include mounting of the same at specified height on wall/column by suitable brackets and connections of the test link to the earth electrode.

7.4 Work Details

Earthing conductors along their run on walls and columns shall be supported by cleating/welding at intervals of 750 mm and 1000 mm respectively.

Wherever earthing conductors cross underground service ducts and pipes, it will be laid 300mm below, the earthing conductor shall be bounded to such service ducts/pipes.

Wherever main earthing conductor crosses cable trenches, they shall be buried below the trench floor.

Suitable earth risers approved by the ENGINEER shall be provided above finished floor/ground level, if the equipment is not available at the time of laying of the main earth conductors. The minimum length of such riser inside the building shall be 200 mm and outdoors shall be 500 mm above ground level. The risers to be provided shall be marked in project drawings.

Earth leads and risers between equipment earthing terminals and the earthing grid shall follow as direct and short a path as possible.

Neutral connection shall never be used for the equipment earthing. Each neutral point of a transformer shall be earthed to two separate earth electrodes for connection with earthling system.

Shield wire in sub-stations shall be connected to the earthing grid through test links at every alternate switchyard portal tower.

An earthing pad as shown in the drawings shall be provided under each operating handle of the isolator and operating mechanism of HV breakers. Operating handle of the isolator and supporting structure shall be bonded together by a flexible connection and connected to the earthing grid.

A separate earth electrode bed shall be provided adjacent to structures supporting lightning arrestors and coupling capacitors. Each connections shall be as short and as straight as practicable. For arrestors mounted near transformers, earth conductors shall be located clear of the tank and coolers.

Whenever earthing conductor passes through walls, galvanized iron sleeves shall be provided for the passage of earthing conductor. The pipe ends shall be sealed by the CONTRACTOR by suitable water proof compound. Water stops shall be provided wherever earthing conductor enters the building form outside below grade level. Water stops and above mentioned sleeves shall be provided by the civil contractor.

7.5 Earthing Connections

All connections in the main earth conductors buried in earth/concrete shall be welded/brazed type. Connection between main earthing conductor and earth leads also be a welded/brazed type. Cad welding type connections shall be done if specifically indicated.

Connection between earth leads and equipments shall be of bolted type, unless, otherwise specified

or shown in the drawings. Equipment vendors shall provide earthing terminals on their equipments.

Welding and brazing operations and fluxes/alloys shall be of approved standards.

All connections shall be of low resistance. Contact resistance also shall be minimum.

All bimetallic connections shall be treated with suitable compound to prevent moisture ingression.

Metallic conduits and pipes shall be connected to the earthing system unless, otherwise specified.

Lightning protection system down conductors shall not be connected to other earthing conductors above ground level. Also no intermediate earthing connection shall be made to lightning arrestor, transformer and CVT earthing leads which shall be directly connected to pipe plate/rod electrode.

7.6 Earth Electrode

Electrodes shall as far as practicable, be embedded below permanent moisture level.

Some electrodes shall be housed in test pits with concrete covers for periodic testing of earth resistivity. Installation of rod/pipe/plate electrodes in test pits shall be convenient for inspection, tasting and watering.

7.7 Pipe Earth Electrodes

GI pipe shall be of medium Class-B 50 mm dia and 3.0 m length Galvanizing of the pipe shall confirm to relevant Indian Standards. GI Pipe electrodes shall be tapered at the bottom and provided with holes of 12 mm dia drilled not less than 7.5 cm from each other up to suitable length from bottom. The electrode shall be buried in the ground vertically with its top hot less 20 cm below ground level.

7.8 Plate Earth Electrode

For Plate electrode minimum dimension of the electrode shall be as under : GI plate electrode 60 cm x 60 cm x 6 mm thick Heavy duty cast iron/MS frame with cover shall be suitably embedded in the masonry.

Soil, salt and charcoal placed around the electrode shall be finely graded, free from stones and other harmful mixures. Backfill shall be placed in the layers of 250 mm thick uniformly spread and compacted. If excavated soil is found unsuitable for backfilling, the CONTRACTOR shall arrange for a suitable soil from outside.

7.9 Method of Connecting Earthing Lead to Earth Electrode

In the case of plate earth electrodes, the earthing lead shall be securely bolted to the plate with two bolts, nuts, check nuts and washers. In the case of pipe earth electrodes, they shall be connected by means of a through bolt, nuts and washers and cable socket.

All materials used for connecting the earth lead with electrodes shall be GI in case of GI pipe and GI plate earth electrodes The earthing lead shall be securely connected at the other end to the main board.

7.10 Lightning Protection System

Lightning protection of any installation shall be done in accordance with IS:2309:1989.

The lightning protection air termination and/or horizontal air termination conductors shall be fixed in such a way that they remain in their installed position even during severe weather conditions.

Air termination system shall be connected to earthing system by down conductors as shown in various drawings. The down conductors shall follow a direct path to earth. There shall not be any sharp bends, turns and kinks in the down conductors.

All metalic structures within 2 m vicinity of down conductors shall be bonded to the lightning protection system.

Every down conductor shall be provided with a test joint at about 100 mm above ground level. The test joint shall be directly connected to the earthing system/electrode.

The lightning protection system shall not be direct contact with underground metallic service ducts, cables, cable conduits and metal enclosures of electrical equipment.

The recommendation shape and minimum size of conductors for use above and below ground are given below and should be used unless otherwise indicated.

	Above ground	Below ground
GI Strip	20 x 3 mm	32 x 6 mm

Down conductors shall be provided for every 30 m of perimeter or one for first 100 sq. m plus ne more for every additional 300 sq.m or part thereof. Out of the two cases, smaller of two shall be applicable.

Joints as far as possible, should be avoided and wherever joints are necessary, they shall be mechanically and electrically effective. The joints may be clamped, screwed, bolted, riveted, sweated, braced or welded. No joints should be made below ground.

The lightning conductors shall be secured at not more than 2 m apart for horizontal run and 1.0 m for vertical run by fasteners resistive to corrosion. Earth down conductor shall have an independent earth termination. The interconnection of all the earth terminals shall be preferred. It should be capable of isolation for testing purpose by “Testing Joints”. The whole of lightning protective system should have combined resistance to earth not exceeding 10 ohm before any bonding has been affected to metal in or on a structure of surface below ground. In addition the resistance from the earth electrode to the nearest test clamps shall not exceed 0.2 ohm.

8.0 GENERAL INSTRUCTIONS ON ELECTRICAL PRE-COMMISSIONING ARRANGEMENT AND TESTS .

8.1 All tests shall be carried out by the Contractor using his own instruments , testing equipments as well as qualified testing personnel .

8.2 The result of all tests shall conform to the specification requirements as well as any specific performance data guaranteed during finalization of contract .

8.3 Cable termination and jointing.

Termination and jointing of alluminium conductor power cable shall be by means of compression method using compression type alluminium lugs . Copper conductor control cables shall be terminated directly into screwed type terminals provided in the equipment . Wherever control cables are to be terminated by means of terminal lugs , the same shall be of tinned copper compression type .

8.4 Testing and Commissioning of Electrical Equipment Installation

8.4.1 General

The testing and commissioning for all electrical equipment at site shall be according to the procedure laid down below .

All electrical equipments shall be tested , installed and commissioned in accordance with the latest relavant standards and codes of practice published by Indian Standard Institution whereever available and stipuylations and in relevant general specifications .

8.4.2 Polarity test of Switches

In a two wire installation a test shall be made to verify that all switches in every circuit have been fitted in the same conductor throughout and such conductor shall be labelled or marked for connection to the phase conductor or to the non earthed conductor of the supply .

A verification of polarity shall be made and shall be ensured that all fuses and single pole control devices are connected in the live conductor only and for socket outlets that the wiring is correctly connected .

8.4.3 Earth Electrode Resistance Test

The earth resistance of the earth electrode is to be measured by an earth testing 'Megger' provided with a direct reading Ohmmeter . Readings obtained in ohms shall not be more than 1 ohms .

If necessary , with the approval of Engineer –in-Charge additional electrode shall be provided away from the resistance and linked to the electrode system .

8.4.4 Insulation resistance test should be made before the installation is permanently connected to the Electric supply . The insulation resistance to be measured by using an approved portable hand operated insulation resistance tester reading directly in Ohms .

8.4.5 Earth continuity test

The earth continuity conductor should be tested for continuity to ensure that there is no breakage or loose connections in the system .

8.4.6 The installation with fittings complete shall before the current is switched on satisfactorily pass the following tests a)All lamps and appliances having been connected and all witches 'ON' a pressure of not less than twice the working pressure (subject to a limit of 500 V) shall be applied and insulation resistance of the whole or any part of installation to earth , must not be less than 50 Mega Ohms divided by the number of points .

b) With all lamps and appliance removed from the circuit and all switches 'ON' a similar test between poles shall satisfy the above requirement

c) Test to ensure that all single pole switches are on the live side of the apparatus they control .

d) Insulation test in accordance with Indian Electricity rules

e) Earth continuity and resistance test in accordance with IS specification and Indian Electricity rules

f) Load balancing test with tong tester .

8.4.6 **Test Certificates**

Type and routine test certificates for the factory build assembly of board / panels , flameproof enclosures and for all competent parts and other equipments eg. Switches , MCBs , fuses , conduits , lighting wires , light switches etc. shall be furnished

APPROVED LIST OF MATERIALS FOR ELECTRICAL WORKS			
Sl. No.	ITEMS		MAKERS / BRANDS
1	MCB Distribution Board with MCB Isolator / MCB / ELCB / RCCB/ RCBO	:	HAGER / HAVELS / LEGRAND
2	PVC INSULATED SINGLE CORE MULTISTRANDED FLEXIBLE COPPER CONDUCTOR 1100V GRADE FRLS	:	FINOLEX / POLYCAB / RR CABLE
3	PVC INSULATED TELEPHONE CABLES & WIRES (ARMOURED / UNMOURED)	:	DELTON / NETCO
4	UTP CABLE	:	D-LINK / AVAYA
5	CONDUIT	:	
	a) EI (MS) CONDUIT		BEC / SUPREM / KK A.K.G / PRECISION /

	b) PVC (RIGID) CONDUIT		SUPREME / AKG / PRECISION
6	6/16A SWITCH, SOCKET, BELL PUSH, TELEPHONE & TV SOCKET ETC. (MODULAR)	:	WIPRO FLAT SWITCH(PLATIA) /HAGER (Insysta)/ LEGRAND/ HAVELS
7	CEILING ROSE	:	ANCHOR / PRECISION / SSK
8	SINGLE PHASE MOTOR STARTER UNIT	:	NORTHWEST / ELECTRON DEVICE
9	LIGHTING FIXTURES (INDOOR)	:	PHILIPS / WIPRO / CORMPTON
10	LAMPS (CF & FL.TUBE)	:	PHILIPS / OSRAM / BAJAJ
11	CEILING FAN / WALL BRACKET FAN	:	CROMPTON / POLAR /HAVELS
12	EXHAUST FAN	:	CALCUTTE / EPC / CROMPTON / POLAR / HAVELS
13	CURRENT TRANSFORMER	:	KPPA / A.E.
14	INCATING METERS (AMMETER/VOLTMETER/FREQUENCY METER ETC. (ANALOG TYPE)	:	A.E / IMP
15	SELECTOR SWITCH (AMMETER / VOLTMETER)	:	KAYCEE / HPL / VAISHNO
16	INCATING LAMP	:	VAISHNO / BINAY
17	MCCB (MP THERMAL I MAGNATE RELEASE)	:	L&T / SIEMENS / HAGER
18	SWITCH DISCONNECTOR FUSE (HRC) UNIT (OPEN & SS ENCLOSURE UNIT)	:	L&T / ABB / SIEMENS
19	ON – LOAD CHANGE OVER SWITCH (OPEN & SS ENCLOSURE UNIT)	:	L&T / ABB / LEGRAND

20	XIPE – ARMOURED AL CABLE	:	NICCO / GLOSTER
21	MCB CHANGE OVER ISOLATO(CENTRE OFF)	:	ABB / HAVELLS / LEGRAND
22	METAL CLADED POWER PLUG & SOCKET (FLUSH TYPE)	:	LEGRAND / SIEMENS

Note: 1) Architects reserves the right to insist contractor for use of any specific brand / make etc.

2) In case any materials are not available from the above brands, Architect will suggest names of other brands / manufacturers and contractor will have to abide by the same.

Date: Signature of Contractor with Seal

Drawings & Master Plan